ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Concorde Industrial Estate, Naas Road, Dublin 12

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In Association with:
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Chapter 1:

Introduction and Methodology

1.0 INTRODUCTION AND METHODOLOGY

1.1 INTRODUCTION AND TERMS OF REFERENCE

John Spain Associates, Planning & Development Consultants, have been commissioned by Development Ocht Ltd. to prepare an Environmental Impact Assessment Report (EIAR) for a proposed strategic housing development of 491 no. unit "Build to Rent" residential development with commercial uses comprising of a shop, restaurant, café, creche, medical centre at Concorde Industrial Estate, Naas Road, Dublin 12.

The application site comprises of a former car dealership and a range of other commercial uses such as car repair, and gym in the Concorde Industrial Estate. The site is located to the south of the Naas Road and is located in a mixed use area comprising of a range of commercial and residential uses.

The proposal seeks to redevelop the subject site for a mixed use "build to rent" residential and commercial development. The proposed development will comprise of 492 no. residential units and a range of commercial uses, public open space, communal open space, surface and basement car parking and the provision of new pedestrian and cycle linkages.

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 Environmental Impact Assessment Report (EIAR); which is then submitted to the competent/ consent authority, in order to inform the subsequent decision as to whether the development should be permitted to proceed.

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

This EIAR document has been prepared in accordance with the European Union EIA Directive 85/337/EC as amended by 97/11/EC, 2003/4/EC, 2011/92/EU and Directive 2014/52/EU.

The EIAR has also been prepared in accordance with the Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (published in August 2018) and the 2017 Draft EIA Guidelines published by the EPA.

1.2 DEFINITION OF EIA AND EIAR

Directive 2014/52/EU defines '*environmental impact assessment'* as a process, which includes the responsibility of the developer to prepare an Environmental Impact Assessment Report (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) 4 of Directive 2014/52/EU states that "environmental impact assessment" means a process consisting of:

(i) the preparation of an environmental impact assessment report by the developer, as referred to in Article 5(1) and (2);
(ii) the carrying out of consultations as referred to in Article 6 and, where relevant, Article 7;
(iii) the examination by the competent authority of the information presented in the environmental impact assessment report and any supplementary information provided, where necessary, by the developer in accordance with Article 5(3), and any relevant information received through the consultations under Articles 6 and 7;

(iv) the reasoned conclusion by the competent authority on the significant effects of the project on the environment, taking into account the results of the examination referred to in point (iii) and, where appropriate, its own supplementary examination; and
(v) the integration of the competent authority's reasoned conclusion into any of the decisions referred to in Article 8a.

The amended Directive (Directive 2014/52/EU) uses the term environmental impact assessment report (EIAR) rather than environmental impact statement (EIS).

A definition of Environmental Impact Assessment Report (EIAR) has not been included in the revised 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 or not to grant consent. Where significant and likely environmental effects are identified that are unacceptable; 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 document 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.

1.3 EIA LEGISLATION

Certain public and private projects that are likely to have significant effects on the environment are subject to EIA requirements derived from EIA Directive 85/337/EC (as amended by Council Directive 97/11/EC, Directive 2003/4/EC, Directive 2009/31/EC, Directive 2011/92/EU and recently Directive 2014/52/EU which amends EIA law in a number of respects by amending Directive 2011/92/EU) which are designed 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.

Article 2 of Directive 2014/52/EU provides that Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with the Directive by 16 May 2017.

The Department of Housing, Planning, Community and Local Government has brought forward the Planning and Development Regulations 2001-2018 to provide for the transposition of the Directive into the Irish planning

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

code. To this effect, the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 have now transposed the 2014 Directive into Irish law.

The Department has also provided an updated to the 2013 "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 Directive 2014/52/EU.

These new Guidelines – 'Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment' were published in August 2018. These Guidelines have informed the preparation of this EIAR.

As referenced above, the 2017 Draft Guidelines prepared by the EPA have also informed this EIAR.

1.4 EIA GUIDELINES

EIA practice has evolved substantially since the introduction of the EIA Directive in 1985. Practice continues to evolve and takes 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
• 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 (in addition to Directives referenced above)
• 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 August 2018 EIA Guidelines for Planning Authorities and the Board.

The 2017 EPA draft guidelines have been prepared to help practitioners interpret the amended EIA Directive and in advance of new regulations transposing Directive 2014/52/EU 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.

1.5 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.

Annex I of the EIA Directive 85/337/EC requires as mandatory the preparation of an EIA for all development projects listed therein.

Schedule 5 (Part 1) of the Planning & Development Regulations 2001 (as amended) transposes Annex 1 of the EIA Directive directly into Irish land use planning legislation. The 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 & Development Regulations 2001 (as amended) set 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.

The proposed Strategic Housing Development comprises of *inter alia* the demolition of an existing house and the construction of 492 no. residential units, commercial uses and all other ancillary infrastructure such as open space, car parking and new vehicular and cycle links.

The proposed development therefore falls below the thresholds set out above for mandatory Environmental Impact Assessment. Notwithstanding this, an EIAR has been prepared to accompany the subject strategic housing development application to An Bord Pleanála, having regard to the specific characteristics and features of this site, its size, and the quantum of development proposed.

In relation to Screening, EIA Directive 2014/52/EU 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.

1.6 SCOPING

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

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

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 Environmental Impact Assessment process was carried out by the applicant, design team and EIAR consultants and informed the format of this EIAR.

As set out within the 2018 EIA Guidelines published by the Department of Housing, Planning and Local Government, Section 7 of the Planning and Development (Housing) and Residential Tenancies Act 2016 and Planning and Development (Strategic Housing Development) Regulations 2017 allow for a prospective applicant to make a request to An Bord Pleanála for an EIA scoping opinion in regard to a proposed Strategic Housing Development (SHD). Such requests are discretionary.

The EIAR prepared for the scheme has endeavoured to be as thorough as possible and therefore the provisions included in the revised EIA Directive and all of the issues listed in Schedule 6, Sections 1, 2 and 3 of the Planning and Development Regulations 2001-2018 and in recent guidance documents have been addressed in the EIAR.

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,
- Archaeology and Cultural Heritage,
- Biodiversity,
- Landscape and Visual Impact,
- Land and Soils,
- Water,
- Air Quality and Climate,
- Noise and Vibration,
- Material Assets,
- Interactions of the Foregoing,
- Principle Mitigation and Monitoring Measures,
- Non-Technical Summary.

In addition to the above a series of standalone reports have been prepared to accompany the application and which have helped inform the above chapters of the EIAR where relevant. Barrett Mahony Consulting Engineers have prepared a Traffic and Transport Assessment Report. Barrett Mahony have prepared a Site Specific Flood Risk Assessment for the site; and BM with input from Reddy Architects, Stephen Diamond Landscape and Environmental Consultants and the Applicant have also produced a Construction Management Plan. AWN Consulting have produced a Construction and Operational Waste Management Plan. In addition, Modelwotks have prepared a Visual Impact Assessment, IAC have prepared a Desktop Archaeology Report and Openfield

[2] Guidance on EIA Scoping, EC, 2001

have prepared an AA Screening Report. A SEVESO site safety report has also been prepared by AWN Consulting.

It is necessary to examine each of the aforementioned sections of the EIAR with respect to the impacts that the proposed development may have on the environment. The purpose of this 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:

- 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
- 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 and Development Act, 2000, as amended, and Part 10 of the Planning & Development Regulations, 2001-2017;
- The requirements of the Dublin City Development Plan 2016-2022;
- Regional and National Planning Policy Documents;
- 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; and,
- Available methods of reducing or eliminating undesirable impacts.

A series of meetings have taken place with the technical staff of Dublin City Council and a consultation meeting has taken place between the Applicant, the Planning Authority and An Bord Pleanala under the strategic housing development (SHD) process which assisted in the preparation of this EIAR and planning application.

The content of this Environmental Impact Assessment Report has been prepared in accordance with the provisions of Article 5(1) and Annex IV of Directive 2014/52/EU. 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;
(a) (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;
(b) (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;
(c) (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."

1.7 PURPOSE OF THE EIAR

The objective of the EIAR is to identify and predict the likely 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 EPA guidelines, the EIAR focuses on:

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

The objective of the EIAR will be to identify and predict the likely 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.

The definition of Environmental Impact Assessment is clarified within the 2014 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."*

Under Article 5(3) of the 2014 Directive, it is expressly required that the developer must ensure that the environmental impact assessment report (EIAR) is prepared by competent experts. Each of the chapters of this EIAR for the subject development have been prepared by experts with the requisite qualifications and competences.

The intention of this EAR 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 Pleanala, statutory consultees and the public in assessing all aspects of the application proposals.

1.8 OBJECTIVES OF THIS EIAR

The EPA guidelines 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 development on the various factors listed under Section 171A of the Planning and Development Act 2000, as amended.

The amended 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 Directive 92/43/EEC and Directive 2009/147/EC;
(c) land, soil, water, air and climate;
(d) material assets, cultural heritage and the landscape;
(e) the interaction between the factors referred to in points (a) to (d).

This EIAR documents the assessment process of the prescribed environmental factors in relation to the proposed SHD residential development at Concorde Industrial Estate.

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

- Pursuing Preventative Action;
- Maintaining Environmental Focus and Scope;
- Informing the Decision; and

- Public & Stakeholder Participation

1.8.1 Pursuing Preventative Action

Pursuing preventative action is the most effective means by which potential negative environmental impacts can be avoided. An assessment 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 amended 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.

1.8.2 Maintain Environmental Scope and Focus

It is important that the EIAR document remains tightly focussed. This minimises expenses, 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 documentation and analysis are confined to those topics and issues which are explicitly described 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 project or development under consideration and remain focused on issues that:

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

1.8.3 Informing the Decision

The EIAR document enables the competent/consent authorities 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.

1.8.4 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.

Public participation and consultation is an integral part of the new Strategic Housing Development process as outlined in the Planning and Development (Housing) and Residential Tenancies Act 2016 and the Planning and Development (Strategic Housing Development) Regulations 2017.

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

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

1.9 FORMAT AND STRUCTURE OF THIS EIAR

The preparation of an EIAR document 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 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 document is set out in Table 1.2 below.

TABLE 1.2: STRUCTURE OF THIS EIAR

Chapter	Title	Content
1	Introduction and Methodology	Sets out the purpose, methodology and scope of the document.
2	Project Description and Alternatives Examined	Sets out the description of the site, design and scale of development, considers all relevant phases from construction through to existence and operation together with a description and evaluation of the reasonable alternatives studied by the developer 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.
4	Archaeology 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.
5	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.
6	Landscape & Visual Impact	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.
7	Land and Soils	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.
8	Water	Provides an overview of the baseline position, the potential impact of the proposed development on water quality and quantity and recommends mitigation measures.

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

TABLE 1.2: STRUCTURE OF THIS EIAR

Chapter	Title	Content
9	Air Quality and Climate	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 recommends mitigation measures.
10	Noise and Vibration	Provides an overview of the baseline noise environment, the potential impact of the proposed development and recommends mitigation measures.
11	Material Assets – Traffic and Transport and Utilities	Describes the existing services and infrastructural service requirements of the proposed development and the likely impact of the proposed development on material assets.
12	Material Assets – Waste	Describes the existing services and infrastructural service requirements of the proposed development and the likely impact of the proposed development on material assets.
13	Interactions of the Foregoing	Describes the potential interactions and interrelationships between the various environmental factors
14	Risk	Describes the risk associated with the development through construction and operation and the management of these risks
13	Summary of Mitigation and Monitoring Measures	Sets out the key mitigation and monitoring measures included in the EIAR Document for ease of reference.

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. An outline of the methodology employed consistently in each chapter to examine each environmental topic is provided below:

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.
- **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 proposed 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 and indication of any difficulties encounters by the environmental specialist in compiling the required information.

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 Regulations.

The amended EIA Directive (Directive 2014/52/EU) 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 of the amended directive 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 1.4 below.

TABLE 1.4: EIAR SPECIALIST CONSULTANTS

Organisation	EIAR Specialist Topics / Inputs
John Spain Associates, Planning & Development Consultants, 39 Fitzwilliam Place, Dublin 2, D02 ND61 T: 01 662 5803 E:mmacmahon@johnspainassociates.com Mary MacMahon MSc TCP Pg Dip MSP Pg Dip Env Eng Dip Env Plg Law Dip Mgmt Dip EIA & SEA B Soc Sc MIPI	• Introduction and Methodology • Project Description and Alternatives Examined • Population and Human Health • Material Assets • Interactions of the Foregoing • Principle Mitigation and Monitoring Measures • Non-Technical Summary
Reddy Architecture and Urbanism Dartry Mills, Dartry Road, Dartry, Dublin 6, D06 Y0E3 T: 01 498 7000 E: kkapetangiannis@reddyarchitecture.com	• Project Description and Alternatives Examined • Material Assets

TABLE 1.4: EIAR SPECIALIST CONSULTANTS

Organisation	EIAR Specialist Topics / Inputs
Kosta Kapetangiannis- DIP. ARCH., B.ARCH.	
Barrett Mahony Consulting Engineers Sandwith House, 52-54 Sandwith Street Lower, Dublin 2, D02 WR26 T: 01 677 3200 E: jconsidine@bmce.ie John Considine (B Eng MIEI MIStruct E C Eng FConsEI IEI Mem No. 022256)	• Land and Soils • Water • Material Assets • Traffic and Transport Assessment and MMP (included as separate standalone reports) • Site Specific Flood Risk Assessment • Construction and Environmental Management Plan (included as a separate standalone report)
Openfield Ecological Services 12 Maple Avenue, Carpenterstown, Dublin 15, D15 YX7V T: 01 823 6145 E: padraic@openfield.ie Padraic Fogarty – MSc Ecological Impact Assessment (EcIA) MIEMA	• Biodiversity • Appropriate Assessment Screening Report (included as separate standalone document)
AWN Consulting The Tecpro Building Clonshaugh Business and Technology Park Dublin 17 T: 01 847 4220 E: Ciara Nolan MSc Environmental Science BSc Energy Systems Engineering Member of Institute of Air Quality Management and Institution of Environmental Science. Damian Kelly BSc Msc Institution of Acoustics	• Air Quality and Climate • Noise and Vibration • Construction and Operational Waste and Environmental Management Plan (included as separate standalone document)
IAC Archaeology, Unit G1, Kilcoole Road, Network Enterprise Park, Co. Wicklow T: 01 201 8380 E: FBailey@iac.ie	• Archaeology and Cultural Heritage

TABLE 1.4: EIAR SPECIALIST CONSULTANTS	
Organisation	**EIAR Specialist Topics / Inputs**
Faith Bailey – MA, Cultural Landscape Management (Archaeology & Built Heritage), University of Wales, Lampeter (2003) BA (Hons) Archaeology, University of Wales, Lampeter (2001) Member of the Chartered Institute of Field Archaeologists Member of the Institute of Archaeologists of Ireland Licence eligible archaeologist	
Modelworks The Old Courtyard NewtownPark Avenue Blackrock, Co. Dublin E: rbutler@modelworks.ie T: 01- 289 9039 Richard Butler - BLArch MSc MILI MIPI	• Landscape and Visual Impact and Photomontages

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 EPA guidelines note that the non-technical summary of the EIAR should facilitate the dissemination of the information contained in the EIAR and that the core objective is to ensure that the public is made as fully aware as possible of the likely environmental impacts of projects prior to a decision being made by the Competent Authority.

The 2018 EIA Guidelines prepared by the DHPLG 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.

1.12 LINKS BETWEEN EIA AND APPROPRIATE ASSESSMENT (AA)

Article 6(3) of the Habitats Directive (92/43/EEC) states 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 Appropriate Assessment procedure of its likely implications for the site in view of the site's conservation objectives.

In January 2010, the Department 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 **Appropriate Assessment Stage 1 Screening** exercise was undertaken by Brady Shipman Martin 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 Appropriate Assessment may be a separate document or form part of the EIAR. In the case of the proposed development a separate Appropriate Assessment Screening Report 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 Pleanála and Dublin City Council (Planning Authority) at a fee not exceeding the reasonable cost of reproducing the document. It can also be viewed on the SHD website set up by the applicant www.concordeshdnaasroad.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 exceptional difficulties were experienced in compiling the necessary information for the proposed development. Where any specific difficulties were encountered these are outlined in the relevant chapter of the EIAR.

1.16 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.

The DHPLG have recently published draft guidelines on Environmental Impact Assessment for Planning Authorities and the Board (published August 2018)[4], and the EPA have published draft guidelines on the information to be contained in an Environmental Impact Assessment Report[5] which have been consulted in the preparation of this EIAR.

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.

[4] *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment, 2018*
[5] *Guidelines on the Information to be contained in an Environmental Impact Assessment Report, Environmental Protection Agency, 2017*

Chapter 2:

Project Description & Alternatives Examined

2.0 PROJECT DESCRIPTION AND ALTERNATIVES EXAMINED

2.1 INTRODUCTION AND TERMS OF REFERENCE

This section of the EIAR has been prepared by John Spain Associates, Planning & Development Consultants, and provides a description of the proposed development and also explains the evolution of the scheme design through the reasonable alternatives examined. This chapter of the EIAR was prepared by Mary MacMahon MSc TCP Pg Dip MSP Pg Dip Env Eng Dip Env Plg Law Dip Mgmt Dip EIA & SEA B Soc Sc MIPI, Executive Director. 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). It is also a requirement of the EIA Directive (as amended) to present an outline of the main alternatives considered and a justification of the final proposed development.

A systematic approach in accordance with the Draft Guidelines on the Information to be Contained in EIARs (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 and 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 document 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.

2.2 SITE LOCATION AND DESCRIPTION

The subject site is c. 1.8 hectares and is located on the southern side of the Naas Road, Dublin 12. The site is a brownfield site formerly used as a car sales showroom.

The site is well served by public transport including the Luas Red Line and Dublin Bus.

The existing building on site comprise of former industrial type units which comprise of the majority of the site. The site is entirely covered by buildings and hard standing with a single tree line to the rear of the site adjoining lands to the south.

A number of services adjoin and intersect the site including a 38KV Pylon which runs through the south eastern corner of the site, a 110KV Pylon which adjoins the site to the west and a trunk sewer pipe which runs along the northern and eastern boundary of the site.

The site is bound to the north by the Naas Road, and the Luas Line, to the south by greenfield lands and a hard standing car park, to the east by industrial / warehouse buildings and a residential development under construction and to the west by a electrical pylon and an industrial building.

The subject site is located in an emerging area for high density residential and commercial development with high quality public transport services. The location of the subject site is identified for re-generation as set out in the Naas Road LAP and has the potential to provide for significant residential and commercial development in this part of the city.

Figure 2.1: Subject Site and Surroundings (Approximate Extent in Red)

2.3 PROJECT OVERVIEW

The proposed development comprises of the demolition of the existing single storey industrial building (8,660 sq.m.) on the site and the construction of a "Build to Rent" Residential and commercial development on lands at Concorde Industrial Estate (1.88ha), Naas Road, Dublin 12.

The proposed development comprises of 492 no. residential units comprising of 104 no. studios, 136 no. 1 beds and 252 no. 2 beds. The proposed development includes the provision of communal residential facilities such as concierge, resident lounge, shared winter gardens, shared work space, meeting rooms, events spaces and external residential courtyards and all associated resident support facilities to accompany the "Build to Rent" development.

The development also includes the provision of 3,347 sq.m. commercial uses comprising of retail, café, restaurant, medical centre, car showroom, and creche. The proposed development also accommodates 200 no. car parking spaces at basement level and 43 no. at surface level, 276 no. cycle parking spaces at basement level and 236 no. cycle spaces at surface level with a further 60 no. surface level visitor spaces, plant rooms,

refuse storage, public open space, landscaping, SUDS drainage, and all associated site development works necessary to facilitate the development.

The description of the proposed development, as set out in the public notices is as follows:

"Development Ocht Ltd. intend to apply for planning permission for a mixed use development comprising of a "Build to Rent" Residential Development and commercial units on lands (1.88 ha) at the Former Concorde Industrial Estate, Naas Road, Walkinstown, Dublin 12.
The proposed development comprises of the following:

- *Demolition of the existing 5,810 sq.m. 2 no. storey industrial units and associated structures on the site;*
- *Construction of a mixed use development comprising of 2 no. main structures comprising of Blocks A-E in one structure and Block F as a stand along structure.*
- *Provision of 492 residential units (104 no. studios, 136 no. 1 bed units and 252 no. 2 bed units), ranging in height from 4 no. storeys (12m) to 8 no. storeys (24.1m) over basement level;*
- *Provision of 3,347 sq.m. commercial use including 7 no. commercial units at ground floor comprising of a car showroom (350 sq.m.), shop (146 sq.m.), shop/ convenience store (437 sq.m.), and 4 no. café/ restaurants ranging in size from 48 sq.m. to 177 sq.m.) and 3 no. commercial units at first floor level comprising of a medical centre (517 sq.m.) and 2 no. shared office spaces (566 sq.m. and 150 sq.m. respectively) and creche unit at ground and first floor (382 sq.m.) and associates outdoor play space;*
- *Provision of 238 no. car parking spaces (200 no. at basement level to serve the residential development and 38 at surface level to serve the commercial development) including the provision of 10 no. car club spaces, 516 no. cycle parking spaces (276 no. basement level and 236 no. within the residential courtyard areas) including 24 no. cycle parking spaces located at surface level to serve the commercial units.*
- *The proposed development will also include the provision of communal open space including courtyard areas, roof terraces, the provision of resident support facilities including reception / concierge, and waste management facilities, and the provision of resident services and amenities including, internal common areas, shared work space, games room, and multi-function event spaces*
- *The proposed development will provide balconies and/ or terraces on the south, east and west elevations, revised boundary treatments and landscaping including 2,901 sq.m. public open space, children's play area, and provision of pedestrian and cycle linkages through the site and along all site boundaries, upgrades to the public realm, provision of green roof, ESB sub-station, SUDS drainage, and all ancillary site development works necessary to facilitate the development.*

An Environmental Impact Statement has been prepared in respect of the proposed development.

The proposed residential development is a "Build to Rent" scheme in accordance with Specific Planning Policy 7 and 8 as set out in the "Sustainable Urban House: Design Standards for New Apartments 2018".

The application contains a statement setting out how the proposal will be consistent with the objectives of the Dublin City Council Development Plan 2016-2022 and the Naas Road Local Area Plan 2013.

The application together with an Environmental Impact Statement may be inspected, or purchased at a fee not exceeding the reasonable cost of making a copy, during public opening hours at the offices of An Bord Pleanála and Dublin City Council. The application may also be inspected online at the following website set up by the applicant: www.concordeshdnaasroad.ie"

The application is accompanied by a Design Statement and drawings prepared by Reddy Architects, which provide a rationale for the design and layout of the proposed scheme, the dwelling types and commercial units. Also included as part of this application is a Landscape Design Report which was prepared by Stephen Diamond Landscape Architects, and which provides a rationale for the landscape proposals within the development including proposals relating to green links and pedestrian movement through the site. The landscape design response to the site has been calculated so as to provide a large quantity of high quality amenity space for residents of the area.

2.4 STATUTORY PLANNING CONTEXT

The subject lands are subject to national, regional, sub-regional, county and local planning policy. The following outlines the key planning documents of relevance to the future development of the subject lands. This section will not address the detailed policies and objectives contained in the various plans which are relevant to the proposed residential and commercial development at Concorde Industrial Estate, as these are addressed in a separately bound Planning Report and Statement of Consistency prepared by John Spain Associates which accompanies the planning application.

National

- National Planning Framework - Project Ireland 2040;
- 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;
- Quality Housing for Sustainable Communities (2007);
- Sustainable Urban Housing: Design Standards for New Apartments (2018)
- Design Manual for Urban Roads and Streets (2013);
- 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).

Regional

- Eastern and Midland Regional Assembly - Regional Spatial & Economic Strategy (RSES): Draft October 2018
- Regional Planning Guidelines for the Greater Dublin Area (2010 – 2022);

Local

- Dublin City Development Plan 2016-2022.
- Naas Road Local Area Plan 2012

The Dublin City Development Plan 2016-2022 sets out the planning policy context for future development in city up to 2022. It details land use and development objectives, settlement hierarchy, development control standards and policies and objectives for the protection of the built and natural environment of the City. It is the most relevant document pertaining to the future development of the subject lands, together with the Nass Road Local Area Plan 2012.

The site is zoned Z14 with the objective *"to seek the social, economic and physical development and/or rejuvenation of an area with mixed use of which residential and "Z6" would be the predominant uses".*

2.5 ALTERNATIVES EXAMINED

2.5.1 INTRODUCTION

The EIA Directive (2014/52/EU) requires that Environmental Impact Assessment Reports 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 Regulations, alternatives may be described at three levels:

- Alternative Locations.
- Alternative Designs.
- Alternative Processes.

The DHPLG 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. A 'mini- EIA' is not required for each alternative studied."

Pursuant to Section 3.4.1 of the Draft 2017 EPA Guidelines, 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 2017 EPA Guidelines 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'".

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 need to achieve a density exceeding 50 units per hectare to comply with the requirements of the guidelines for Sustainable Residential Development in Urban Areas and the policies of the Dublin City Development Plan, given the location of the subject site adjacent to a Luas stop.
- The need to consider the interaction of the development with the surrounding key development sites and specific requirements of the Naas Road Local Area Plan.
- The need to ensure any residential development provides an appropriate mix of housing types which meet current market demand and which are deliverable in the short to medium term.
- The need to ensure that an appropriate quantum of commercial use was provided in accordance with the land use objectives on the site.
- The need to provide for high quality open space.
- The need to consider the interaction of the access arrangements for the development with the Luas line adjacent to the site.
- Provision of landscape buffering between the development and the roadway to the north of the site.
- 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.

The following analyses alternative development options for the site, describing design options and changes which were incorporated into the scheme as the proposals progressed through extensive and detailed pre-application discussions with the Planning Authority. The key considerations and amendments to the design of the scheme, having regard to and comparing the key environmental issues, are set out and discussed.

The subject scheme is for the construction of residential units and commercial uses with associated open space and road and service infrastructure, on brown field lands which are zoned for mixed use development. Having regard to the above it was not considered necessary to consider alternative sites for the proposed development.

A 'do-nothing' scenario was considered to represent an inappropriate, unsustainable and inefficient use of these strategically located zoned lands; particularly having regard to the opportunity to provide much needed housing for both Dublin City and the wider Greater Dublin Area (GDA). The suitability of the lands for development, i.e. located within an established development area of the City and adjacent to high frequency public transport and good quality road infrastructure, were also key considerations.

2.5.2 Description of Alternative Locations

As outlined above, the subject site is primarily zoned for residential and commercial use under the City Development Plan 2016-2022. As such consideration of alternative sites for the construction of residential and commercial use proposed in this proposal was not considered necessary. The project is site specific.

During the design process for the proposed development several iterations of the site layout and alternative designs were considered. The final planning application demonstrates that the subject site and the surrounding area have the environmental capacity to accommodate the proposed development without any significant risk of impact upon environmental sensitivities due to the sites location.

2.5.3 Description of Alternative Designs

This section provides an overview of how the proposed development has evolved to date by way of consideration of alternative designs and how the final Strategic Housing Development scheme before the Board has been reached. Various options were considered as the scheme progressed and key considerations and amendments to the design were incorporated, having regard to the key environmental issues pertaining to the lands.

The environmental issues which have most informed the design process to date relate to visual impact, ecology, water, noise, and the potential impacts upon existing and future traffic and transport in the area. These issues have informed the consideration of alternative designs, layouts, and access arrangements up to the formalisation of the scheme submitted in this final application to the Board.

Alternative 1: Early Design Iterations June 2018

Early design iterations for the subject scheme considered variations of the heights, layout, and breakdown of the land use mix on the site. However, due to the location of the site fronting the Naas Road, the form of the development was set from an early stage to create a new strong urban edge to the Naas Road. Initial design sketches were presented to Dublin City Council on 18th June 2018.

These iterations provided for lower proportions of commercial space, lack of detail on communal and public open space and little interaction and consideration of the surrounding key sites.

These earlier design iterations also did not provide for the linkages now proposed with the adjoining residential development to the South East, Carriglea, or extensive pedestrian and cycle link to the wider network in the area.

Figure 2.2: Scheme as Presented at DCC s. 247 Pre Application Meeting 1 - June 2018

Alternative 2: Scheme as Presented at DCC s.247 Pre-Application Meeting 1

The scheme presented at the second formal pre-application meeting with the Planning Authority on the 27th August 2018 incorporated a wide range of amendments and refinements to the previous stages of the development design, with an enhancement in the landscape treatment and open space provision in the scheme, improvements in the level and mix of the commercial space provided and the layout of the proposed development as it relates to the site boundaries and surrounding sites.

The main improvements to the scheme related to the provision of green linkages to protect and enhance biodiversity of the site.

The introduction of a separated residential block was also introduced at this stage to the south eastern corner of the site. The inclusion of the separated block at this location was a result of the existing underground services. The proposed separation distances enabled the development to keep outside the recommended distances as set by Irish Water as to not disturb the water infrastructure beneath. This revised design resulted in the protection of the existing water supply and reduced the environmental impact of the development on water, biodiversity and human health.

Figure 2.3: Proposed development, formal Planning Authority pre-application meeting 2 ground floor level

Figure 2.4: Proposed development, formal Planning Authority pre-application meeting 2 first floor level

Alternative 3: Scheme as Presented at DCC s.247 Pre-Application Meeting 3 – 10th October 2018

The scheme as presented at pre-application meeting no. 3 with the Planning Authority incorporated a series of changes and updates following comments made by the Authority after pre-application meeting 2. The key changes made in advance of pre-application meeting no. 3 can be summarised as follows:

- Justification of design of the north elevation including the provision of dual aspect units
- Increase in the quantum of commercial floor area at ground and first floor level
- Increase in the quantum of public open space and communal spaces
- Increase in the level of the landscape detail provided.
- Provision of internal communal spaces and uses

Figure 2.5: Site layout plan as presented at pre-application meeting no. 3

Alternative 4: Scheme submitted for pre-application consultation with ABP

The scheme which was submitted for pre-application consultation with the Board was the product of an iterative process of design amendments and improvements resulting from the pre-application process up to submission of the pre-application documentation and pre-application request. This process was guided by the need to manage the impact of the proposed scheme on the environment.

The amendments to the scheme which had been incorporated to that point reflect the findings of investigations and surveys undertaken by the EIAR team for the proposed development.

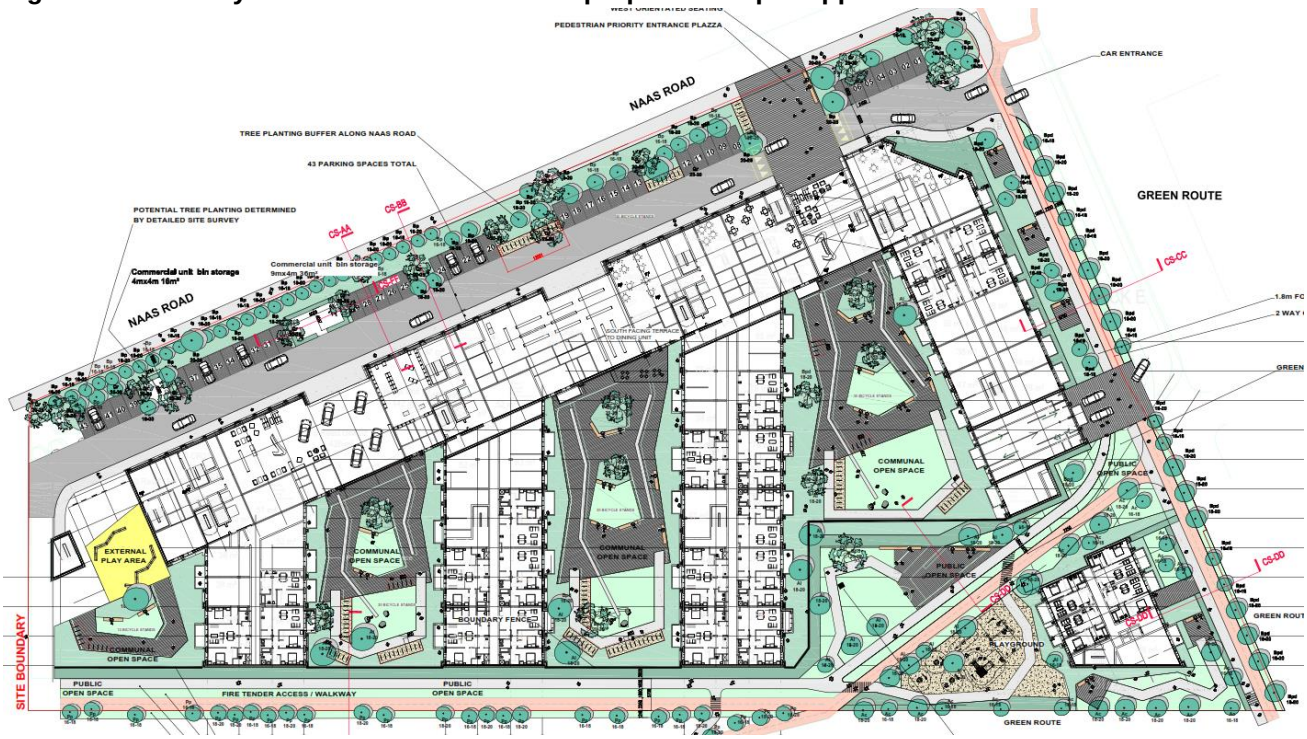
The information feeding into the design process from these EIAR consultants was invaluable in progressing a scheme which is considered to respond well to the existing environment in which it is to be introduced, and to the features and environmental characteristics of the subject site and its surrounding area.

The scheme as presented to ABP addresses the following concerns raised in the last pre application meeting

with Dublin City Council.

- Increase in the percentage area of the commercial floor area
- Reconfiguration of internal communal space for residents
- Relocation of bin store area to the north of the site
- Increased level of detail on the quantum and provisions of the communal and public open space area
- Increased detail on the boundary treatments on the site
- Breakdown of residential service facilities and amenity areas
- Increase in dual aspect ratios
- Revised design to the north facing units
- Details of the proposed materials refined in response to the overall context of the development

Figure 2.6: Site Layout Plan of the scheme as proposed for pre-application consultation with ABP



Final Overall Proposed Development Scheme

An Bord Pleanála's Opinion in respect of the proposed development (as submitted to the Board for pre-application consultation) was issued on the 22nd March 2018.

The Board's Opinion provided the view that there were some minor issues which required to be addressed prior to the submission of a final Strategic Housing Development planning application, in order for the proposals to constitute a reasonable basis for an application. In summary, these issues, in summary, were as follows:

- Further consideration / amendment of the documentation as it relates to the interface between the proposed development and the Naas Road.
- Further consideration and amendment of the documentation as it relates to the pedestrian and cycle routes in the proposed development.

Detailed responses to each of these items have been provided as part of the final application pack, and the scheme has been updated and improved where necessary as a result.

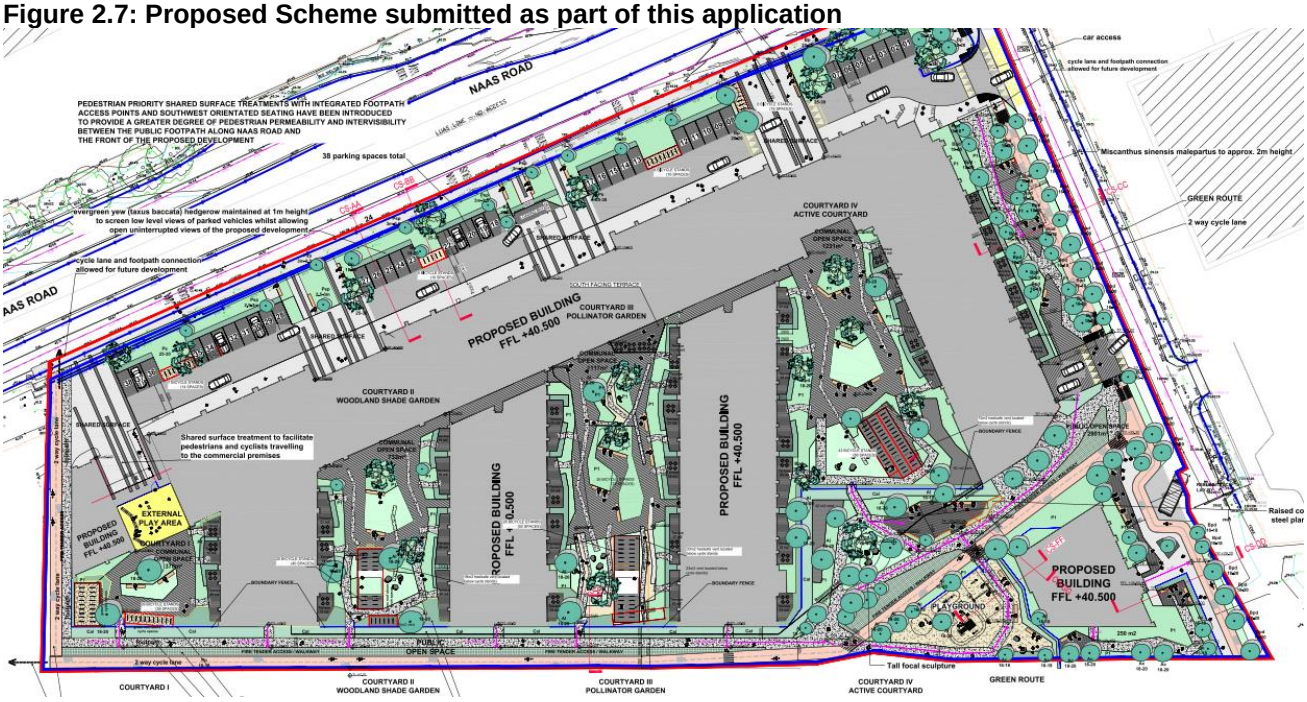
The landscape proposal for the scheme has been revised to directly address the Naas Road. The proposed development provides for increased pedestrian openings to enable a more easily accessible pedestrian movement within the scheme. The revised landscape treatment also enables direct visual links to be obtained from the Luas into the subject site, highlighting the provision of commercial space at ground and first floor level.

The internal pedestrian arrangements have been updated and improved, with associated upgrades, linkages and improvements to surrounding pedestrian and cycle infrastructure now provided for within the red line of the proposed application site, following receipt of a letter of consent for these upgrade and tie-in works from Dublin City Council. The proposed cycle and pedestrian links also enable future development of the key surrounding sites to connect into the proposed development to form a high quality green network in the area.

The inclusion of the separated block at the south eastern corner of the site was a result of the existing underground services. The proposed separation distances enabled the development to keep outside the recommended distances as set by Irish Water as to not disturb the water infrastructure beneath. This revised design resulted in the protection of the existing water supply and reduced the environmental impact of the development on water, biodiversity and human health.

In summary, the design of the proposed development takes into account all environmental issues raised with respect to previous design alternatives and within the Board's Opinion, and provides for a development that has been optimised to amplify positive environmental effects whilst reducing negative environmental impacts wherever possible.

Figure 2.7: Proposed Scheme submitted as part of this application



2.5.4 Description of Alternative Processes

The EIA Guidelines state that within each design solution there can be a number of different options as to how the processes or activities of the development can be carried out. These can include management of emissions, residues, traffic and the use of natural resources.

A key consideration in the various options which were considered, as discussed above, was the uses proposed within the development and the appropriate proportion of these uses within the site. A key consideration of this was the location of the site in the proximity to SEVESO sites which would result in impact on human health. An assessment of the land use planning for the site was carried out to ensure that the proposed uses would not be impacted in an unlikely hazardous event.

It was concluded that the proposed development is outside the zones of influence and therefore the uses proposed are appropriate.

Another key consideration within the development was the presence of a number of underground and overhead services which would result in impacts on the water supply to the area. The design and massing of the development was based on the presence of wayleaves and KV lines which provided some constraints in terms of site layout.

The alternative processes are further considered in each Chapter of the EIAR.

2.6 CHARACTERISTICS OF THE PROJECT

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

"Development Ocht Ltd. intend to apply for planning permission for a mixed use development comprising of a "Build to Rent" Residential Development and commercial units on lands (1.88 ha) at the Former Concorde Industrial Estate, Naas Road, Walkinstown, Dublin 12.
The proposed development comprises of the following:

- *Demolition of the existing 5,810 sq.m. 2 no. storey industrial units and associated structures on the site;*
- *Construction of a mixed use development comprising of 2 no. main structures comprising of Blocks A-E in one structure and Block F as a stand along structure.*
- *Provision of 492 residential units (104 no. studios, 136 no. 1 bed units and 252 no. 2 bed units), ranging in height from 4 no. storeys (12m) to 8 no. storeys (24.1m) over basement level;*
- *Provision of 3,347 sq.m. commercial use including 7 no. commercial units at ground floor comprising of a car showroom (350 sq.m.), shop (146 sq.m.), shop/ convenience store (437 sq.m.), and 4 no. café/ restaurants ranging in size from 48 sq.m. to 177 sq.m.) and 3 no. commercial units at first floor level comprising of a medical centre (517 sq.m.) and 2 no. shared office spaces (566 sq.m. and 150 sq.m. respectively) and creche unit at ground and first floor (382 sq.m.) and associates outdoor play space;*
- *Provision of 238 no. car parking spaces (200 no. at basement level to serve the residential development and 38 at surface level to serve the commercial development) including the provision of 10 no. car club spaces, 516 no. cycle parking spaces (276 no. basement level and 236 no. within the residential courtyard areas) including 24 no. cycle parking spaces located at surface level to serve the commercial units.*
- *The proposed development will also include the provision of communal open space including courtyard areas, roof terraces, the provision of resident support facilities including reception / concierge, and waste management facilities, and the provision of resident services and amenities including, internal common areas, shared work space, games room, and multi-function event spaces*
- *The proposed development will provide balconies and/ or terraces on the south, east and west elevations, revised boundary treatments and landscaping including 2,901 sq.m. public open space, children's play area, and provision of pedestrian and cycle linkages through the site and along all site boundaries, upgrades to the public realm, provision of green roof, ESB sub-station, SUDS drainage, and all ancillary site development works necessary to facilitate the development.*

An Environmental Impact Statement has been prepared in respect of the proposed development.

The proposed residential development is a "Build to Rent" scheme in accordance with Specific Planning Policy 7 and 8 as set out in the "Sustainable Urban House: Design Standards for New Apartments 2018".

The application contains a statement setting out how the proposal will be consistent with the objectives of the Dublin City Council Development Plan 2016-2022 and the Naas Road Local Area Plan 2013.

The application together with an Environmental Impact Statement may be inspected, or purchased at a fee not exceeding the reasonable cost of making a copy, during public opening hours at the offices of An Bord Pleanála and Dublin City Council. The application may also be inspected online at the following website set up by the applicant: www.concordeshdnaasroad.ie"

The SHD application to An Bord Pleanála is accompanied by detailed drawings and a detailed design statement, prepared by Reddy Architects, which provides a rationale for the design of the proposed scheme and the

commercial uses proposed. Additional justification is provided within the statements of response prepared by the design team, to provide a comprehensive response in accordance with the opinion of the Board on the pre-application consultation for the proposed development. The Statement of Response prepared by John Spain Associates provides a summary of the overall response provided to the issues raised by the Board, and by the Planning Authority during the course of the SHD pre-application consultation process, and refers the reader to the relevant documentation within the planning application pack.

Density

The proposed density on the subject site is 262 no. units per hectare. It is considered that the proposed density is appropriate given the National Policy objective to increase residential density in existing urban infill locations.

Land Use Mix

The proposed development provides for a "Build to Rent" development with a mix of studios, one bed and two bed units. The proposed development provides for a mix of 104 no. studios, 136 no. 1 beds, and 252 no. 2 bed units.

The proposed development also includes provision of a range of commercial uses at ground at first floor levels fronting the Naas Road. The proposed commercial uses amount to 3,347 sq.m., c,. 7.3% of the total floor area. The proposed commercial uses will provide for a mix of supporting services such as café, restaurant, retail, office, medical, employment and creche uses. The proposed uses have been carefully considered in response to the availability of such uses in the surrounding area.

Landscape Proposals

The proposed development includes significant areas of public open space and communal residential amenity space. The proposed landscaping also include a numbers of pedestrian and cycle linkages through the site and the provision of a green way for both biodiversity and the movement through the site. the landscape plans also include children's play area and a number of passive recreational spaces.

The landscape design also includes significant improvements to the public realm fronting the Naas Road providing for a new interface between the proposed development and the main roadway.

Access

The principle pedestrian entrance to the proposed development will be accessed off the Naas Road. Other pedestrian links are also provided through the site linking the Naas Road with other surrounding developments to the south and west of the site as well as linking into future connections from the surrounding developments to the east of the site.

The vehicular entrance will remain as per the existing arrangement on the site, access from the Naas Road and the internal road to the east of the site serving the industrial estate. The Traffic Impact Assessment prepared by BM Consulting Engineers sets out the capacity for this junction and confirms that there is adequate provision to accommodate the proposed development.

Demolition of Existing Commercial Use

The proposed development includes the demolition of an existing former car show room located fronting the Naas Road.

The building which is proposed to be demolished is single storey in height and is not considered to be of and significant architectural merit.

The removal of this existing commercial premises is required for the implementation of the proposed development and is considered to be justified to facilitate a residential and commercial development which fully utilises the subject site to provide for an appropriate density and form of development having regard to the highly accessible nature of the subject site.

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 Construction Management Plan and Construction and Operational Waste Management Plan, 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 in above the construction of this development is likely to take place in two phases of development as described below:

- Phase 1 – Access, site clearance and demolition works
- Phase 2 – Delivery of the full mixed use development over an estimated 24 month period.

The sequence of construction outlined above in addition to the method outlined in Construction Management Plan is to be confirmed with the Contractor prior to commencement on site. The Contractor will be required to prepare a detailed CMP, including traffic management, on foot of these proposals.

- 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, the basement and residential and commercial floorspace above.
- Structure
  Structure includes the foundations and the physical frame of the residential units and commercial units.
- Enclosures

The enclosures for the building will be formed from brick, block work, timber, and glass, with concrete roofs, all with the required levels of insulation and water proof membranes.

- Facades
  The facades will comprise of selected Brick finish with brick return detailing, brick/ rendered inset panels, selected Metal cladding to selected elevation elements and bay windows, selected Feature stone cladding to residents main entrance, selected Aluclad/aluminium windows/doors
- Services
  The requisite services will be provided including drainage and lightning.
- Landscaping
  The landscaping works include some hard landscaping, roads, footpaths, cycle-paths, bed and tree planting, and significant open spaces.

Geotechnical Investigation

The ground conditions are described in further detail in the Land and Soils Chapter of the EIAR.

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 TTA).
- Health and Safety issues.
- Noise & Vibration due to construction work.
- Air quality (principally dust)
- Construction 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 Construction Management Plan and TTA address these issues in greater detail. It advises that the works associated with the new development will develop additional traffic on the public road network associated with the removal of excavated material etc. and the delivery of new materials, concrete trucks etc.

The vehicles associated with the construction activities are as follows:

- Excavators;
- Dump trucks;

- Concrete delivery trucks;
- Concrete pumps;
- Mobile 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 Dublin City Council in advance of the project and that the construction traffic plan management is reviewed throughout the project.

Health & Safety Issues

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.

Noise & Vibration due to Construction Work

The potential impacts associated with noise and vibration due to construction work, are addressed in Chapter 11 Noise & Vibration.

Air Quality

The potential impacts associated with air quality due to construction work are addressed in Chapter 10 Air Quality and Climate.

Construction Waste Management

A standalone Construction & 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 phase 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 document 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 residential development at Concorde Industrial Estate, including associated infrastructural works, commercial uses and areas of open space. The primary direct 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; and relate to Population and Human Health, Landscape and Visual Impact and Noise and Air impacts associated with the traffic generated.

The proposed development also has the potential for cumulative, secondary and indirect impacts particularly with respect to such topics as traffic – which in many instances – are often difficult to quantify due to complex inter-relationships. However, 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

Draft Guidelines on the information to be contained in environmental impact assessment reports were published by the EPA in August 2017.

The draft guidelines 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 EPA guidelines 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.

Given the proposed site layout extent and the limitations of physical boundaries, adjoining land uses and land ownership the potential for growth of the proposed development is considered limited and confined primarily to potential minor domestic extensions 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 Dublin City Development Plan 2016-2022 and the Naas Road LAP. Any adjacent undeveloped lands 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 deemed 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 Environmental Impact Assessment Report.

2.8 RELATED DEVELOPMENT AND CUMULATIVE IMPACTS

Each Chapter of the EIAR includes a cumulative impact assessment of the proposed development with other planned projects in the immediate area. The potential cumulative impacts primarily relate to traffic, dust, noise and other nuisances from the construction of the development, with other planned or existing projects, and each of the following EIAR chapters has regard to these in the assessment and mitigation measures proposes.

As such, with the necessary mitigation for each environmental aspect, it is anticipated that the potential cumulative impact of the proposed development in conjunction with the other planned developments will be minimal.

2.9 MITIGATION MEASURES

PD&AE CONST 1: It will be necessary for the appointed contractor to prepare and implement a construction management plan (including traffic management) to reduce the impacts of the construction phase on local residents and ensure the local road network is not adversely affected during the course of the construction project.

PD&AE CONST 2: The appointed contractor should prepare a Construction and Operational Waste Management Plan for the proposed development as part of their contractual responsibilities. The Waste Management Plan should meet the requirements of the Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects.

Chapter 3:

Population and Human Health

3.0 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 of the EIAR was prepared by by Mary MacMahon MSc TCP Pg Dip MSP Pg Dip Env Eng Dip Env Plg Law Dip Mgmt Dip EIA & SEA B Soc Sc MIPI, Executive Director, of John Spain Associates, Planning & Development Consultants.

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'. While most developments by people will affect other people, this EIAR document concentrates on those topics which are manifested in the environment, such as new land uses, more buildings or greater emissions.

3.2 STUDY METHODOLOGY

At the time of writing there is no guidance from the EU Commission on the 2014 EIA Directive to indicate how the new term 'Human Health' should be addressed. Therefore 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 Draft Guidelines on the information to be contained in environmental impact assessment reports, published by the EPA in August 2017.

The 2018 EIA Guidelines published by the DHPLG state that there is a close interrelationship between the SEA Directive and the 2014 EIA Directive. The Guidelines 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.

To establish the existing receiving environment / baseline, several site visits were undertaken to appraise the location and likely and significant potential impact upon human receptors. Desk based study of published reference documents such as Central Statistics Office Census data, the ESRI Quarterly Economic Commentary, the Regional Planning Guidelines for the Greater Dublin Area 2010-2022, the Dublin City Council Development Plan 2016-2022 and the Naas Road Local Area Plan was also carried out.

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 landscape and visual impact, biodiversity, archaeology, architectural and cultural heritage, 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 consequence to human health. For detailed reference to particular environmental topics please refer to the corresponding chapter of the EIAR.

The Draft Guidelines on the information to be contained in environmental impact assessment reports, published by the EPA 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 primarily on the potential likely and significant impact on Population, which includes Human Beings as required under the Schedule 6 of the Regulations, and Human Health in relation to health effects/issues and environmental hazards arising from the other environmental factors. 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. The reader is directed to the relevant environmental chapter of this EIAR document for a more detailed assessment.

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 EPA and the Department, 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.

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

- Economic Activity;
- Social Patterns;
- Land-Use and Settlement Patterns;
- Employment;
- Health & Safety; and
- Risk of Major Accidents and Disasters.

3.3.2 Economic and Employment Activity

The CSO's Quarterly Labour Force Survey (which has now replaced the Quarterly Household Survey) for Q4 2018, indicated that there was an annual increase in employment of 2.3 % or 50,500 in the year to the fourth quarter of 2018, bringing total employment to 2,281,300. This compares with an annual increase of 3.0% or 66,700 in employment in the previous quarter and an increase in 3.1% of 67,300 in the year to Quarter 4 of 2017.

The increase in total employment of 50,500 in the year to Q4 2018 was represented by an increase in full-time employment of 48,200(+2.7%) and an increase in part-time employment of 2,300 (+0.5%), representing an improvement in the quality and quantity of employment in the economy.

Unemployment decreased by 15,200 (-10.5%) in the year to Q4 2018 bringing the total number of persons unemployed to 128,800. The CSO state that this is the twenty sixth quarter in succession where unemployment has declined on an annual basis.

Employment increased in ten of the fourteen economic sectors over the year (excluding *Not stated*). The largest rates of increase were recorded in the *Administrative and support service activities* (+12.6% or +11,900) and the Construction (+7.9% or 10, 600) sectors.

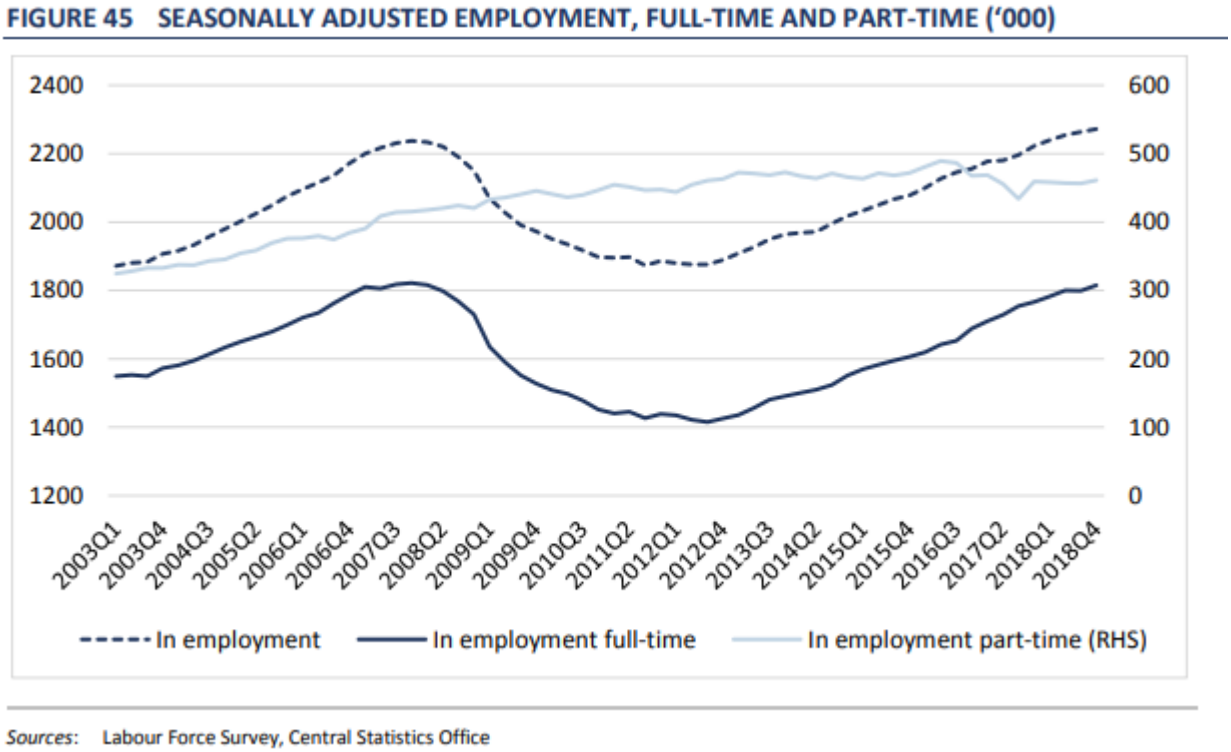
The overall unadjusted unemployment rate decreased from 6.1% to 5.4% over the year to Q4 2018. The total number of people unemployed was 50,100, an annual decrease of -9,900.

The ESRI Quarterly Economic Commentary for Spring 2019 states that an additional 50,000 jobs were added in Q4 2018 in comparison to the same period the previous year, bringing the total number of people in employment up to 2,272,200. The labour force participation rate remained at 62.2 per cent in Q4 2018, the same rate as it had been in Q4 2017.

The number of people in full time employment increased by 2.8% from Q4 2017 up to 1,815,000 in Q4 2018. Over the same period the number of people in part-time employment has increased by 0.5% up to 461,400. The number of people who are part-time underemployed, which is a measure of the number of people who are currently working part time but would like more hours fell by 6% over this period. The fall in this measure suggests there has been an increase in the number of people who moved from part -time to full-time work in the Irish labour force. As of Q4 2018, 80% of the Irish workforce are working full time.

The above sources demonstrate that the national economy and employment levels were expected to improve further 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.

Figure 3.1: Unemployment rate in Ireland by quarter (Q1 2011 – Q4 2018) *CSO Labour Force Survey*



Sources: Labour Force Survey, Central Statistics Office

The ESRI Quarterly Commentary further indicates that household consumption is set to continue growing over the next two years, a slowdown in the fall in unemployment and associated further decreases in consumer sentiment will likely moderate the increase. In 2019 it is expected that consumption expenditure will grow by 2.3 % and at a slight slower pace of 2.2% in 2020.

The ESRI Quarterly Commentary notes from a growth perspective, the Irish economy sustained an excellent performance in 2018. While headline estimates of GDP are significantly impacted by the performance of a relatively small number of multinational firms, the increase in taxation receipts (apart from those in the

corporation category), along with the continued expansion in total employment, illustrates the strong momentum in the domestic economy.

3.3.3 Social Patterns

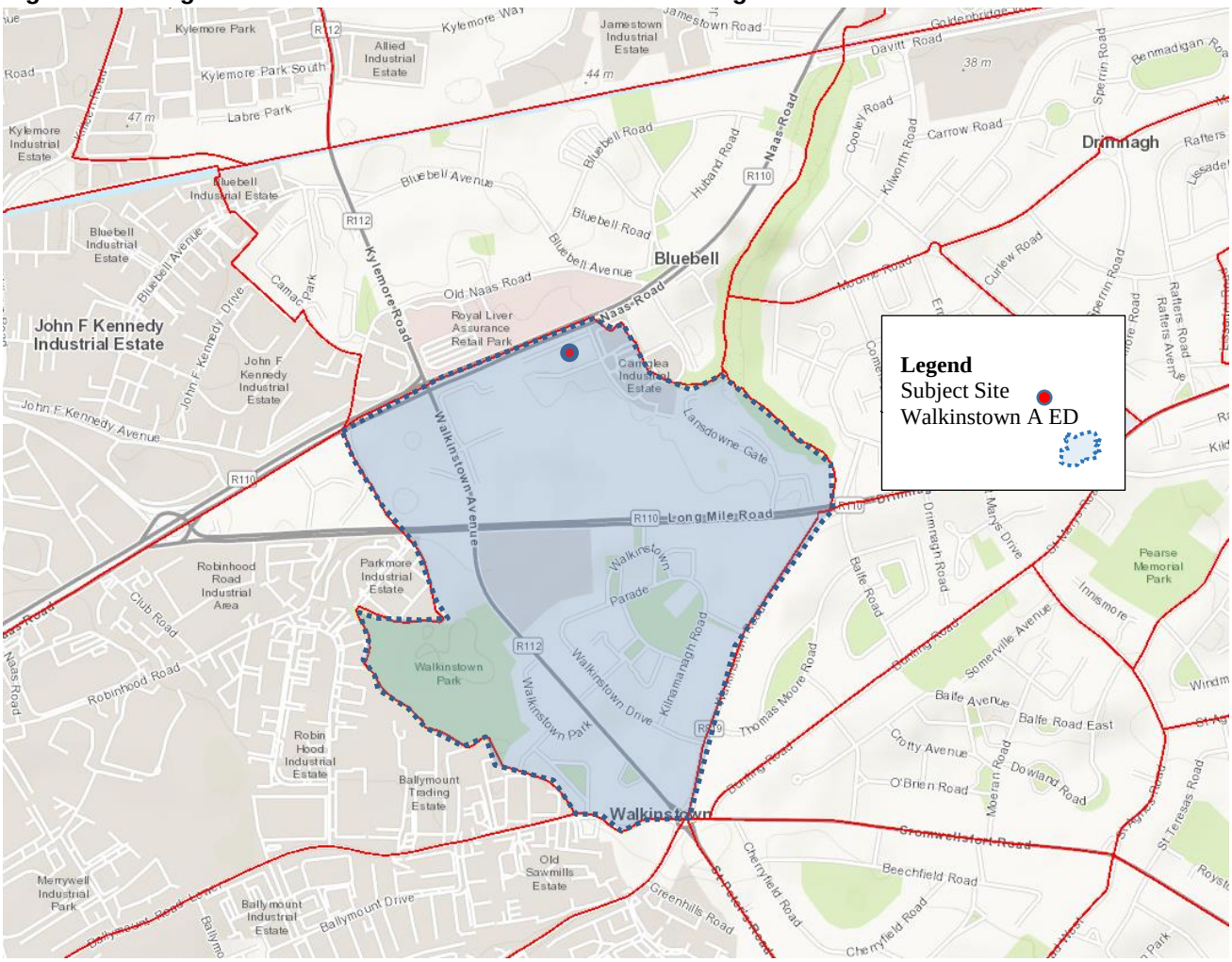
The CSO data illustrates that the population of the Irish State increased between 2011 and 2016 by 3.8%, bringing the total population of the Irish State to 4,761,865. The rate of growth slowed from 8.1% in the previous census, attributable to the slower economic activity in the early part of the census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

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

Table 3.1: Population change in the State, Dublin County, and Walkinstown A ED 2011-2016 (Source: CSO)

Area	Number of Persons		
	2011	2016	% change 11-16
Ireland - State	4,588,252	4,761,865	3.8
Dublin County	1,273,069	1,347,359	5.8
Dublin City	527,612	554,554	4.8
Electoral Division of Walkinstown A	2,619	2,765	5.2

Figure 3.2: Image of the Concorde electoral division indicating site location



The population of Walkinstown A grew in tandem with the overall population growth rate for Dublin County and Dublin City. The steady growth in the area is also likely to be attributable to the designation of growth areas in this part of the County, the availability and provision of physical and social infrastructure, including the Luas, and the associated redevelopment of this area in recent years for an increase in residential development.

3.3.4 Land Use & Settlement Patterns

The subject site of the SHD application is brownfield in nature. The subject site is c. 1.8 hectares and is located on the southern side of the Naas Road, Dublin 12. The site is a brownfield site formerly used as a car sales showroom and other commercial uses such as a gym.

The site is well served by public transport including the Luas Red Line and Dublin Bus.

The existing building on site comprise of former industrial type units which comprise of the majority of the site. The site is entirely covered by buildings and hard standing with a single tree line to the rear of the site adjoining lands to the south.

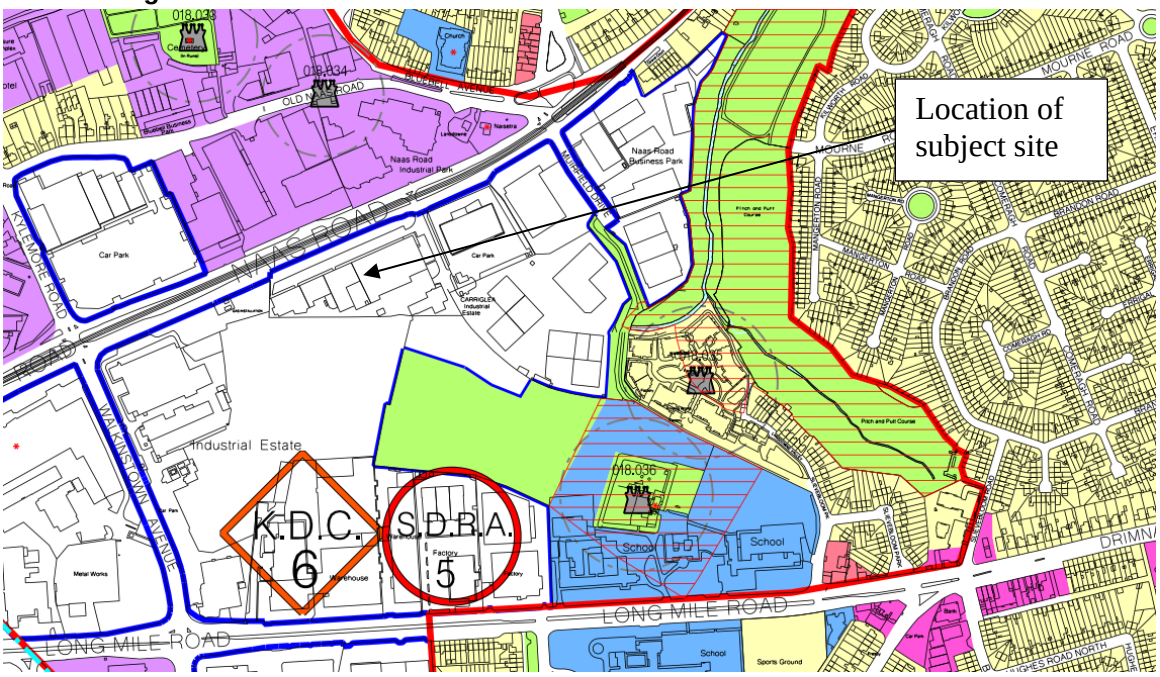
A number of services adjoin and intersect the site including a 38KV Pylon which runs through the south eastern corner of the site, a 110KV Pylon which adjoins the site to the west and a trunk sewer pipe which runs along the northern and eastern boundary of the site.

The site is bound to the north by the Naas Road, and the Luas Line, to the south by greenfield lands and a hard standing car park, to the east by industrial / warehouse buildings and a residential development under construction and to the west by a electrical pylon and an industrial building.

The subject site is located in an emerging area for high density residential and commercial development with high quality public transport services. The location of the subject site is identified for re-generation as set out in the Naas Road LAP and has the potential to provide for significant residential and commercial development in this part of the city.

The subject site is located within the administrative area of Dublin City Council and is therefore subject to the objectives and policies contained within the Dublin City Development Plan 2016-2022.

Figure 3.3: Extract from Dublin City Council zoning map illustrating the subject site and its surroundings



The site is zoned Z14 with the objective *"to seek the social, economic and physical development and/or rejuvenation of an area with mixed use of which residential and "Z6" would be the predominant uses".*

Z14 areas are capable of accommodating significant mixed use development, therefore, developments must include proposals for additional physical and social infrastructure/facilities to support same. Residential development is listed as a permissible use within this zone. The proposed development contains a mix of residential and commercial uses such as retail, shared office, café, restaurant, medical centre, creche, and car showroom. The proposed mix of uses is compatible with the zoning objective on the site.

The subject site is located to the north west of a zone of archaeological constraint for the recorded monument DU018-035 (Watermill Site), which is subject to statutory protection under Section 12 of the National Monuments (Amendment) Act 1994. An Archaeological assessment has been prepared as part of EIAR, Chapter 4.

Figure 3.4: Aerial view of the subject site

3.3.5 Health & Safety

The surrounding context consists of a mix of commercial, industrial, residential, transport- related, recreational and amenity related land uses. The site is located in the vicinity of a number of man-made industrial processes (including SEVESO II Directive sites (96/82/EC & 2003/105/EC) which could be likely to result in a risk to human health and safety. A report[1] is submitted with this application which assesses the impact of the surrounding industrial related SEVESO sites on the proposed development, see Appendix 3.1. The report states that the proposed development is located outside the consultation zones of the SEVESO sites and is therefore considered to not cause any harm to human health.

3.3.6 Risk of Major Accidents and Disasters

The 2018 EIA Guidelines 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. A land use planning assessment was completed for the proposed development in respect of the surrounding SEVESO sites, BOC Gases Ireland Upper Tier COMAH establishment and the Kayfoam Woolfson Lower Tier COMAH establishment.

The assessment of BOC Gases Ireland was based on the following major accident scenarios :

- Release and dispersion of toxic chlorine gas from 1 tonne tank;
- Reboiler explosion with overpressure consequences;
- Hydrogen Compressor Jet fire with Thermal radiation consequences.

[1] Comah Land Use Planning Assessment of Development of Former Concorde Site at Naas Road, Dublin prepared by AWN Consulting

The following major accident scenarios were assessed for Kayfoam Woolfson:

- Major leak from bulk storage tank, pool formation within storage tank bund and evaporation and dispersion of TDI from the surface of the liquid pool;
- Catastrophic tank rupture with bund overtopping pool formation within and adjacent to bund and evaporation and dispersion of TDI from the surface of the liquid pool.

It is concluded that the outer use land use planning zone does not extend to the proposed development. Therefore, on the basis of individual risk, the BOC Gases Ireland Ltd and Kayfoam Woolfson Ltd. sites do not pose a constraint to the development or human health within the development.

In this respect, taking cognisance of the other chapters contained within this EIAR document, it is not considered that the proposed development site presents risks of major accidents or disasters, either caused by the scheme itself or from external man made or 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.

A full description of the proposed development is provided in Section 2. In summary the proposed development consists of the demolition of an existing house on site and provision for the construction of 492 no. residential units, and commercial uses, open space and all associated site and infrastructural works on a site of c. 1.8 hectares.

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 and the Department outline that the assessment of impacts on population and human health should focus on health issues and environmental hazards arising from the other environmental factors, and does not require a wider consideration of human health effects which do not relate to the factors identified in the EIA Directive.

Additionally, this section addresses the socio-economic and employment impacts of the proposed development. For a more detailed assessment of potential impacts please refer to specific chapters of the EIAR which assess the environmental topics outlined in the EIA Directive.

3.5.2 Water

Construction Phase

Provision of water infrastructure for the proposed development would involve construction activities within the subject lands. Provided that the proposed remedial or reductive measures as set out in Chapter 8 of this EIAR are implemented, the impact of the proposed development during the construction stage will be of a temporary nature and will be minimised. Therefore the impact on human health and population in this regard is considered to be insignificant.

During the construction phase there is potential for weathering and erosion of the surface soils from precipitation and run-off and surface water runoff may also contain increased silt levels or pollutants from the construction processes. The discharge of these contaminants, such as concrete and cement, which are alkaline and corrosive, to the culverted stream to the south east of the site has the potential to cause pollution and consequential impacts to human health and population. A number of mitigation measures are outlined in Chapter 9 – Water. A detailed Construction Management Plan which details mitigation measures for the above issues has been prepared by Barrett Mahony Consulting and is included under separate cover.

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 peak demand from the development will be 15.9 l/s with the average daily demand being 225.3 m^3.

Surface water run-off system is proposed as a two stage treatment. A new separate surface buried drainage system has been designed and will be implemented within the site as part of the proposed development. The new surface water drainage system is designed using the Micro Drainage Windes software. As a result there will be a decrease in the surface water run – off from the new development.

SUDs will be implemented in accordance with the recommendations of the GDSDS and Dublin City Council requirements. In addition, the 'The Planning System and Flood Risk Management Guidelines for Planning Authorities' will be adhered to. The quality of the surface water run-off will also improve as a result of the SUDs measures.

Therefore, the potential impact on population and human health in this regard is considered to be insignificant.

3.5.3 Noise

Construction Phase

During the construction phase there will be extensive site works, involving construction machinery, construction activities on site, and construction traffic, which will all generate noise. The highest noise levels will be generated during the general construction activities occur within 30m of the nearest noise sensitive locations to the site boundary. During these times there is potential for temporary, negative, moderate to significant noise impacts to occur. For the remainder of construction periods, construction noise impact will be short -term, negative, slight to moderate.

The construction noise levels will occur over an approximate 24 month period and will only occur during daytime hours which will serve to minimise the noise impacts at local existing receptors over the course of the construction phase. A series of remedial and mitigation measures are proposed in Chapter 10 of this report to further reduce the noise impacts.

The proposed construction phase noise mitigation measures as detailed in the Noise and Vibration chapter of this EIAR shall ensure that all construction activities are controlled and managed and audited by an independent acoustic consultant to confirm that the mitigation measures are implemented throughout the construction phase.

Operational Phase

The main potential for altering the noise environment once the development is operational, and thus impacting neighbouring residential receptors, is road traffic noise associated with the development as a result of increased movements on the site. However in the context of the existing noise environment, the overall contribution of induced traffic is considered to be of neutral, imperceptible and long term impact to nearby residential locations.

Noise levels associated within building services plant are expected to be well within the adopted day and night time noise limits at the nearest noise sensitive properties taking into account the site layout, the nature and type of units proposed and distances to nearest residences. Assuming the operational noise levels for not exceed the adopted design goals, the resultant residual noise impact from this source will be neutral, imperceptible, long term impact.

3.5.4 Air Quality & Climate

Construction Phase

During the construction phase, site clearance and ground excavation works have the potential to generate dust emissions rising from the operation and movement of machinery on site. This has a potential impact on population and 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.

Once the dust minimisation measures as set out in Chapter 9 of the EIAR are implemented, the impact of the proposed development in terms of dust soiling or PM10/ PM2.5 emissions will be short – term and not significant at nearby receptors.

Operational Phase

The operational phase of the proposed development will result in a slight impact on local air quality primarily as a result of the requirements of new buildings to be heated and with the increased traffic movements associated with the development.

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 and, therefore, will not result in a significant impact on human health.

It is predicted that the operational phase of the development will not generate air emissions that would have an adverse impact on local ambient air quality or local human health, as stated in Chapter 9 – Air Quality and Climate.

3.5.5 Landscape and Visual Impact

Construction Phase

The construction phase will have short term landscape and visual impacts. The impacts are not considered significant on population and human health, particularly given the level of screening to site boundaries and the setting back of the main residential elements of the scheme from adjacent sensitive land uses.

Operational Phase

The operational phase of the proposed development has the potential to lead to positive impacts on population and human health as a result of the significant quantity of open space and recreational provision including new cycle links and pedestrian walkways, playgrounds all of which will help provide a high quality residential environment with provision for exercise and play, and will be a valuable amenity and cultural resource to surrounding residential areas.

The proposed development incorporates design principles such as permeability, shared surfaces and a layout which prioritises walking and cycling and therefore has the potential to positively impact on population and human health.

Please refer to Chapter 6- Landscape and Visual Impact and the accompanying photomontages for the a more detailed assessment.

3.5.6 Economic Activity

Construction Phase

The construction phase of the proposed development 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 492 no. residential dwellings, commercial uses and all associated infrastructure 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 residential development such as this, however it is estimated that c. 225 no. people will be employed on the site. A portion of the work will be undertaken by sub-contractors who will also work elsewhere on a phased basis over the construction period.

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.

The proposed development could have a slight negative impact on the surrounding area during construction phase due to traffic and associated nuisance, dust and noise. These issues and appropriate mitigation measures are addressed in Chapters 9 & 10 of the EIAR, in the Traffic and Transportation Assessment, Construction and Environmental Management Plan and the Waste Management Plan which accompany the

application. The Traffic and Transportation Assessment recommends that a Construction Traffic Management Plan be implemented for the site which will minimise disruption to the surrounding road network.

Operational Phase

The operational phase of the proposed development will result in the provision of 492 no. residential units, commercial uses and associated open space. This will provide accommodation for approximately 1,379 persons, based upon the maximum number of bed spaces per unit.

This increase in occupancy in the area will enhance local spending power and will assist with the delivery of a critical mass of population which will support a wide range of additional local businesses, services, transport infrastructure and employment opportunities.

The proposed development includes the provision of 3,347 sq.m. of commercial uses including retail, co-working space, café / restaurants, car show room, medical centre and a creche. The inclusion of these commercial uses will generate significant amount of employment opportunities, thus providing a positive impact on the economy. The residential development itself as a "Build to Rent" scheme will also generate employment opportunities in the management of the facility, further enhancing employment and the economy.

The use of the commercial activities on the site will also generate high levels of expenditure in the area, thus aiding the economic prosperity of the development.

3.5.7 Social Patterns

Construction Phase

The construction phase of the proposed development is unlikely to have any significant impact on social patterns within the surrounding area. Some additional temporary additional local populations may arise out of construction activity. However, these impacts are imperceptible, temporary in nature and therefore not considered significant.

It is acknowledged that the construction phase of the project may have some short-term negative impacts on local residents. Such impacts are likely to be associated with construction traffic and possible nuisances associated with construction access requirements. These impacts are dealt with separately and assessed elsewhere in the EIAR, including Chapter 2 - Project Description and Alternatives Examined, Chapter 9 - Air Quality and Climate and Chapter 10 - Noise and Vibration and also in the Traffic and Transportation Assessment report.

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.

Operational Phase

The addition of new residents to the area will improve the vibrancy and vitality of the area and will help to support existing community and social infrastructure. The proposed development will provide much needed homes in this well served area of the County, which will help cater for the considerable and consistent demand in the GDA, which is not being met at present.

The provision of commercial uses at ground and first floor will also enhance the overall vibrancy and vitality of the area and will provide for local employment opportunities to serve the new residential population.

3.5.8 Land-Use & Settlement Patterns

Construction Phase

The construction phase of the proposed development will primarily consist of site clearing, excavation and construction works, and has the potential to impact adversely and result in the temporary degradation of the local visual environment on a short-term basis. The visual impacts precipitated by the proposed development are assessed in greater detail in Chapter 7.

Secondary land use impacts include off-site activity in relation to building materials and appropriate disposal sites for removed spoil. Construction works are likely to take place on a phased basis, which will moderate the potential impacts on adjoining land use. The Construction Management Plan addresses these issues in more detail.

The construction phase may result in a marginally increased population in the wider area due to increased construction employment in the area, however, this would be temporary in nature and the impact would be imperceptible.

Operational Phase

The operational phase of the proposed development will result in the introduction of a residential land use to the subject site which will provide much needed housing for the growing population of the immediate area and the GDA in general. In addition, a significant quantity of commercial development will enhance and support the proposed and existing residential uses on the site. The provision of open space consisting of recreational and amenity space is also provided.

3.5.9 Employment

The impact of the proposed development in relation to employment has been discussed under economic activity.

3.5.10 Health & Safety

Construction Phase

The construction phase of the proposed development may give rise to short-term impacts associated with construction traffic, migration of surface contaminants, dust, noise and littering. Secondary impacts may include resulting increased traffic arising from hauling building materials to and from the proposed development site which are likely to affect population and human health distant from the proposed development site, including adjacent to aggregate sources and landfill sites.

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 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 commercial units accord with the relevant guidelines and will meet all relevant safety and building standards and regulations, ensuring a development which promotes a high standard of health and safety for all occupants and visitors.

The proposed development will not result in any significant impacts on human health and safety once completed and operational. The proposed development therefore is unlikely to result in negative impacts in relation to population and human health in this regard.

3.5.11 Risk of Major Accidents or Disasters

Construction Phase

Having regard to the topography, geology and location of the subject site, and its low risk of flooding as established in the Barrett Mahony Site Specific Flood Risk Assessment submitted with the application, it is not considered likely that there will be any impact related to a major accident or disaster during the construction phase of the proposed development, stemming internally from within the development, or externally.

The works proposed in proximity to roadways and the Luas line will be governed by best practice and appropriate safety procedures, ameliorating any risk of a major accident in those contexts.

Operational Stage

The proposed development will be located on land which is not at any significant risk of flooding. The entrance arrangements have been designed so as to avoid any risk of a major accident associated with the surrounding road network and the Luas line adjacent to the site.

For further details in relation to the junction and entrance layout please refer to the TTA and associated documentation prepared by Barrett Mahony Consulting Engineers.

A SEVESO site safety plan has also been prepared to assess the potential impact of the surrounding SEVESO sites on the proposed development. The subject site is located outside the zone for any potential major accident or disasters airing from the SEVESO site activities.

Therefore, it is considered that there is no significant risk related to major accidents or disasters, external or internal, man-made or natural in respect of the proposed development.

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.

The cumulative impact of the proposed development will be a further increase in the population of the wider area. The previously brown field lands will provide for 492 no. new residential units across a variety of unit and tenure types. 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 high quality, high frequency 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 high quality new neighbourhoods 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, with a direct and convenient link to high frequency public transport modes.

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 as an industrial estate and car showrooms units. This would be an underutilisation of the site from a sustainable planning and development perspective, particularly considering the location of the lands adjacent to high quality public transport, and within an area which is identified as a Key Growth Area within the Dublin Metropolitan Area. 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.

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 residential and commercial purposes within the Dublin City Development Plan 2016-2022 with an objective to *"to seek the social, economic and physical development and/or rejuvenation of an area with mixed use of which residential and "Z6" would be the predominant uses"* 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, which is zoned for mixed use development, remaining in its current predominantly brown-field state, and remaining underutilised.

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, 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 EIA.

POP & HH CONST 1: 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 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.

In addition, a number of commercial uses ae also proposed which will support the future residential needs and will provide for local jobs to both the existing and future residents.

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 in to 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 are likely to take place over two phases spanning the 5 year duration of the planning permission, 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 site in terms of the provision of residential units and commercial uses to serve the growing population of the area in accordance with the objectives of the Dublin City Development Plan 2016-2022.

Positive impacts on population and human health will include health benefits associated with the provision of a significant quantity of open space, a permeable layout which encourages walking and cycling, amenity and recreational facilities including open green spaces, a playground and landscaped seating areas.

The inclusion of increased local services at ground and first floor level such as medical centre, retail uses, creche, co-working spaces and café / restaurants will also generate a positive impact on the human health in the area increasing the level of services and facilities available to the future and existing residents.

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. sufficiently address monitoring requirements.

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 INTERACTIONS

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 are 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.

3.13 DIFFICULTIES ENCOUNTERED IN COMPILING

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

3.14 REFERENCES

Regional Planning Guidelines for the Greater Dublin Area 2010-2022.
Dublin City Development Plan 2016-2022.
2018 Labour Force Survey Q4 – www.cso.ie .
ESRI Quarterly Economic Commentary, Spring 2019.
Central Statistics Office www.cso.ie.
Pobal.ie.

Chapter 4:

Archaeological, Architectural, and Cultural Heritage

4.0 ARCHAEOLOGICAL, ARCHITECTURAL, AND CULTURAL HERITAGE

4.1 INTRODUCTION

4.1.1 General

Irish Archaeological Consultancy Ltd has prepared this report on behalf of Development Ocht Ltd. to assess the impact, if any, on the archaeological, architectural, and cultural heritage resource of a proposed redevelopment at Concorde Industrial Estate, Naas Road, Dublin 12 (ITM 710727/732090). The assessment was undertaken by Faith Bailey MA, BA, Member of Chartered Institute of Field Archaeologists, Member of Institute of Archaeologists Ireland, Licence eligible archaeologist and Ross Waters of Irish Archaeological Consultancy Ltd. The proposed development area is currently occupied by the former buildings of Concorde Industrial Estate.

This study determines, as far as reasonably possible from existing records, the nature of the cultural heritage resource in and within the vicinity of the development area using appropriate methods of study. Desk-based assessment is defined as a programme of study of the historic environment within a specified area or site that addresses agreed research and/or conservation objectives. It consists of an analysis of existing written, graphic, photographic and electronic information in order to identify the likely heritage assets, their interests and significance and the character of the study area, including appropriate consideration of the settings of heritage assets (CIfA 2014). This leads to the following:

- Determining the presence of known archaeological heritage sites that may be affected by the proposed development;
- Assessment of the likelihood of finding previously unrecorded archaeological remains during the construction programme;
- Suggested mitigation measures based upon the results of the above research.

The study involved detailed interrogation of the archaeological and historical background of the development area. This included information from the Record of Monuments and Places of County Dublin; the County Development Plan; the topographical files of the National Museum of Ireland and cartographic and documentary records. Aerial photographs of the study area held by the Ordnance Survey of Ireland and Google Earth were also consulted. A field inspection was carried out in an attempt to identify any known cultural heritage sites and previously unrecorded features, structures and portable finds within the proposed development area.

An impact assessment and a mitigation strategy have been prepared. The impact assessment is undertaken to outline potential adverse impacts that the proposed development may have on the cultural heritage resource, while the mitigation strategy is designed to avoid, reduce or offset such adverse impacts.

4.1.2 Definitions

In order to assess, distil and present the findings of this study, the following definitions apply:

'Cultural Heritage' where used generically, is an over-arching term applied to describe any combination of archaeological, architectural and cultural heritage features, where –

- the term 'archaeological heritage' is applied to objects, monuments, buildings or landscapes of an (assumed) age typically older than AD 1700 (and recorded as archaeological sites within the Record of Monuments and Places)
- the term 'architectural heritage' is applied to structures, buildings, their contents and settings of an (assumed) age typically younger than AD 1700
- the term 'cultural heritage', where used specifically, is applied to other (often less tangible) aspects of the landscape such as historical events, folklore memories and cultural associations.

4.1.3 Impact Definitions

Imperceptible Impact
An impact capable of measurement but without noticeable consequences

Not Significant
Effects which causes noticeable changes in the character of the environment but without noticeable consequences

Slight Impact
An impact which causes changes to the character of the environment which are not significant or profound and do not directly impact or affect an archaeological feature or monument.

Moderate Impact
An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends. A moderate effect arises where a change to the site is proposed, which although 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 modern day development without damage and that all procedures used to facilitate this are reversible.

Significant Impact
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.

Very Significant
Effects which, by its character, magnitude, duration or intensity significantly alters the majority of a sensitive aspect of the environment.

Profound Impact
Applies where mitigation would be unlikely to remove adverse effects. Reserved for adverse, negative effects only. These effects arise when an archaeological site is completely and irreversibly destroyed by a proposed development.

Impacts as defined by the EPA 2017 Guidelines (pg. 23).

4.2 STUDY METHODOLOGY

Research has been undertaken in two phases. The first phase comprised a paper survey of all available archaeological, architectural, historical and cartographic sources. The second phase involved a field inspection of the proposed development area.

4.2.1 Paper Survey

- Record of Monuments and Places for County Dublin;
- Sites and Monuments Record for County Dublin;
- Monuments in State Care Database;
- Preservation Orders;
- Register of Historic Monuments;
- Topographical files of the National Museum of Ireland;
- Cartographic and written sources relating to the study area;
- Dublin City Development Plan 2016-2022;
- Place name analysis;
- National Inventory of Architectural Heritage; and
- Excavations Bulletin (1970–2018).

Record of Monuments and Places (RMP) is a list of archaeological sites known to the National Monuments Section, which are afforded legal protection under Section 12 of the 1994 National Monuments Act and are published as a record.

Sites and Monuments Record (SMR) holds documentary evidence and field inspections of all known archaeological sites and monuments. Some information is also held about archaeological sites and monuments whose precise location is not known e.g. only a site type and townland are recorded. These are known to the National Monuments Section as 'un-located sites' and cannot be afforded legal protection due to lack of locational information. As a result, these are omitted from the Record of Monuments and Places. SMR sites are also listed on the Department of Culture, Heritage and the Gaeltacht (DoCHG) website – www.archaeology.ie.

National Monuments in State Care Database is a list of all the National Monuments in State guardianship or ownership. Each is assigned a National Monument number whether in guardianship or ownership and has a brief description of the remains of each Monument.

The Minister for the DoCHG may acquire national monuments by agreement or by compulsory order. The state or local authority may assume guardianship of any national monument (other than dwellings). The owners of national monuments (other than dwellings) may also appoint the Minister or the local authority as guardian of that monument if the state or local authority agrees. Once the site is in ownership or guardianship of the state, it may not be interfered with without the written consent of the Minister.

Preservation Orders List contains information on Preservation Orders and/or Temporary Preservation Orders, which have been assigned to a site or sites. Sites deemed to be in danger of injury or destruction can be allocated Preservation Orders under the 1930 Act. Preservation Orders make any interference

with the site illegal. Temporary Preservation Orders can be attached under the 1954 Act. These perform the same function as a Preservation Order but have a time limit of six months, after which the situation must be reviewed. Work may only be undertaken on or in the vicinity of sites under Preservation Orders with the written consent, and at the discretion, of the Minister.

Register of Historic Monuments was established under Section 5 of the 1987 National Monuments Act, which requires the Minister to establish and maintain such a record. Historic monuments and archaeological areas present on the register are afforded statutory protection under the 1987 Act. The register also includes sites under Preservation Orders and Temporary Preservation Orders. All registered monuments are included in the Record of Monuments and Places.

The topographical files of the National Museum of Ireland are the national archive of all known finds recorded by the National Museum. This archive relates primarily to artefacts but also includes references to monuments and unique records of previous excavations. The find spots of artefacts are important sources of information on the discovery of sites of archaeological significance.

Cartographic sources are important in tracing land use development within the development area as well as providing important topographical information on areas of archaeological potential and the development of buildings. Cartographic analysis of all relevant maps has been made to identify any topographical anomalies or structures that no longer remain within the development area. These include:

- William Petty, Down Survey Map, Barony of Newcastle, Parish of Clandalkin and Balliformatt, c. 1655
- John Rocque, An Actual Survey of the County of Dublin, 1760
- John Taylor, Map of the environs of Dublin, extending 10 to 14 miles from the castle, 1816
- William Duncan, Map of the County of Dublin, 1821
- Ordnance Survey maps of County Dublin 1843, 1871, and 1909

Documentary sources were consulted to gain background information on the archaeological, architectural and cultural heritage landscape of the proposed development area.

Aerial photographic coverage is an important source of information regarding the precise location of sites and their extent. It also provides initial information on the terrain and its likely potential for archaeology. A number of sources were consulted including aerial photographs held by the Ordnance Survey and Google Earth.

Place Names are an important part in understanding both the archaeology and history of an area. Place names can be used for generations and in some cases have been found to have their root deep in the historical past.

Development Plans contain a catalogue of all the Protected Structures and archaeological sites within the county. The Dublin City Development Plan (2016-2022) was consulted to obtain information on cultural heritage sites in and within the immediate vicinity of the proposed development.

The National Inventory of Architectural Heritage (NIAH) is a state initiative established under the provisions of the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999 tasked with making a nationwide record of significant local, regional, national and international structures, which in turn provides county councils with a guide as to what structures to list

within the Record of Protected Structures. The NIAH have also carried out a nationwide desk-based survey of historic gardens, including demesnes that surround large houses.

Excavations Bulletin is a summary publication that has been produced every year since 1970. This summarises every archaeological excavation that has taken place in Ireland during that year up until 2010 and since 1987 has been edited by Isabel Bennett. This information is vital when examining the archaeological content of any area, which may not have been recorded under the SMR and RMP files. This information is also available online (www.excavations.ie) from 1970–2018.

4.2.4 Field Inspection

Field inspection is necessary to determine the extent and nature of archaeological and historical remains and can also lead to the identification of previously unrecorded or suspected sites and portable finds through topographical observation and local information.

The archaeological and architectural field inspection entailed:

- Inspecting the proposed development area and its immediate environs.
- Noting and recording the terrain type and land usage.
- Noting and recording the presence of features of archaeological, architectural or cultural heritage significance.
- Verifying the extent and condition of any recorded sites.
- Visually investigating any suspect landscape anomalies to determine the possibility of their being anthropogenic in origin.

4.3 THE EXISTING RECEIVING ENVIRONMENT (BASELINE SITUATION)

4.3.1 Archaeological and Historical Background

The proposed development area is located in the townland and Parish of Drimnagh and Barony of Uppercross. The site is occupied by the former buildings of the Concorde Industrial Estate. It is bounded to the north by the Naas Road, to the east by Carriglea Business Park, and to the southwest by a carpark. Drimnagh Castle (RMP DU018-03/ RPS 4832) lies c. 300m to the southeast separated from the proposed development by sports fields (Figure 4.1 and 4.2). The closest recorded monument to the proposed development area consists of the site of a bridge that is located c. 170m to the northwest (RMP DU018-034). The closest protected structure is located c. 125m to the northeast (RPS 5793).

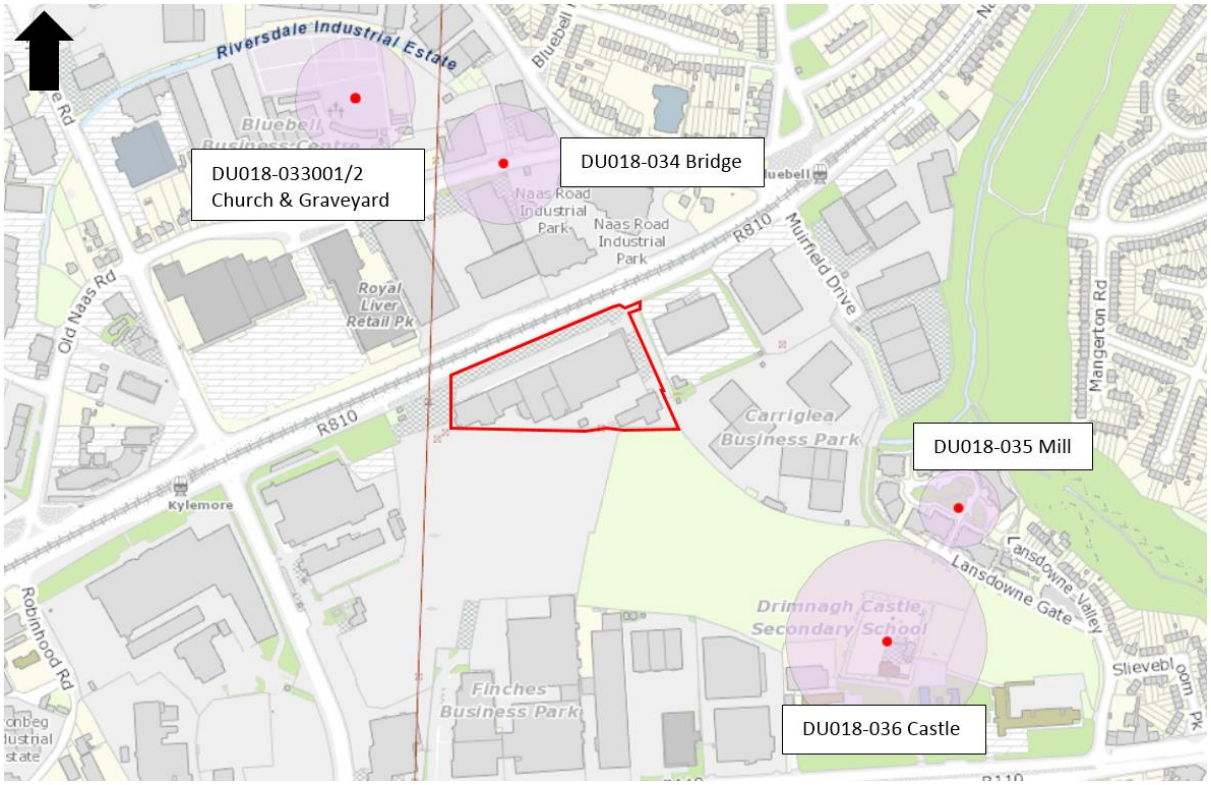


Figure 4.1: Extract from archaeology.ie showing recorded monuments within the surrounding landscape

Mesolithic Period (7000-4000 BC)

Although very recent discoveries may push back the date of human activity by a number of millennia (Dowd and Carden, 2016), the Mesolithic period is the earliest time for which there is clear evidence for prehistoric activity in Ireland. During this period people hunted, foraged and gathered food and appear to have had led a primarily, but not exclusively, mobile lifestyle. The presence of Mesolithic communities is most commonly evidenced by scatters of worked flint material, a by-product from the production of flint implements.

The current archaeological evidence suggests that the environs around Dublin were first inhabited towards the later part of this period. At this time people made crude flint tools known as Larnian (or Bann) Flakes. Small numbers of these flakes have been found along coastal areas of County Dublin such as Dun Laoghaire, Dalkey Island, and Loughlinstown and may indicate small-scale transient

settlement along the riverbanks and seashores (Corlett, 1999). There are no known Mesolithic sites located within the immediate vicinity of the proposed development area.

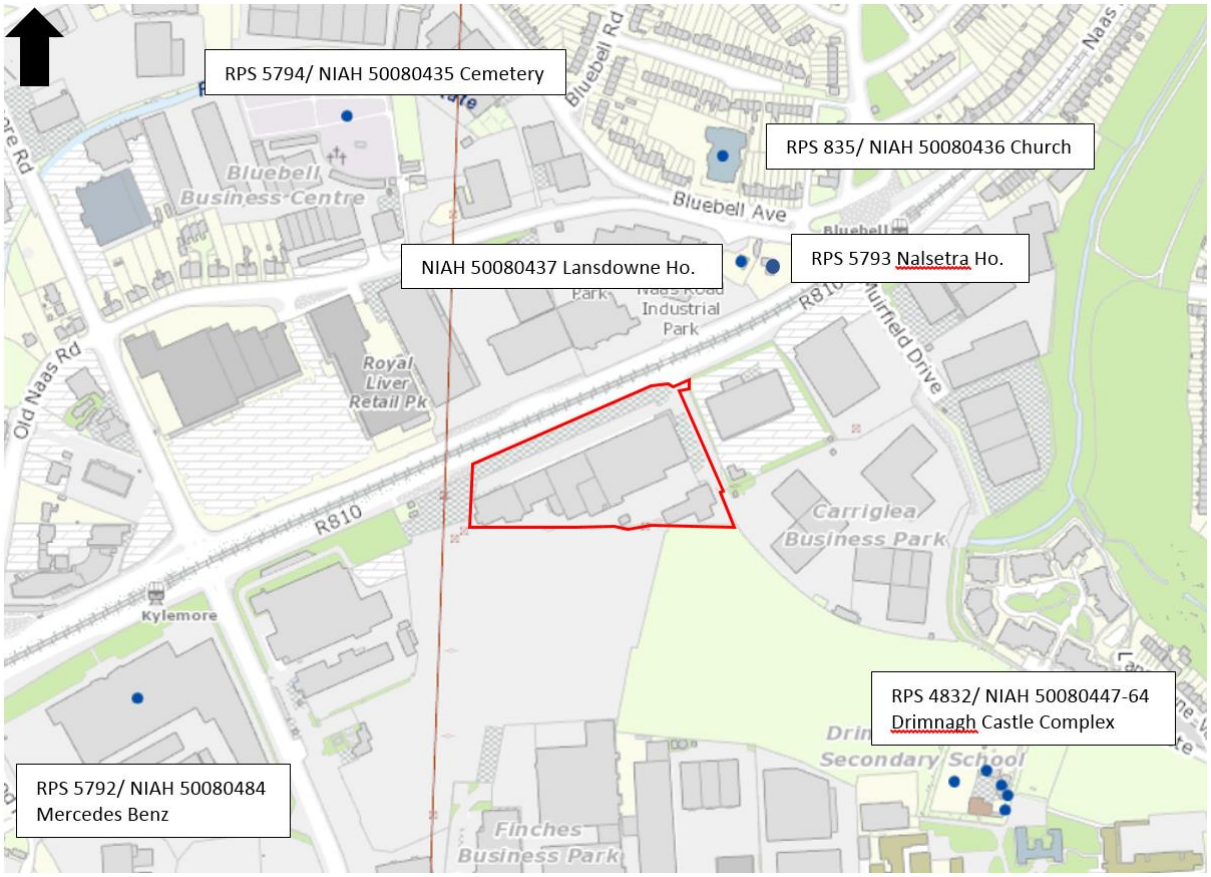


Figure 4.2: Proposed development area showing surrounding protected structures and NIAH structures

Neolithic Period (4000-2500 BC)

During the Neolithic period, communities generally became less mobile and their economy became based on the rearing of stock and cereal cultivation. The transition to the Neolithic was marked by major social change. Communities had expanded and moved further inland to more permanent settlements. This afforded the development of agriculture which demanded an altering of the physical landscape. Forests were rapidly cleared and field boundaries constructed. Pottery was also being produced, possibly for the first time.

While recent years have seen a large increase in the number of identified Neolithic settlement and habitation sites, the period is most commonly characterised by its impressive megalithic tombs. There are no known Neolithic sites located within the immediate vicinity of the proposed development area.

Bronze Age (2500-500 BC)

The Bronze Age was marked by the widespread use of metal for the first time in Ireland. As with the transition from Mesolithic to Neolithic, the transition into the early Bronze Age was accompanied by changes in society. The construction of megalithic tombs went into decline and the burial of the individual became typical. Cremated or inhumed bodies were often placed in a cist, which is a stone-lined grave, usually built of slabs set upright to form a box-like construction and capped by a large slab or several

smaller lintels (Buckley & Sweetman, 1991). Barrows and pit burials are also funerary monuments associated with this period. One such monument in the wider area is known as the Linkardstown burial (RMP DU018-037), c. 725m to the south. It comprised a mound of decayed sods overlain by a mound of gravel and sand dating to the mid-late Bronze Age. These contained a stone-setting and an oval cairn covering a central cist. The cist contained a hanging bowl and an extended burial. Secondary burials accompanied by a Food Vessel were later inserted into the mound.

Iron Age (500 BC-AD 400)

Until recently, the dearth of evidence representing the Irish Iron Age lead to the it being among the most enigmatic and least understood period in Irish prehistory. However, large scale commercial excavations carried out over the past two decades have produced large quantities of new data relating to Iron Age settlement and industry across the country. This raw excavation data is still being analysed and a picture of life during the Iron Age is being assembled (Becker 2012, 1).

As in Europe, two phases of the Iron Age have been proposed in Ireland; the Hallstatt and the La Tène (Raftery, 1994). The Hallstatt period generally dates from 700BC onwards and spread rapidly from Austria, across Europe, and then into Ireland. The later Iron Age or La Tène culture also originated in Europe during the middle of the 5th century BC. This theory however has been challenged in recent years by John Koch and Barry Cunliffe, amongst others. Cunliffe has put forward an opposing theory suggesting that the Insular Celtic Cultures originated in Western Europe (Koch and Cunliffe, 2013). There is no known evidence of Iron Age activity in the vicinity of the proposed development.

Early Medieval Period (AD 400–1100)

The early medieval period is depicted in the surviving sources as largely rural characterised by the basic territorial unit known as *túath*. Byrne (1973) estimates that there were at least 150 kings in Ireland at any given time during this period, each ruling over their own *túath*. One of the most common indicators of settlement during this period is the ringfort. Ringforts were often constructed to protect rural farmsteads and are usually defined as a broadly circular enclosure. One of the most recent studies of the ringfort (Stout, 1997) has suggested that there is a total of 47,000 potential ringforts or enclosure sites throughout Ireland. They are typically enclosed by an earthen bank and exterior ditch and range from 25m to 50m in diameter. Ringforts can be divided into three broad categories – univallate sites, with one bank or ditch; multivallate sites with as many as four levels of enclosing features and platform or raised ringforts, where the interior of the ringfort has been built up. These enclosed farmsteads were intimately connected to the division of land and the status of the occupant.

The space within the ringfort that was enclosed by the ditch or wall is known as the *lios* in early literature, while larger fortifications were known as *dúns*. Ringforts are most commonly located at sites with commanding views of the surrounding environs, which provided an element of security. While raths, for the most part, avoid the extreme lowlands and uplands, they also show a preference for the most productive soils (Stout, 1997).

This period was also characterised by the introduction of Christianity to Ireland. The new religion was a catalyst for many changes, one of the most important being literacy. Irish was written down for the first time using the ogham script. The ogham alphabet is thought to be based on the Latin alphabet of the later Roman Empire and today the majority of the inscriptions that survive are located on pillar stones or boulders. As well as this form of the written word, the church created impressive tomes in their official

language, Latin. Examples of these include the Book of Kells and the Book of Durrow as well as other mundane works such as the Annals, which were an account of the history of the church. Monasticism was known in St. Patrick's time (mid-5th century) but it was not until the 6th and 7th centuries that the famous monastic houses such as Glendalough, Bangor, Clonfert, Clonard, Clonmacnoise and Durrow were founded. An early medieval ecclesiastical enclosure (RMP DU018-038003) is recorded c. 1.2km to the southeast of the proposed development area within the townland of Crumlin.

Medieval Period (AD 1100–1600)

The beginning of the medieval period was characterised by political unrest that originated from the death of Brian Borumha in 1014. In 1171 AD, Dublin was besieged and taken by Diarmait MacMurchada and his Leinster forces supported by a force of Anglo-Norman knights led by Strongbow (Richard Fitz-Gilbert de Clare) and Raymond le Gros. Diarmait MacMurchada, deposed King of Leinster, sought the support of mercenaries from England, Wales and Flanders to assist him in his challenge for kingship. Norman involvement in Ireland began in 1169 AD, when Richard de Clare and his followers landed in Wexford to support MacMurchada. Two years later de Clare (Strongbow) inherited the Kingdom of Leinster and by the end of the 12th century the Normans had succeeded in conquering much of the country (Stout & Stout, 1997). The initial stage of the invasion of the country was marked by the construction of motte and bailey castles, which were later replaced with stone fortifications.

After the Anglo-Norman invasion King John granted Hugh de Berneval, anglicised as Barnewall, lands in Terenure, Kimmage, and Drimnagh for services rendered by his relations who partook in the conquest of Ireland and were killed in Bearhaven (www.drimnaghcastle.org). The Barnewalls constructed the original Drimnagh Castle (RMP DU018-036) in c. 1240 though it was destroyed by the Wicklow O'Byrnes in a raid and replaced by a stone fortification (www.dublincity.ie; www.drimnaghresidents.ie). Despite the presence of the castle since the 13th century its environs were scarcely populated and a document records that the area had eleven inhabitants in the 18th century (www.drimnaghcastle.org). The church (RMP DU018-033001), which is associated with Drimnagh Castle, is situated c. 285m to the north-northwest of the proposed development area. This was constructed in the 13th century and was in use until the dissolution in 1547, whereupon it fell into ruin.

Post-Medieval Period (AD 1600–1900)

The 18th century witnessed a more pacified Ireland and during this time industry was developed in the landscape. In the area of Drimnagh, the water power of the Rivers Bluebell and Cammock were utilised and fed millraces to operate mills. The first edition OS map of 1843 shows several of the mills found in the area during this time. There has been a mill present on the location of Drimnagh Paper Mill (RMP DU018-035), c. 290m to the southeast of the proposed development area, since the medieval period; however, the complex expanded significantly during the 18th century.

With the onset of the 18th century, the political climate settled and this saw a dramatic rise in the establishment of large residential houses around the country. This was largely due to the fact that after the turbulence of the preceding centuries, the success of the Protestant cause and effective removal of any political opposition, the country was at peace. The large country house was only a small part of the overall estate of a large landowner and provided a base to manage often large areas of land that could be dispersed nationally. During the latter part of the 18th century, the establishment of a parkland context (or demesnes) for large houses was the fashion. Although the creation of a parkland landscape involved working with nature, rather than against it, considerable construction effort went into their creation. Major

topographical features like rivers and mountains were desirable features for inclusion into, and as a setting, for the large house and parkland.

Multiple demesne landscapes and large houses were established throughout County Dublin during this period, due to the proximity of the city. The closest demesne landscapes were located c. 345m to the east-southeast of the proposed development area (Drimnagh Cottage) and c. 710m to the west-southwest (Drimnagh Lodge). Whilst a small portion of the Drimnagh Cottage landscape survives as parkland, nothing remains of Drimnagh Lodge or its landscape.

The NIAH has undertaken a garden survey of the demesne landscapes within County Dublin. Despite the fact that no specific demesne landscape is marked within the first edition OS map of 1843 in association with Drimnagh Castle, it has been included in the survey (NIAH Ref.: DU-50-O-111318). The site is a recorded monument and protected structure with multiple elements also listed within the NIAH building survey (Figures 4.1 and 4.2). The survey notes that the main garden features are substantially present with some loss of integrity. It is possible that the proposed development area was once located within landscape associated with the castle as they are both situated within the townland of Drimnagh.

The remaining architectural heritage within the landscape surrounding the proposed development is characterised by 20th century buildings, including two houses c. 115m and c. 125m to the northeast of the site (NIAH 50080437 and RPS 5793); a church c. 175m to the north-northeast (RPS 835/ NIAH 50080436) and a factory c. 275m to the west-southwest (RPS 5792/ NIAH 50080484). Little or no post-medieval architecture survives within 500m of the proposed development area due to the suburban and highly developed nature of the landscape.

4.3.2 Summary of Previous Archaeological Fieldwork

A review of the Excavations Bulletin (1970-2018) has shown that no previous archaeological investigations have been carried out within the proposed development area, although 11 have taken place within 500m of the site. These are summarised below:

A number of investigations have been undertaken in close proximity to the site of Drimnagh Castle (RMP DU018-036), c. 290-310m to the southeast of the proposed development area. In 1992 a trench was opened in an area to the northwest of the castle buildings, which is enclosed by a moat (Bennett 1992:038). This revealed a late 19th century cobbled area atop a deposit of mortar and finds of modern pottery mixed with three sherds of 17th-century sgraffito ware and some locally made ware of 13th-15th century date. The second investigation extended the previous trench to include the moat (Licence 92E0114; Bennett 1993:048). This encountered a layer of brown sod beneath the mortar deposit containing medieval pottery and a stone-filled pit containing a drilled roof slate and two sherds of 13th to 15th century pottery.

In 1993 test-trenching was carried out in a yard to the south of the main tower that discovered evidence of renovations carried out by Louis Hatch to the surrounding wall and the construction of the coach house built in the 20th century (Licence 93E0183; Bennett 1993:049). An extension to this licence investigated the area to the north of the ballroom building (Bennett 1994:050). The trenches revealed medieval pottery mixed with clay pipes, brick, mortar, and a variety of glass suggesting the area had been previously disturbed.

In 1998 further testing was carried out prior to the extension to the existing Scoil Iognaid Rís CBS, to the immediate south of the castle. This included the approximate location of a 17th century bastion and testing revealed the presence of a 17th/18th century stone-surfaced trackway (Licence 98E0183; Bennett 1998:134).

A number of investigations have been carried out that failed to identify any sites of archaeological significance. The works were carried out between 270-310m southeast and 280m north-northwest of the proposed development area (Licence 05E0629; Bennett 2006:596, Licence 01E0028; Bennett 2001:352, Licence 03E1004; Bennett 2003:488, Licence 98E0183ext.; Bennett 2000:0236), Licence 17E0449; Bennett 2017:211 and Licence 04E1673; Bennett 2006:595).

4.3.3 Cartographic Analysis

William Petty, Down Survey Map, Barony of Newcastle, Parish of Clandalkin and Balliformatt, c. 1655 (Figure 4.3)

The townland of Drimnagh is depicted within the Parish of Clondalkin on Petty's map although is not sure in detail. The site of a bridge to the north of the proposed development area (RMP DU018-034) is shown as traversing the River Cammock and the church (RMP DU018-033001) to the north is also marked. A mill (RMP DU018-035) is annotated further to the east along the river and Drimnagh Castle (RMP DU018-036/ RPS 4832) is depicted to the south.

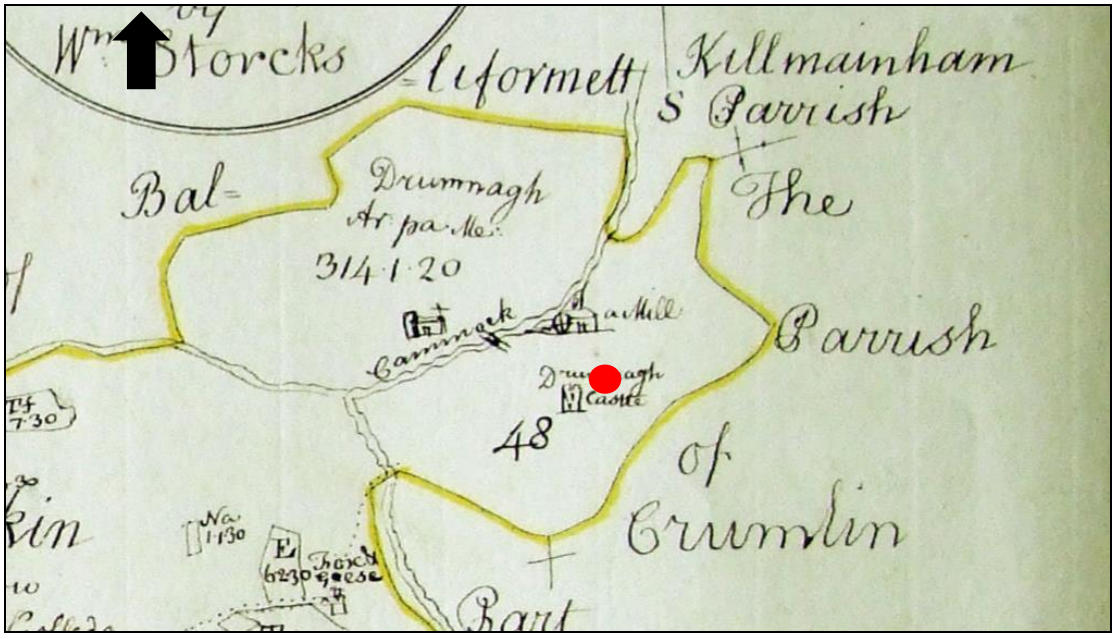


Figure 4.3: Extract from the Down Survey (c. 1655) showing the approximate location of the proposed development area

John Rocque, An Actual Survey of the County of Dublin, 1760

The area of the proposed development appears as an open field to the south of the Old Naas Road. The road has several houses fronting onto it and the church (RMP DU018-033001) is indicated to the north although it is not annotated. The gardens of Drimnagh Castle (RMP DU018-036/ RPS 4832) are more accurately depicted within this mapping.

John Taylor, Map of the environs of Dublin, 1816

By the time of this map the Grand Canal has been constructed to the north of the road travelling west-southwest to east-northeast and there are more mills depicted along the river within the environs of the proposed development. The site itself remains located within open fields. To the immediate east of the site a pond is depicted in an area annotated as the Lansdowne Valley. The church to the north (RMP DU018-033001) is no longer depicted but Drimnagh Castle remains present to the southeast.

William Duncan, Map of the County of Dublin, 1821

There are no major changes within the cartography of this map that relate to the proposed development area.

First Edition Ordnance Survey Map, 1843, scale 1:10,560 (Figure 4.4)

This is the first mapping to accurately portray the landscape containing the proposed development area. It is shown within portions of three fields to the west of 'Lansdowne Valley'. A mill race is located to the immediate east of the site along with further watercourses shown to the east. Bluebell church and graveyard (RMP DU018-033001/2) are depicted to the north and a paper mill (RMP DU018-035) is shown to the east-southeast. The mill occupies a large complex and Drimnagh Cottage and demesne are shown to the immediate east of the complex. Drimnagh Castle is also depicted in detail with structures and a moat (RMP DU018-036/ RPS 4832).

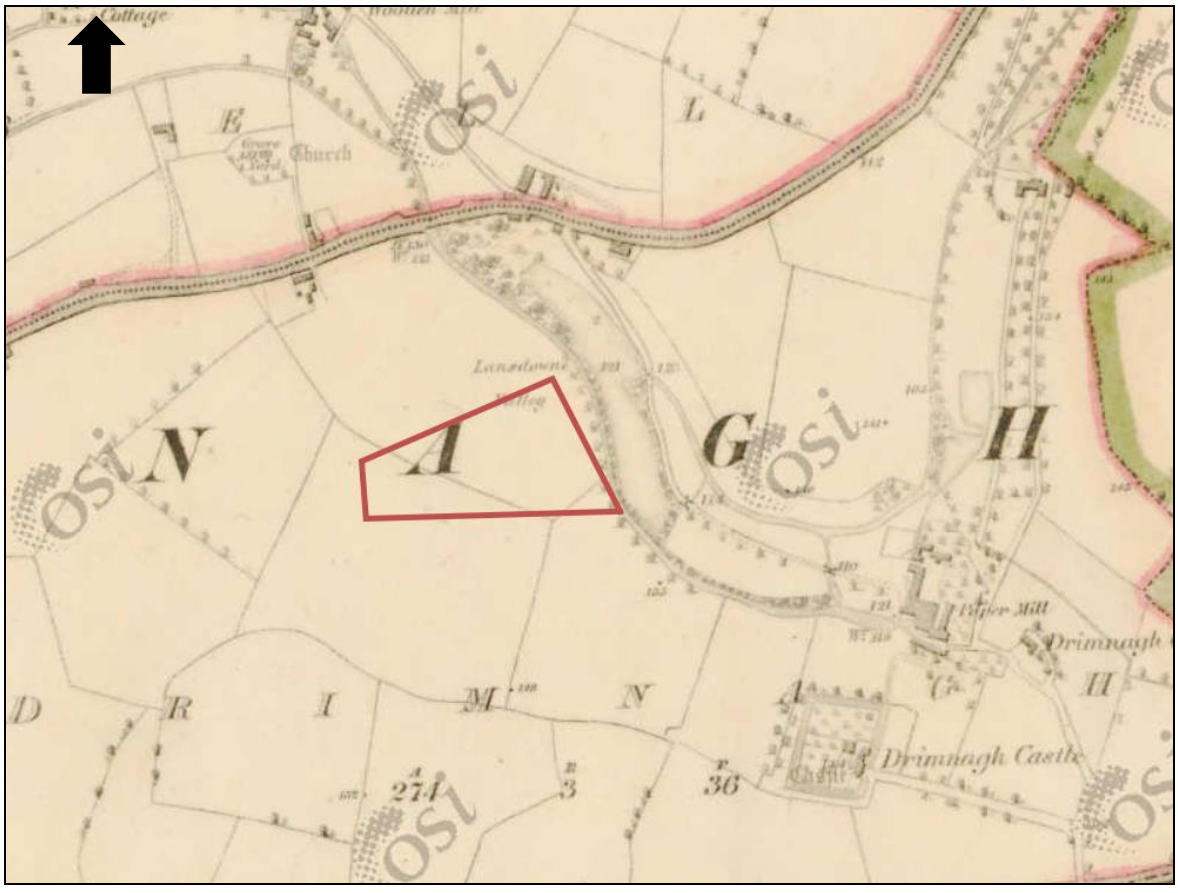


Figure 4.4: Extract from the first edition OS map (1843) showing the proposed development area

Second Edition Ordnance Survey Map, 1871 scale 1:1,0560

There are no major changes to note within the cartography of this map that relate to the proposed development area.

Ordnance Survey Map, 1909 scale 1:2,500

There are no major changes to note within the cartography of this map that relate to the proposed development area.

Third Edition Ordnance Survey Map, 1939, scale 1:10,560 (Figure 4.5)

There has been significant development in the study area by the time of this map and a large number of structures have been constructed along the length of the Old Naas Road and in the wider environs. The current path of the Naas Road has been constructed and passes to the immediate north of the proposed development area. The mill race and watercourses to the east of the site continue to be depicted and a mill pond is also marked to the east of the proposed development area. A channel cuts the southeast corner of the site, which connects a watercourse marked further to the south. Naisetra House (RPS 5793) is shown to the northeast of the proposed development area. The site itself remains undeveloped.

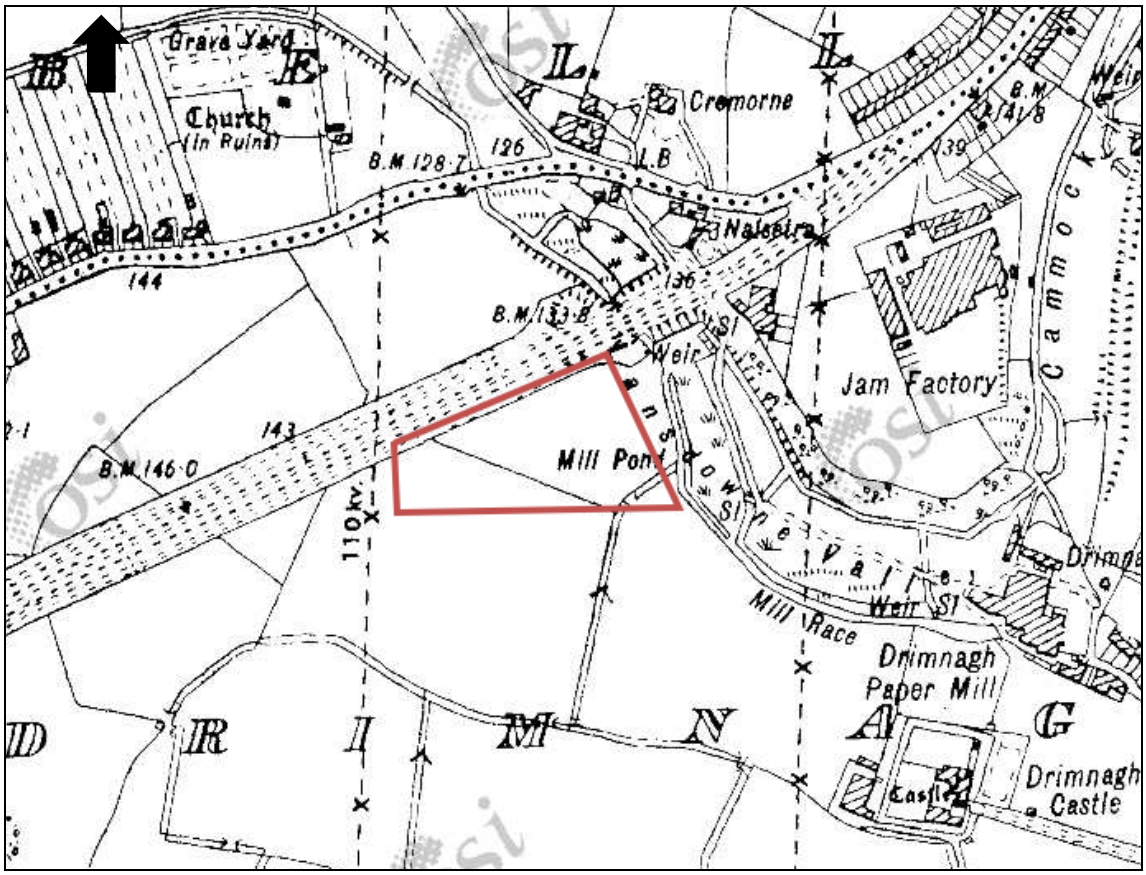


Figure 4.5: Extract from the third edition OS map (1939) showing the proposed development area

4.3.4 Aerial Photography

Inspection of the aerial photographic coverage of the proposed development area held by the Ordnance Survey (1995, 2000, and 2005), Bing Maps, and Google Earth (2003-2018) was undertaken as part of this assessment. This revealed that the site has been developed since at least 1995. No previously unknown archaeological or architectural features were identified.

4.3.5 Dublin City Development Plan

Archaeological Heritage

The Dublin City Development Plan (2016–2022) recognises the statutory protection afforded to all Record of Monuments and Places (RMP) sites under the National Monuments Legislation (1930–2014). The development plan lists a number of aims and objectives in relation to archaeological heritage (Appendix 4.4).

There are no recorded monuments located within the proposed development area. However, there are four monuments or groups of monuments within the study area, two of which are also included on the RPS and NIAH survey. The nearest consists of a bridge (RMP DU018-034), located c. 170m to the north.

TABLE 4.1: Recorded Monuments and Places within 500m of the proposed development area

RMP No.	Location	Classification	Distance to site
DU018-034	Bluebell/Drimnagh	Bridge	c. 170m north
DU018-033001/2*	Bluebell	Church and Graveyard	c. 285m north-northwes
DU018-035	Drimnagh	Water mill - unclassified	c. 290m southeast
DU018-036*	Drimnagh	Castle - Anglo-Norm masonry castle	c. 290m southeast

* Listed on the RPS and NIAH survey

Architectural Heritage

The Dublin City Development Plan (2016–2022) recognises the statutory protection afforded to all protected structures under the Planning and Development Act. The plan also lists a number of aims and objectives in relation to architectural heritage (Appendix 4.5).

There are no protected structures located within the proposed development area, although there are five structures within the study area listed on the Record of Protected Structures for Dublin City. The closest is Nalsetra House (RPS 5793) which is c. 125m to the northeast. Four of these structures are also listed on the NIAH survey and two of these are also recorded monuments.

TABLE 4.2: Recorded Protected Structures within 500m of the proposed development area

RPS No.	Location	Classification	Distance to site
5793	Drimnagh	Naisetra House	c. 125m northeast
835*	Bluebell	Church	c. 195m north

RPS No.	Location	Classification	Distance to site
4832**	Drimnagh	Drimnagh Castle	c. 290m southeast
5794**	Bluebell	Medieval church ruin, graveyard (Bluebell Cemetery)	c. 310m north-northwes
5792*	Drimnagh	Volkswagen premises, fro range of buildings only/ Mercedes Benz Factory	c. 320m southwest

* Listed on the NIAH survey
** Listed on both the NIAH survey and the RMP

The proposed development is not situated within an Architectural Conservation Area.

4.3.6 National Inventory of Architectural Heritage

Building Survey

There are five sites or groups of sites located within a 500m radius of the proposed development area included within the NIAH survey for County Dublin, four of which are listed as protected structures and two of which are also recorded monuments. The nearest is Lansdowne House (NIAH 50080437) which is c. 115m to the northeast.

TABLE 4.3: NIAH Structures within 500m of the proposed development area

NIAH Ref.	Location	Classification	Distance to site
50080437	Drimnagh	Lansdowne House	c. 115m northeast
50080436*	Bluebell	Church	c. 195m north
500804-47/48/50/51/64**	Drimnagh	Drimnagh Castle – Moat, Bridge, Garden, Museum/Gallery, Barn	c. 290m southeast
50080435**	Bluebell	Bluebell Cemetery	c. 310m north-northwes
50080484*	Drimnagh	Mercedes Benz Factory/ Volkswagen premises, fro range of buildings only	c. 320m southwest

* Listed on the RPS
** Listed on both the RPS and the RMP

Garden Survey

There is one designed landscape recorded on the NIAH Garden Survey within the study area. The demesne of Drimnagh Castle (NIAH Garden DU-50-O-111318), c. 290m to the southeast. The survey records it as 'Main features substantially present - some loss of integrity'. There are no other designed landscapes in the environs of the proposed development.

The garden survey does not include an entry for Drimnagh Cottage, which was located c. 345m to the east-southeast. Today a small section of the demesne survives as a suburban park. However, the principal structure is no longer present.

4.3.7 Place Name Analysis

Townland and topographic names are an invaluable source of information on topography, land ownership and land use within the landscape. They also provide information on history; archaeological monuments and folklore of an area. A place name may refer to a long-forgotten site and may indicate the possibility that the remains of certain sites may still survive below the ground surface. The Ordnance Survey surveyors wrote down townland names in the 1830's and 1840's, when the entire country was mapped for the first time. Some of the townland names in the study area are of Irish origin and through time have been anglicised. The main reference used for the place name analysis is *Irish Local Names Explained* by P.W Joyce (1870) and Logainm.ie (Irish Place name Database).

TABLE 4.4: List of townlands, parishes, and baronies in the vicinity of the proposed development area

Name	Derivation	Possible Meaning
Drimnagh	*Droimeanach*	Full of ridges or long hills
Bluebell	From the English for t flower 'Bluebell'	May have related to an Inn within the landsca that was called 'The Bluebell Inn' (Logainm.ie)
Jamestown	*Baile Shéamais*	Town or place of James. Possible that t name reflects Anglo land ownership.
Uppercross	*Crois (also: cros)*	Upper Crossroads

4.3.8 Townlands

The townland is an Irish land unit of considerable longevity as many of the units are likely to represent much earlier land divisions. However, the term townland was not used to denote a unit of land until the Civil Survey of 1654. It bears no relation to the modern word 'town' but like the Irish word *baile* refers to a place. It is possible that the word is derived from the Old English *tun land* and meant 'the land forming an estate or manor' (Culleton 1999, 174). The proposed development area is located within the townland of Drimnagh.

Gaelic land ownership required a clear definition of the territories held by each sept and a need for strong, permanent fences around their territories. It is possible that boundaries following ridge tops, streams or bog are more likely to be older in date than those composed of straight lines (*ibid.* 179).

The vast majority of townlands are referred to in the 17th century, when land documentation records begin. Many of the townlands are mapped within the Down Survey of the 1650s, so called as all measurements were carefully 'laid downe' on paper at a scale of forty perches to one inch. Therefore, most are in the context of pre-17th century landscape organisation (McErlean 1983, 315).

In the 19th century, some demesnes, deer parks or large farms were given townland status during the Ordnance Survey and some imprecise townland boundaries in areas such as bogs or lakes, were given more precise definition (*ibid.*). Bluebell was established at this time. Larger tracts of land were divided into a number of townlands, and named Upper, Middle or Lower, as well as Beg and More (small and large) and north, east, south and west (Culleton 1999, 179). By the time the first Ordnance Survey had been completed a total of 62,000 townlands were recorded in Ireland.

Drimnagh is noted within the Down Survey with the majority of its boundaries following natural features or topography. Today, very few of the original townland boundaries survive due to the suburban nature of the landscape.

4.3.9 Cultural Heritage Sites

The term 'cultural heritage' can be used as an over-arching term that can be applied to both archaeology and architectural features. However, it also refers to more ephemeral aspects of the environment, which are often recorded in folk law or tradition or possibly date to a more recent period. No specific cultural heritage sites have been identified during the course of this assessment that relate to the proposed development area.

4.3.10 Field Inspection

The field inspection sought to assess the proposed development area, its previous and current land use, the topography and any additional information relevant to the report. The field inspection was carried out on the 4th January 2019. The site is occupied by industrial units associated with the existing Concorde Industrial Estate and extensive car parking spaces (Plates 4.1 and 4.2). The site is level and bordered to the north by the Naas Road. It is surrounded by industrial development with the exception of playing fields to the immediate southeast. No archaeological, architectural, or cultural heritage features were identified during the field inspection.

Plate 4.1: Proposed development area facing west-southwest

Plate 4.2: Proposed development area facing east

4.3.11 Conclusions

The proposed development is occupied by modern structures and car parking associated with the Concorde Industrial Estate. It is located in the townland and Parish of Drimnagh and Barony of Uppercross, to the south of the Naas Road.

There are no RMP sites, RPS or NIAH structures, or demesne landscapes located within the proposed development area or its immediate vicinity. The closest recorded monument consists of the site of a bridge (RMP DU018-034), located c. 170m to the north. Of the five protected structures within the study area, the closest is Nalsetra House (RPS 5793) situated c. 125m to the northeast. Lansdowne House (NIAH 50080437) is the closest NIAH structure located c. 115m to the northeast.

A review of the cartographic sources revealed that all of the recorded monuments have been depicted since the mid-17th century and the development area remained as greenfield throughout the post-medieval period. An inspection of the available aerial photography revealed that the site has been an industrial estate since prior to 1995.

A field inspection of the site did not identify anything of cultural heritage significance due to its highly developed nature. A review of the previous archaeological work in the study area has shown that no previous archaeological investigations have been carried out with the site itself. There have been 11 investigations in the study area, six of which did not produce any features of archaeological significance. The remaining took place within the site of Drimnagh Castle (RMP DU018-036), c. 290m to the southeast. Here a cobbled surface, stone-surfaced trackway, clay pipes and post-medieval and medieval pottery have been recorded.

4.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development comprises the demolition of the existing buildings on the subject site and the construction of a mixed-use residential development comprising of c. 480 units, residential support facilitates and commercial uses at ground and first floor level.

4.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

4.5.1 Archaeology

- Given the level of development that has taken place within the proposed development area, it is highly likely that any previously unknown archaeological deposits which may have been located within the site have since been removed. No potential negative impacts upon the archaeological resource are predicted as a result of the development going ahead.

4.5.2 Architecture

- Due to the highly developed nature of the study area, no potential negative impacts upon the architectural resource are predicted as a result of the development going ahead.

4.5.3 Cultural Heritage

- No potential negative impacts upon the cultural heritage resource are predicted as a result of the development going ahead.

4.6 POTENTIAL CUMULATIVE IMPACTS

No cumulative impacts are predicted upon the archaeological, architectural or cultural heritage resource.

4.7 'DO NOTHING' IMPACT

If the development were not to proceed, no negative impacts would occur upon the archaeological, architectural and cultural heritage resource.

4.8 AVOIDANCE, REMEDIAL & MITIGATION MEASURES

No mitigation measures will be required with regards to the archaeological, architectural and cultural heritage resource.

4.9 PREDICTED IMPACTS OF THE PROPOSED DEVELOPMENT

No negative impacts are predicted upon the archaeological, architectural or cultural heritage resource as a result of the proposed development going ahead.

4.10 MONITORING

No monitoring will be required as part of the proposed development.

4.11 REINSTATEMENT

Reinstatement will not be required.

4.12 INTERACTIONS

No interactions have been identified.

4.13 DIFFICULTIES ENCOUNTERED IN COMPILING

No difficulties were encountered during the compilation of this chapter.

4.14 REFERENCES

Becker, K. 2012 'Redefining the Irish Iron Age' In: Potterton, M. and Corlett C. (eds) *Life and death in Iron Age Ireland*. Wordwell books, Bray, 1-14.

Bennett, I. (ed.) 1987–2014 *Excavations: Summary Accounts of Archaeological Excavations in Ireland*. Bray. Wordwell.

Buckley, V. and Sweetman, P.D. 1991. *Archaeological Survey of County Louth.* Dublin.

Byrne, F. J. 1973. *Irish kings and high-kings*. London: Batsford.

Corlett, C. 1999. *Antiquities of Old Rathdown: The Archaeology of South County Dublin and North County Wicklow*. Bray. Wordwell.

Department of Arts, Heritage, Gaeltacht and the Islands. 1999a *Framework and Principles for the Protection of the Archaeological Heritage*. Dublin. Government Publications Office.

Department of Arts, Heritage, Gaeltacht and the Islands. 1999b *Policy and Guidelines on Archaeological Excavation.* Dublin. Government Publications Office.

Dowd, M. and Carden R. 2016. "First evidence of a Late Upper Palaeolithic human presence in Ireland." *Quaternary Science Reviews* **139**: 158-163.

Environmental Protection Agency. 2015 (Draft) *Advice Notes on Current Practice (in the preparation of Environmental Impact Statements)*. Dublin. Government Publications Office.

Environmental Protection Agency. 2017 (Draft) *Guidelines on the Information to be Contained in Environmental Impact Statements.* Dublin. Government Publications Office.

Chartered Institute for Archaeologists 2014a *Standards & Guidance for Archaeological Excavation*

Chartered Institute for Archaeologists 2014b *Standards & Guidance for an Archaeological Watching Brief (Monitoring)*

Chartered Institute for Archaeologists 2014c *Standards & Guidance for Field Evaluation*

Chartered Institute for Archaeologists 2014d *Standards & Guidance for Desk Based Assessments*.

Dublin City Development Plan 2016-2022

Joyce, P. W. 1870. *Irish Local Names Explained*. Sydney: Wentworth Press.

Koch, J. T., and. Cunliffe, B. W. 2013 (eds). *Celtic from the West 2: Rethinking the Bronze Age and the Arrival of Indo-European in Atlantic Europe*. Oxbow.

Lewis, S. 1837 (online edition) *Topographical Dictionary of Ireland*.

National Monument Service, Department of Culture, Heritage and The Gaeltacht. *Sites and Monuments Record*, County Dublin.

National Museum of Ireland. *Topographical Files*, County Dublin

Raftery, B. 1994. *Pagan Celtic Ireland: the enigma of the Irish Iron age*. Thames and Hudson.

Stout, G & Stout, M 1997 'Early Landscapes: from Prehistory to Plantation' in Aalen, F.H.A et al (eds) 1997 *Atlas of the Irish Rural Landscape* Cork University Press

Cartographic Sources

William Petty, Down Survey Map, Barony of Newcastle, Parish of Clandalkin and Balliformatt, c. 1655

John Rocque, An Actual Survey of the County of Dublin, 1760

John Taylor, Map of the environs of Dublin, extending 10 to 14 miles from the castle, 1816

William Duncan, Map of the County of Dublin, 1821

Ordnance Survey maps of County Dublin 1843, 1871, 1909, 1939

Electronic Sources

www.archaeology.ie – DoCHG website listing all SMR sites

www.booksulster.com/library/plnm/placenamesC.php – Contains the text from Irish Local Names Explained by P.W Joyce (1870).

www.buildingsofireland.ie – NIAH survey results for Dublin

www.excavations.ie – Summary of archaeological excavations from 1970–2017

www.googleearth.com – Satellite imagery of the proposed development area.

www.heritagemaps.ie – The Heritage Council web-based spatial data viewer which focuses on the built, cultural and natural heritage.

www.logainm.ie – Placenames Database of Ireland launched by Fiontar agus Scoil na Gaelige and the DoCHG.

www.osiemaps.ie – Ordnance Survey aerial photographs dating to 1995, 2000 & 2005

www.dublincity.ie – Dublin City Council information on Drimnagh Castle

www.drimnaghcastle.org – Drimnagh History

www.drimnaghresidents.ie – Drimnagh Castle, founders and families

Chapter 5

Biodiversity

5.0 BIODIVERSITY

5.1 INTRODUCTION

This section of the EIAR has been prepared by Pádraic Fogarty of OPENFIELD Ecological Services. Pádraic Fogarty has worked for over 20 years in the environmental field and in 2007 was awarded an MSc from Sligo Institute of Technology for research into Ecological Impact Assessment (EcIA) in Ireland. OPENFIELD is a full member of the Institute of Environmental Management and Assessment (IEMA).

Under the EIA Directive as well as best practice methodology from the EPA, the analysis of impacts to biodiversity is an essential component of the EIA process, and so is a required chapter in any EIAR.

Under Article 6(3) of the Habitats Directive an 'appropriate assessment' of projects must be carried out to determine if significant effects are likely to arise to Natura 2000 sites. An Appropriate Assessment Screening Report has been prepared as separate stand-alone report.

5.2 STUDY METHODOLOGY

The assessment was carried out in accordance with the following best practice methodology: 'Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland' by the Institute of Ecology and Environmental Management (IEEM, 2016) and 'Guidelines on the information to be contained in Environmental Impact Assessment Reports by the Environmental Protection Agency (EPA, 2017).

A site visit was carried out on the 4th of January 2019 in fair weather. The site was surveyed in accordance with the Heritage Council's Best Practice Guidance for Habitat Survey and Mapping (Smith et al., 2010). Habitats were identified in accordance with Fossitt's Guide to Habitats in Ireland (Fossitt, 2000).

The nomenclature for vascular plants is taken from *The New Flora of the British Isles* (Stace, 2010) and for mosses and liverworts *A Checklist and Census Catalogue of British and Irish Bryophytes* (Hill et al., 2009).

January lies outside the optimal survey period for general habitat surveys (Smith et al., 2010) but it was possible to classify all habitats on the site to Fossitt level 3. January lies outside the optimal season for surveying breeding birds, bats or amphibians. It is inside the optimal season for surveying Badgers. However, given the urban context of the site, this was not a constraint to a full ecological assessment.

5.3 EXISTING RECEIVING ENVIRONMENT

5.3.1 Zone of Influence

Best practice guidance suggests that an initial zone of influence be set at a radius of 2km for non-linear projects (IEA, 1995). However, some impacts are not limited to this distance and so sensitive receptors further from the project footprint may need to be considered as this assessment progresses. This is shown in figure 6.1.

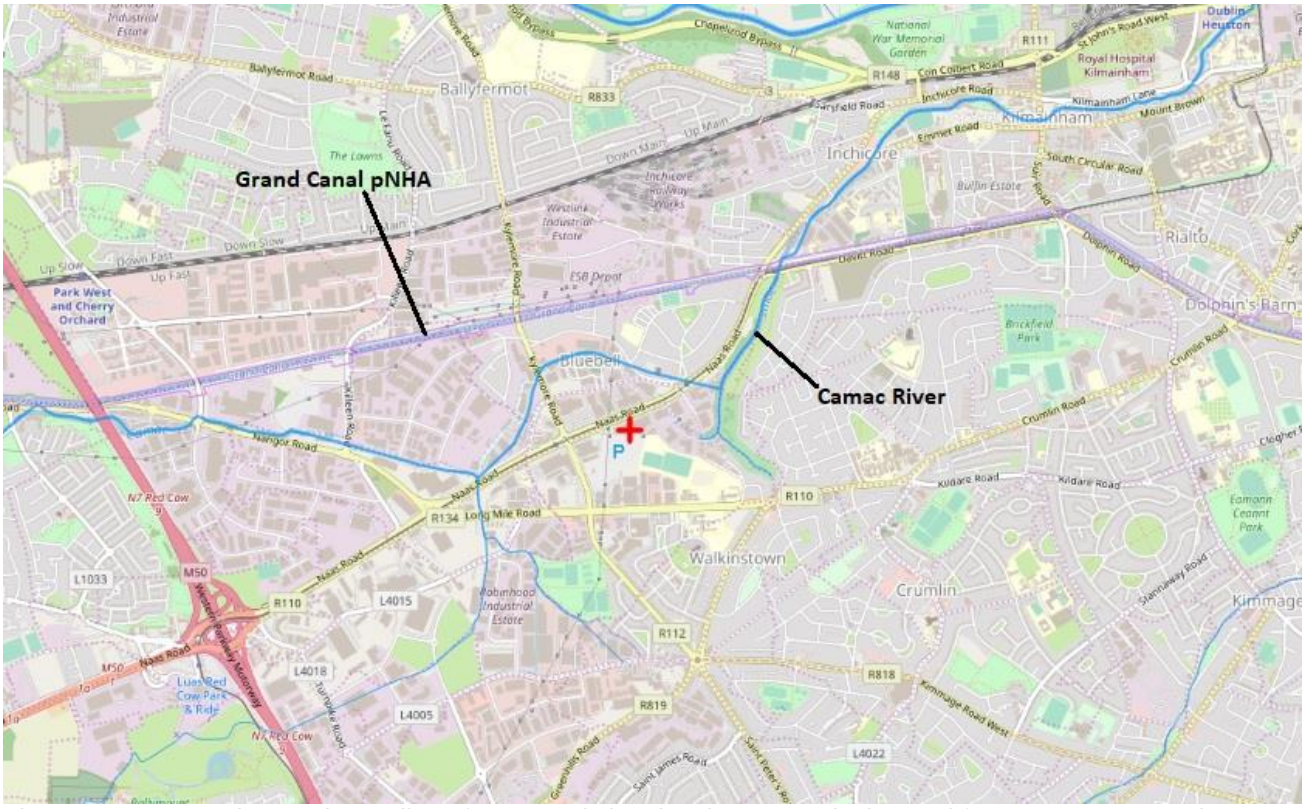


Figure 5.1 – Approximate 2km radius of proposed site showing areas designated for nature conservation

There are a number of designations for nature conservation in Ireland including National Park, National Nature Reserve, RAMSAR site, UNESCO Biosphere reserves, Special Protection Areas (SPA – Birds Directive), Special Areas of Conservation (SAC – Habitats Directive); and Natural Heritage Areas. The mechanism for these designations is through national or international legislation. Proposed NHAs (pNHA) are areas that have yet to gain full legislative protection. They are generally protected through the relevant County Development Plan. There is no system in Ireland for the designation of sites at a local, or county level. The following areas were found to be located within an approximate 2km radius of the application site:

Grand Canal pNHA (site code: 2104): The Grand Canal was constructed in the 18th century and links Dublin to the River Shannon. It is a nationally valuable wildlife corridor and is home to a wide range of plants and animals, many of conservation value, including the Otter *Lutra lutra* and Kingfisher *Alcedo atthis.*

The NPWS web site (www.npws.ie) contains a mapping tool that indicates historic records of legally protected species within a selected Ordnance Survey (OS) 10km grid square. The Concorde Industrial Estate site is located within the square O13 and six species of protected flowering plant are highlighted. These species are detailed in Table 3. It must be noted that this list cannot be seen as exhaustive as suitable habitat may be available for other important and protected species.

Table 5.1 – Known records for protected species within the O13 10km square

Species	Habitat[1]	Current status[2]
Groenlandia densa Opposite-leaved Pondweed	Rivers, canals and estuarine mud	Current
Galeopsis angustifolia Red Hemp-nettle	Calcareous gravels	Record pre-1970
Hordeum secalinum Meadow Barley	Upper parts of brackish marshes, chiefly near the sea	

[1] Parnell et al., 2012
[2] Preston et al., 2002

Puccinellia fasciculata Borrer's salt-marsh grass	Muddy inlets on the coast	
Hypericum hirsutum Hairy St. John's-wort	Woods and shady places	Current
Viola hirta Hairy Violet	Sand dunes, grasslands, limestone rocks	

In summary, it can be seen that of the six species only three records remain current. Opposite-leaved Pondweed was recorded as being 'common in the Grand Canal' in the *Flora of County Dublin* (Doogue et al., 1998). This source elaborates that the plant was "scattered along the Grand Canal at Dolphin's Barn from Portobello to Charlemont Bridge, and between Drimnagh and Kilmainham."

Water quality in rivers, canals and estuaries is monitored on an on-going basis by the Environmental Protection Agency (EPA). They assess the pollution status of a stretch of river by analysing the invertebrates living in the substrate as different species show varying sensitivities to pollution. They arrive at a 'Q-Value' where Q1 = grossly polluted and Q5 = pristine quality (Toner et al., 2005). The subject lands are in the catchment of the River Camac. This is a tributary of the River Liffey and is extensively culverted as it flows through Dublin, including along a stretch to the north of the subject site. Biological sampling in 2016 from a point in Inchicore indicated Q3 – moderately polluted conditions. The EPA assessed the Camac as of 'poor status' under the Water Framework Directive. These data are taken from the ENVision mapping tool on www.epa.ie.

5.3.2 Stakeholder Consultation

Because of the low ecological sensitivity of the subject site, third party observations were not sought.

5.3.3 Plans or Policies Relating to Natural Heritage

Convention on Biological Diversity (CBD): The protection of biodiversity is enshrined in the CBD to which Ireland is a signatory. As part of its commitment to this international treaty Ireland, as part of a wider European Union initiative, was committed to the halt in loss of biodiversity by the year 2010. This target was not met but in 2010 in Nagoya, Japan, governments from around the world set about redoubling their efforts and issued a strategy for 2020 called 'Living in Harmony with Nature'. In 2011 the Irish Government incorporated the goals set out in this strategy, along with its commitments to conservation biodiversity under national and EU law, in the second national biodiversity action plan (Dept. of Arts, Heritage and the Gaeltacht, 2011).

Dublin City Biodiversity Action Plan 2008 – 2012: This plan was adopted in 2008 and identifies a number of species or species groups which are assigned 'priority status'. These include Bats, Otter, Red Squirrel, Birds, Salmonid fish, as well as selected groups of plants and invertebrates.

Dublin City Development Plan 2015 – 2020: It consists of four themes: strengthen the knowledge base of decision makers; strengthen the effectiveness of collaboration between stakeholders; enhance opportunities for conservation through green infrastructure and promote ecosystem services; develop greater levels of awareness of biodiversity.

River Basin Management Plan: Under the Water Framework Directive (Directive 2000/60/EC) all Irish waters must achieve 'good ecological status' by 2015 or, with exemptions, by 2027 at the latest. The EPA website has assessed Dublin Bay as being of 'moderate' status.

5.3.4 Site Survey

Aerial photography from the OSI and historic mapping shows that this area has long been a part of the built environment of Dublin City. The site itself has been home to a commercial unit for many decades. The immediate vicinity is largely composed of buildings and artificial surfaces and areas of open green space or clusters of mature trees are confined to residential gardens and parks.

5.3.4.1 Flora

The subject site is entirely composed of **buildings and artificial surfaces – BL3** which comprises car parking areas and buildings associated with the commercial centre. A **hedgerow – WL2** along the southern boundary is composed of the non-native New Zealand Broadleaf *Grisilinia littoralis*. These habitats are of negligible biodiversity value.

No plants listed as alien invasive under Schedule 3 of SI No. 477 of 2011 are growing on the site.

5.3.4.2 Fauna

The site survey included incidental sightings or proxy signs (prints, scats etc.) of faunal activity, while the presence of certain species can be concluded where there is suitable habitat within the known range of that species. Table 5.4 details those mammals that are protected under national or international legislation in Ireland. Cells are greyed out where suitable habitat is not present or species are outside the range of the study area.

Table 5.1 – Protected mammals in Ireland and their known status within the zone of influence[3]. Those that are greyed out indicate either that suitable habitat is not present or that there are no records of the species from the National Biodiversity Date Centre.

Species	Level of Protection	Habitat[4]
Otter *Lutra lutra*	Annex II & IV Habitats Directive; Wildlife (Amendment) Act, 2000	Rivers and wetlands
Lesser horseshoe bat *Rhinolophus hipposideros*		Disused, undisturbed old buildings, caves and mines
Grey seal *Halichoerus grypus*	Annex II & V Habitats Directive; Wildlife (Amendment) Act, 2000	Coastal habitats
Common seal *Phocaena phocaena*		
Whiskered bat *Myotis mystacinus*	Annex IV Habitats Directive; Wildlife (Amendment) Act, 2000	Gardens, parks and riparian habitats
Natterer's bat *Myotis nattereri*		Woodland
Leisler's bat *Nyctalus leisleri*		Open areas roosting in attics
Brown long-eared bat *Plecotus auritus*		Woodland
Common pipistrelle *Pipistrellus pipistrellus*		Farmland, woodland and urban areas
Soprano pipistrelle *Pipistrellus pygmaeus*		Rivers, lakes & riparian woodland
Daubenton's bat *Myotis daubentonii*		Woodlands and bridges associated with open water

[3] From the National Biodiversity Data Centre, excludes marine cetaceans
[4] Harris & Yalden, 2008

Nathusius' pipistrelle *Pipistrellus nathusii*		Parkland, mixed and pine forests, riparian habitats
Irish hare *Lepus timidus hibernicus*	Annex V Habitats Directive; Wildlife (Amendment) Act, 2000	Wide range of habitats
Pine Marten *Martes martes*		Broad-leaved and coniferous forest
Hedgehog *Erinaceus europaeus*	Wildlife (Amendment) Act, 2000	Woodlands and hedgerows
Pygmy shrew *Sorex minutus*		Woodlands, heathland, and wetlands
Red squirrel *Sciurus vulgaris*		Woodlands
Irish stoat *Mustela erminea hibernica*		Wide range of habitats
Badger *Meles meles*		Farmland, woodland and urban areas
Red deer *Cervus elaphus*		Woodland and open moorland
Fallow deer *Dama dama*		Mixed woodland but feeding in open habitat
Sika deer *Cervus nippon*		Coniferous woodland and adjacent heaths

Although a number of mammals are known to be present in Dublin city, most notably Fox *Vulpes vulpes,* there are no habitats on the site which are suitable for the majority of these species. The buildings were assessed for the suitability to host bat roosts. The lack of semi-natural vegetation in the immediate vicinity of the buildings is considered to be a significant limiting factor in this location while obvious roof cavities etc. are absent. The site can be considered to be of low roost potential (Hundt, 2013) and a dedicated bat survey was not carried out.

Rock Dove/Feral Pigeon *Columba livia* are present within the city centre and roofs are known to provide nesting opportunities, particularly for Herring Gull *Larus argentatus,* but also Lesser Black-backed Gulls *L. fuscus.* Herring gull is listed as of high conservation concern due to a long-term decline (1980-2013) in the national population of between 25% - 49%. The latest atlas of breeding birds states "reductions in feeding opportunities at feeding sites and from fishing industry discards, changes in intertidal ecology affecting food supplies, continuing effects of botulism plus increased rates of mammalian predation are implicated in the declines" (Balmer et al., 2013). Lesser Black-backed gulls are listed as of medium conservation concern (Colhoun & Cummins, 2013). An unpublished survey by BirdWatch Ireland in 2015 recorded 65 roof-nesting sites for gulls, the majority of these in the Dublin area and belonging to Herring Gulls (82% of the total). A map produced for this study showed that Herring Gull nests are widely distributed throughout Dublin city. The roof is suitable for nesting gulls and Herring Gulls were present at the time of survey – although January is too early to confirm whether nesting is taking place.

There are no suitable habitats on the site for amphibians or fish.

Most habitats, even highly altered ones, are likely to harbour a wide diversity of invertebrates. In Ireland only one insect is protected by law, the Marsh Fritillary butterfly *Euphydryas aurinia,* and this is not to be found on built-up sites. Other protected invertebrates are confined to freshwater and wetland habitats and so are not present on this site.

5.3.5 Overall Evaluation of the Context, Character, Significance and Sensitivity of the Proposed Development Site

In summary it has been seen that the application site is within a built-up area of Walkinstown. There are no semi-natural habitats or records of rare or protected plants. There are no species listed as alien invasive as per SI 477 of 2011 or as 'most unwanted' by Invasive Species Ireland.

The buildings may be home to breeding birds.

Significance criteria are available from guidance published by the National Roads Authority (NRA, 2009). These are reproduced in table 5.2. From this an evaluation of the various habitats and ecological features on the site has been made and this is shown in table 5.3.

Table 5.2 Site evaluation scheme taken from NRA guidance 2009

Site Rating	***Qualifying criteria***
A - International importance	SAC, SPA or site qualifying as such. Sites containing 'best examples' of Annex I priority habitats (Habitats Directive). Resident or regularly occurring populations of species listed under Annex II (Habitats Directive); Annex I (Birds Directive); the Bonn or Berne Conventions. RAMSAR site; UNESCO biosphere reserve; Designated Salmonid water
B - National importance	NHA. Statutory Nature Reserves. Refuge for Flora and Fauna. National Park. Resident or regularly occurring populations of species listed in the Wildlife Act or Red Data List 'Viable' examples of habitats listed in Annex I of the Habitats Directive
C - County importance	Area of Special Amenity, Tree Protection Orders, high amenity (designated under a County Development Plan) Resident or regularly occurring populations (important at a county level, defined as >1% of the county population) of European, Wildlife Act or Red Data Book species Sites containing semi-natural habitat types with high biodiversity in a county context, and a high degree of naturalness, or populations of species that are uncommon in the county
D - Local importance, higher value	Sites containing semi-natural habitat types with high biodiversity in a county context, and a high degree of naturalness, or populations of species that are uncommon in the locality Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.

E - Local importance, lower value	Sites containing small areas of semi-natural habitat that are of some local importance for wildlife; Sites or features containing non-native species that are of some importance in maintaining habitat links.

Table 5.3 Evaluation of the importance of habitats and species on the site

Buildings and artificial surfaces – BL3 Non-native hedgerow – WL2	Negligible ecological value

5.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposal is for a development of 492 residential units. The development will result in the loss of no semi-natural habitat of biodiversity value. Connections to foul and surface water drainage already exist.

Figure 5.2 – Development layout with landscaping.

5.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

This section provides a description of the potential impacts that the proposed development may have on biodiversity in the absence of mitigation. Table 3.3 of the EPA guidance note sets out the criteria for determining the significance of impacts. This based on the valuation of the ecological feature in question and the scale of the predicted impact. In this way it is possible to assign an impact significance in a transparent and objective way. Table 5.4 summaries the nature of the predicted impacts.

5.5.1 Construction Phase

The following potential impacts are likely to occur during the construction phase in the absence of mitigation:

1. The removal of potential habitat including the loss nesting sites for Herring Gull. This gull species has suffered significant decline nationally and so is of high conservation concern. It is normally a coastal bird but has taken to nesting on buildings in urban areas in recent times. Its decline in Ireland is associated with a number of factors however the availability of nesting space or suitable habitat is not among these. While population trends in Dublin city are not available, recent data from BirdWatch Ireland indicate that nesting locations are widespread in the city. Although this nesting site will be lost available nesting sites are widely available across the city and so the overall effect to the Herring Gull population must be considered marginal.
2. The direct mortality of species during demolition. This impact is most acute during the bird breeding season which can be assumed to last from March to August inclusive. It has not been confirmed that the buildings are a nesting site for the birds as the survey took place outside the nesting season. A survey will therefore be required and, arising from this, mitigation may be required during the construction phase as all birds' nests and eggs are protected.
3. Pollution of water courses through the ingress of silt, oils and other toxic substances. The distance of the site from the River Camac means that there is a buffer between potential pollution sources and this receptor. As the site is already built-up, there will not be large quantities of soil exposed to run-off while the River Camac is not of significant fisheries value. Significant effects to water courses are not expected to arise from this phase.

Operation Phase

The following potential impacts are likely to occur during the operation phase in the absence of mitigation:

4. Pollution of water from foul wastewater arising from the development. Wastewater will be sent to the municipal treatment plant at Ringsend. Upgrade works are needed as the plant is not currently meeting its requirements under the Urban Wastewater Treatment Directive. Pollution effects are most acute in freshwater systems where the capacity for dilution is low and the consequent risk of eutrophication is high. The Ringsend WWTP discharges into Dublin Bay which is currently classified as 'unpolluted' by the EPA despite long-running compliance issues at the plant. There is currently no evidence that non-compliance issues at the WWTP are having negative effects to features of high ecological value (e.g. wading birds or intertidal habitats). In April 2019 Irish Water was granted planning permission to upgrade the Ringsend plant. This will see improved treatment standards and will increase network capacity by 50%, with a target completion date of 2023.
5. Pollution of water from surface water run-off. The Greater Dublin Strategic Drainage Study (2005) identified issues of urban expansion leading to an increased risk of flooding in the city and a deterioration of water quality. This arises where soil and natural vegetation, which is permeable to rainwater and slows its flow, is replaced with impermeable hard surfaces. The site is currently entirely of hard standing and the proposed residential extension cannot affect the quantity or quality of surface water run-off. The introduction of SUDS methods, specifically green roofs and permeable paving, will enhance the run-off characteristics from this site.
6. Impacts to protected areas. No impacts are predicted to Natura 2000 areas (SACs or SPAs) in Dublin Bay, principally due to the separation distance between the site and these areas. A full assessment of potential effects to these areas is contained within a separate Screening Report for Appropriate Assessment. There is no pathway to the Grand Canal and so negative effects cannot occur.

Table 5.4: Nature of predicted impacts in the absence of mitigation

	Impact	Direct/ Indirect	Cumulative	Duration[5]	Reversible?	Positive/ Negative
Construction Phase						
1	Habitat loss	Direct	No	Temporary	No	Neutral
2	Species Mortality	Direct	No	Permanent	No	Negative
3	Pollution of water courses	Indirect	Yes	Temporary	Yes	Neutral
Operation Phase						
4	Wastewater	Indirect	Yes	Permanent	Yes	Neutral
5	Surface water run-off	Indirect	Yes	Permanent	Yes	Positive

Table 5.5 below assesses the scale and likelihood of the predicted impacts of the proposed development in the absence of mitigation.

Table 5.5 – Scale and likelihood of predicted impacts in the absence of mitigation.

Impact		Magnitude	As proportion of resource	Likelihood
Construction Phase				
1	Habitat loss	~7,200m^2 of building floor/roof space to be lost	100%, new roof will not be suitable for nesting	Certain
2	Mortality to animals during construction	Mortality could occur were works to affect nests	At least one pair of Herring Gulls are nesting	Depends on timing of works
3	Pollution of water	Not possible to quantify	Could impact on entire downstream stretch of the Liffey and its estuary	Unlikely given barriers to flow between the site and the river
Operation Phase				
4	Wastewater pollution	Not possible to quantify	N/A	Unlikely given existing and future treatment facilities at Ringsend
5	Surface water pollution	Not possible to quantify	N/A	Likely improvement given proposed attenuation measures

Tables 5.3 to 5.5 are combined to determine the level of significance of any given impact. This is shown in table 5.6.

[5] Temporary: up to 1 year; Short-term: 1-7 years; Medium-term: 7-15 years; Long-term: 15-60 years; Permanent: >60 years (NRA, 2006)

Table 5.6: Significance level of likely impacts in the absence of mitigation

Impact		Significance
Construction phase		
1	Loss of habitat	Minor negative – loss of roof nesting space
2	Potential mortality to animals during construction	Potentially moderate negative – permanent impacts to species of high local value/or species with legal protection
3	Pollution of water during construction phase	Neutral – no impacts are likely
4	Wastewater pollution	Neutral
5	Surface water pollution	Minor positive

Overall it can be seen that one potential moderate negative impact is predicted to occur as a result of this project in the absence of mitigation.

5.5.2 Cumulative impacts

A number of the identified impacts can also act cumulatively with other impacts from similar developments in this area of Dublin. These primarily arise through the additional loading to the Ringsend Wastewater Treatment Plant. It is considered that this effect is not significant due to the planned upgrading works that will bring it in line with the requirement of the Urban Wastewater Treatment Directive.

In this instance the incorporation of SUDS attenuation measures into a brown-field site is contributing to the cumulative positive effective of reducing rainwater run off to the municipal treatment plant.

There are no other effects which could act in a cumulative way to result in significant impacts to flora and fauna.

5.6 DO NOTHING IMPACT

The site can be considered to have minimal ecological value. This will not change in the absence of this project.

Water quality may improve throughout the Liffey/Tolka/Dodder catchments with the implementation of the Water Framework Directive however its target of 'good ecological status' for all water bodies by 2015 was not met. In 2018 a second River Basin Management Plan was published which highlights 190 'priority areas for action' where resources will be focussed during the 2018-2021 period. The Tolka and Dodder, as well as the upper Liffey (but not the Camac) are among those areas where improvements are expected.

5.7 AVOIDANCE, REMEDIAL AND MITIGATION MEASURES

This report has identified one impact that was assessed as 'moderate negative' and therefore mitigation is needed to reduce the severity of this potential effect. This may arise where demolition works are undertaken during the nesting season. All birds' nests, eggs or hatchlings are protected under the Wildlife Act. Disturbance to any nest can only be done under licence from the National Parks and Wildlife Service (NPWS).

5.7.1 Mitigation Measures Proposed

The following mitigation measures are proposed for the development

Construction Phase

FF CONST 1: Disturbance of birds' nests

It must first be determined whether birds are nesting on the roof of this building. A survey by a suitably qualified ecologist should therefore be undertaken during the bird nesting season to ascertain whether this is the case. Deliberate disturbance of a bird's nest is prohibited unless under licence from the National Parks and Wildlife Service. If nesting is confirmed demolition works should proceed outside the nesting season, i.e. from September to February inclusive. If a nest is encountered then works must stop, until such time as nesting has ceased. Otherwise, a derogation licence must be sought from the NPWS to allow the destruction of the nest. Alternatively, roof netting can be installed outside the breeding season to prevent nesting occurring.

5.8 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.

If all mitigation measures are fully implemented then no significant negative effects are predicted to occur to biodiversity.

5.9 MONITORING

Monitoring is required where the success of mitigation measures is uncertain or where residual impacts may in themselves be significant.

No further monitoring is required.

5.10 REINSTATEMENT

No reinstatement works are required for ecological features.

5.11 INTERACTIONS

This section provides a description of impact interactions together with potential indirect, secondary and cumulative impacts

The key environmental interaction with Biodiversity is Water. A series of mitigation measures are proposed in Chapter – Water 6 of this EIAR document to ensure the quality (pollution and sedimentation) and quantity (surface run-off and flooding) is of an appropriate standard.

5.12 DIFFICULTIES ENCOUNTERED IN COMPILING

This section provides and indication of any difficulties encounters by the environmental specialist in compiling the required information.

Because of the artificial nature of the habitats on this site, no difficulties were encountered in carrying out this assessment.

5.13 REFERENCES

Bullock C., Kretch C. & Candon E. 2008. *The Economic and Social Aspects of Biodiversity*. Stationary Office.

Colhoun K. & Cummins S. 2013. *Birds of Conservation Concern in Ireland 2014 – 2019.* Irish Birds. Volume 9 Number 4 pg523-541.

Cooney R. & Dickson B. 2005. *Biodiversity and the Precautionary Principle.* Earthscan.

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora

Council Directive 97/11/EEC of 3rd March 1997 amending Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment

Council Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy – more commonly known as the Water Framework Directive

Curtis T.G.F.& McGough H.N. 1988. *The Irish Red Data Book 1: Vascular Plants.* Stationary Office.

Department of Arts, Heritage and the Gaeltacht. 2011. *Actions for Biodiversity 2011 – 2016. Ireland's National Biodiversity Plan.*

DG Environment. 2010. *Natura 2000 European Commission Nature and Biodiversity Newsletter.* Number 28. June 2010. ISSN: 1026-6151.

Doogue D., Nash D., Parnell J., Reynolds S., & Wyse Jackson P. 1998. *Flora of County Dublin.* The Dublin Naturalists' Field Club.

EPA. 2002. *Guidelines on the information to be contained in Environmental Impact Statements.*

EPA, 2003. *Advice Notes on Current Practice (in the preparation of Environmental Impact Statements)*

Fitter R., Fitter A. & Farrer A. 1984. *Grasses, sedges, rushes and ferns of Britain and Northern Europe.* Collins.

Fossitt J. 2000. *A Guide to Habitats in Ireland*. Heritage Council.

Harris S. & Yalden D.W. 2008. *Mammals of the British Isles: Handbook, 4th Edition.* The Mammal Society.

Heritage Council. 2002. *Draft Habitat Survey Guidelines*. The Heritage Council.

Hill M.O., Blackstock T.H., Long D.G. and Rothero G.P 2008. *A Checklist and Census Catalogue of British and Irish Bryophytes.* British Bryological Society.

Hundt L. 2012. *Bat Surveys: Good Practice Guidelines. 2nd Edition.* Bat Conservation Trust.

IEEM. 2016. *Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland.* Institute of Ecology and Environmental Management.

Institute of Environmental Assessment, 1995. *Guidelines for Baseline Ecological Assessment*'

Johnson O. & More D., 2004. *Tree Guide*', Collins

Mason C.F. 1996. *Biology of Freshwater Pollution.* Longman.

Morris P. & Therivel R., 2001. *Methods of Environmental Impact Assessment,* Spon Press

NRA. 2009. *Guidelines for Assessment of Ecological Impacts of National Road Schemes.* National Roads Authority.

Parnell J. & Curtis T. 2012. *Webb's An Irish Flora.* Cork University Press.

Preston C.D., Pearman D.A. & Dines T.D. 2002. *New Atlas of the British & Irish Flora*. Oxford University Press.

Rich C. & Longcore T. Editors. 2006. *Ecological Consequences of Artificial Night Lighting.* Island Press.

Sargent G. & Morris P. 2003. *How to Find & Identify Mammals.* The Mammal Society.

Smith G. F., O'Donoghue P., O'Hora K. and Delaney E. 2010. *Best Practice Guidance for Habitat Survey and Mapping.* Heritage Council.

Stace C. 2010. *New Flora of the British Isles.* Cambridge University Press

Statutory Instrument No. 94 of 1999. Flora (Protection) Order

Treweek J., 1999. *Ecological Impact Assessment*', Blackwell Science.

United Nations. 1992. *Convention on Biological Diversity*

Chapter 6:

Landscape and Visual Impact Assessment

6.0 LANDSCAPE AND VISUAL IMPACT ASSESSMENT

6.1 INTRODUCTION

The Landscape and Visual Impact Assessment (LVIA) was prepared by Richard Butler of Model Works Ltd. Richard has degrees in Landscape Architecture and Town Planning, is a member of the Irish Landscape Institute and the Irish Planning Institute, and has 20 years' experience in development and environmental planning, specialising in LVIA.

6.2 STUDY METHODOLOGY

The LVIA was prepared with reference to the Landscape Institute's *Guidelines for Landscape and Visual Impact Assessment*, 2013 (GLVIA) and Technical Information Note *Townscape Character Assessment*, and the EPA draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, 2017.

6.2.1 Key Principles of the GLVIA

6.2.1.1 Use of the Term 'Effect' vs 'Impact'

The GLVIA requires that the terms 'impact' and 'effect' be clearly distinguished and consistently used. 'Impact' is defined as the action being taken, e.g. the introduction to the landscape of buildings, infrastructure or landscaping. 'Effect' is defined as the change resulting from those actions, e.g. change in landscape character or in the composition of a view.

6.2.1.2 Assessment of Both 'Landscape' and 'Visual' Effects

The GLVIA prescribes that effects on views and visual amenity be assessed separately from the effects on landscape, although the two topics are inherently linked.

'Landscape' results from the interplay between the physical, natural and cultural components of our surroundings. Different combinations and spatial distribution of these elements create variations in landscape character. 'Landscape character assessment' is the method used in LVIA to describe the landscape and by which to understand the effects of development on the landscape as a resource.

Visual assessment is concerned with changes that arise in the composition of available views, the response of people to these changes and the overall effects on the area's visual amenity.

6.2.2 Methodology for Landscape Effects Assessment

Assessment of potential landscape effects involves (a) classifying the sensitivity of the landscape resource, and (b) describing and classifying the magnitude of landscape change which would result from the development. These factors are combined to arrive at a classification of significance of the landscape effects.

6.2.2.1 Landscape Sensitivity

The sensitivity of the landscape is a function of its land use, landscape patterns and scale, visual enclosure and the distribution of visual receptors, and the value placed on the landscape. The nature and scale of the development in question is also taken into account, as are any trends of change, and relevant policy. Five categories are used to classify sensitivity.

Table 6.1 Categories of Landscape Sensitivity

Sensitivity	Description
Very High	Areas where the landscape exhibits very strong, positive character with valued elements, features and characteristics that combine to give an experience of unity, richness and harmony. The landscape character is such that its capacity to accommodate change in the form of development is very low. These attributes are recognised in landscape policy or designations as being of national or international value and the principle management objective for the area is protection of the existing character from change.
High	Areas where the landscape exhibits strong, positive character with valued elements, features and characteristics The landscape character is such that it has limited/low capacity to accommodate change in the form of development. These attributes are recognised in landscape policy or designations as being of national, regional or county value and the principle management objective for the area is the conservation of existing character.
Medium	Areas where the landscape has certain valued elements, features or characteristics but where the character is mixed or not particularly strong, or has evidence of alteration, degradation or erosion of elements and characteristics. The landscape character is such that there is some capacity for change in the form of development. These areas may be recognised in landscape policy at local or county level and the principle management objective may be to consolidate landscape character or facilitate appropriate, necessary change.
Low	Areas where the landscape has few valued elements, features or characteristics and the character is weak. The character is such that it has capacity for change; where development would make no significant change or would make a positive change. Such landscapes are generally unrecognised in policy and the principle management objective may be to facilitate change through development, repair, restoration or enhancement.
Negligible	Areas where the landscape exhibits negative character, with no valued elements, features or characteristics. The landscape character is such that its capacity to accommodate change is high; where development would make no significant change or would make a positive change. Such landscapes include derelict industrial lands or extraction sites, as well as sites or areas that are designated for a particular type of development. The principle management objective for the area is to facilitate change in the landscape through development, repair or restoration.

6.2.2.2 Magnitude of Landscape Change

Magnitude of change is a factor of the scale, extent and degree of change imposed on the landscape by a development, with reference to its key elements, features and characteristics (also known as 'landscape receptors'). Five categories are used to classify magnitude of change.

Table 6.2 Categories of Landscape Change

Magnitude of Change	Description
Very High	Change that is large in extent, resulting in the loss of or major alteration to key elements, features or characteristics of the landscape and/or introduction of large elements considered totally uncharacteristic in the context. Such development results in fundamental change in the character of the landscape.
High	Change that is moderate to large in extent, resulting in major alteration to key elements, features or characteristics of the landscape and/or introduction of large elements considered uncharac-teristic in the context. Such development results in change to the character of the landscape.

Medium	Change that is moderate in extent, resulting in partial loss or alteration to key elements, features or characteristics of the landscape, and/or introduction of elements that may be prominent but not necessarily substantially uncharacteristic in the context. Such development results in change to the character of the landscape.
Low	Change that is moderate or limited in scale, resulting in minor alteration to key elements, features or characteristics of the landscape, and/or introduction of elements that are not uncharacteristic in the context. Such development results in minor change to the character of the landscape.
Negligible	Change that is limited in scale, resulting in no alteration to key elements features or characteristics of the landscape, and/or introduction of elements that are characteristic of the context. Such development results in no change to the landscape character.

10.2.2.3 Significance of Effects

To classify the significance of effects the magnitude of change is measured against the sensitivity of the landscape using the guide in Table 3 below. The matrix (Table 3) is only a guide. The assessor also uses professional judgement informed by their expertise, experience and common sense to arrive at a classification of significance that is reasonable and justifiable.

Table 6.3 Guide to Classification of Significance of Landscape and Visual Effects

		Sensitivity of the Landscape/View				
		Very High	**High**	**Medium**	**Low**	**Negligible**
Magnitude of Change to the Landscape/View	**Very High**	*Profound*	*Profound to Very Significant*	*Very Significant to Significant*	*Moderate*	*Slight*
	High	*Profound to Very Significant*	*Very Significant*	*Significant*	*Moderate to Slight*	*Slight to Not Significant*
	Mediu m	*Very Significant to Significant*	*Significant*	*Moderate*	*Slight*	*Not Significant*
	Low	*Moderate*	*Moderate to Slight*	*Slight*	*Not significant*	*Imperceptible*
	Veglig -ible	*Slight*	*Slight to Not Significant*	*Not significant*	*Imperceptible*	*Imperceptible*

The EPA draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, 2017 describes the significance classifications as follows:

Table 6.4 EPA Descriptions of Significance

Significance Classification	Description
Imperceptible	An effect capable of measurement but without significant consequences.
Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight	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.

6.2.3 Methodology for Visual Effects Assessment

Assessment of visual effects involves identifying a number of key/representative viewpoints in the site's receiving environment, and for each one of these: (a) classifying the viewpoint sensitivity, and (b) classifying the magnitude of change which would result in the view. These factors are combined to arrive at a classification of significance of the effects on each viewpoint.

6.2.3.1 Sensitivity of the Viewpoint/Visual Receptor

Viewpoint sensitivity is a function of two main considerations:

- Susceptibility of the visual receptor to change. This depends on the occupation or activity of the people experiencing the view, and the extent to which their attention is focussed on the views or visual amenity they experience at that location.

  Visual receptors most susceptible to change include residents at home, people engaged in outdoor recreation focused on the landscape (e.g. trail users), and visitors to heritage or other attractions and places of community congregation where the setting contributes to the experience. Visual receptors less sensitive to change include travellers on road, rail and other transport routes (unless on recognised scenic routes), people engaged in outdoor recreation or sports where the surrounding landscape does not influence the experience, and people in their place of work or shopping where the setting does not influence their experience.

- Value attached to the view. This depends to a large extent on the subjective opinion of the visual receptor but also on factors such as policy and designations (e.g. scenic routes, protected views), or the view or setting being associated with a heritage asset, visitor attraction or having some other cultural status (e.g. by appearing in arts).

Five categories are used to classify a viewpoint's sensitivity.

Table 6.5 Categories of Viewpoint Sensitivity

Sensitivity	Description
Very High	Iconic viewpoints (views towards or from a landscape feature or area) that are recognised in policy or otherwise designated as being of national value. The composition, character and quality of the view are such that its capacity for change is very low. The principle management objective for the view is its protection from change.
High	Viewpoints that are recognised in policy or otherwise designated as being of value, or viewpoints that are highly valued by people that experience them regularly (such as views from houses or outdoor recreation features focused on the landscape). The composition, character and quality of the view may be such that its capacity for accommodating change may or may not be low. The principle management objective for the view is its protection from change that reduces visual amenity.
Medium	Views that may not have features or characteristics that are of particular value, but have no major detracting elements, and which thus provide some visual amenity. These views may have capacity for appropriate change and the principle management objective is to facilitate change to the composition that does not detract from visual amenity, or which enhances it.
Low	Views that have no valued feature or characteristic, and where the composition and character are such that there is capacity for change. This category also includes views experienced by people involved in activities with no particular focus on the landscape. For such views the principle management objective is to facilitate change that does not detract from visual amenity or enhances it.
Negligible	Views that have no valued feature or characteristic, or in which the composition may be unsightly (e.g. in derelict landscapes). For such views the principle management objective is to facilitate change that repairs, restores or enhances visual amenity.

6.2.3.2 Magnitude of Change to the View

Classification of the magnitude of change takes into account the size or scale of the intrusion of development into the view (relative to the other elements and features in the composition, i.e. its relative visual dominance), the degree to which it contrasts or integrates with the other elements and the general character of the view, and the way in which the change will be experienced (e.g. in full view, partial or peripheral view, or in glimpses). It also takes into account the geographical extent of the change, as well as the duration and reversibility of the visual effects.

Five categories are used to classify magnitude of change to a view:

Table 6.6 Categories of Visual Change

Magnitude of Change	Description
Very High	Full or extensive intrusion of the development in the view, or partial intrusion that obstructs valued features or characteristics, or introduction of elements that are completely out of character in the context, to the extent that the development becomes dominant in the composition and defines the character of the view and the visual amenity.
High	Extensive intrusion of the development in the view, or partial intrusion that obstructs valued features, or introduction of elements that may be considered uncharacteristic in the context, to the extent that the development becomes co-dominant with other elements in the composition and affects the character of the view and the visual amenity.

Medium	Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity.
Low	Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context, resulting in minor alteration to the composition and character of the view but no change to visual amenity.
Negligible	Barely discernible intrusion of the development into the view, or introduction of elements that are characteristic in the context, resulting in slight change to the composition of the view and no change in visual amenity.

6.2.3.3 Significance of Visual Effects

As for landscape effects, to classify the significance of visual effects, the magnitude of change to the view is measured against the sensitivity of the viewpoint, using the guide in Table 3 above.

6.2.4 Quality of Effects

In addition to predicting the significance of the effects on the landscape and views, EIA methodology requires that the quality of the effects be classified as positive/beneficial, neutral, or negative/adverse.

For landscape effects to a degree, but particularly for visual effects, this is an inherently subjective exercise. This is because landscape and views are perceived by people and are therefore subject to variations in the attitude and values of the receptor. One person's attitude to a development may differ from another person's, and thus their response to the effects of a development on a landscape or view may vary.

Additionally, in certain situations there might be policy encouraging a particular development in an area, in which case the policy is effectively prescribing landscape change. If a development achieves the objective of the policy the resulting effect might be considered positive, even if the landscape character is profoundly changed. The classification of quality of landscape and visual effects should seek to take these variables into account and provide a reasonable and robust assessment.

6.3 THE EXISTING RECEIVING ENVIRONMENT (BASELINE SITUATION)

6.3.1 Townscape Character

The site is occupied by a large, low warehouse building set back from the Naas Road behind a parking area, and a similar but smaller building to the rear. The main building - and the site frontage to the Naas Road - is 180m in length. The facade is divided into units with signage of various design creating a multi-coloured façade with uneven parapet. The area in front of the building is cluttered with parked vehicles and signage.

Figure 6.1 – Site context

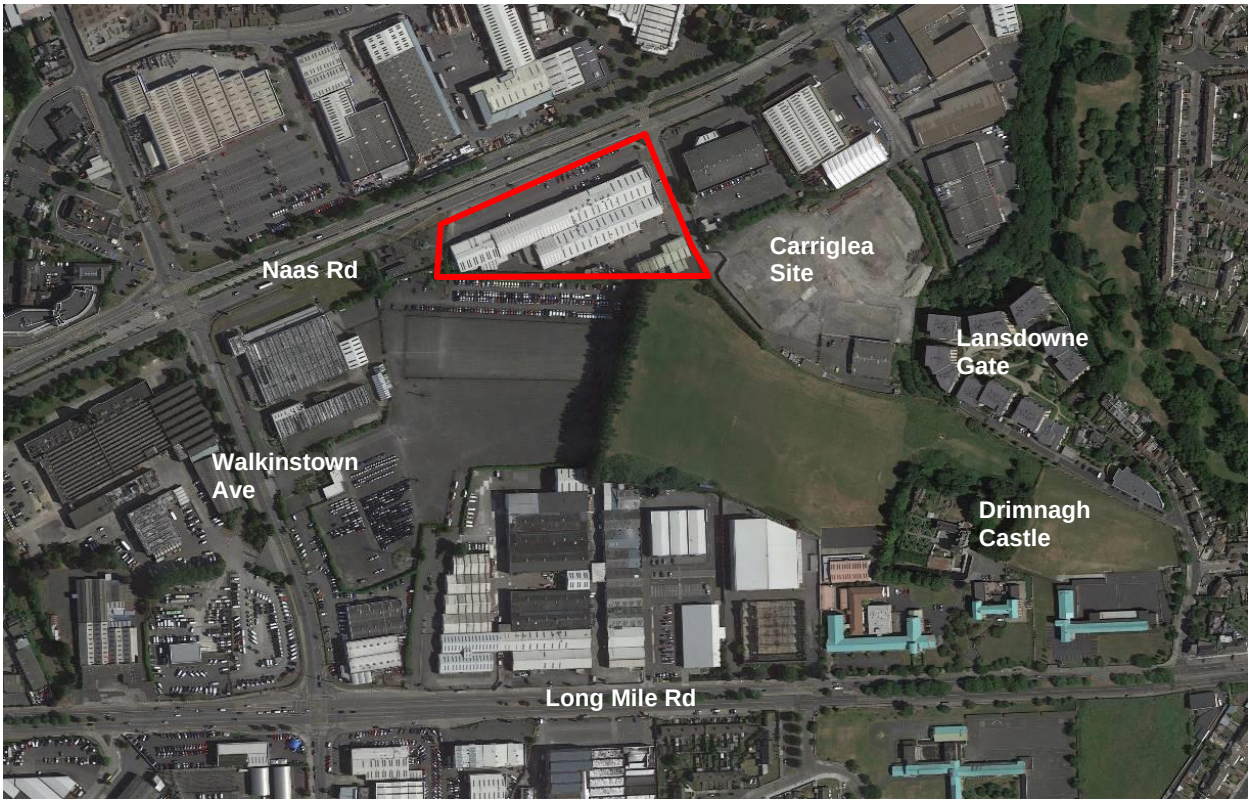


Plate6.1 - A view along the site frontage to the Naas Road

The site is typical of the Naas Road area in its current condition. The road corridor is wide, with carriageways of 2-3 lanes in each direction and the Luas line between the carriageways. On both sides of the road there are sprawling industrial and retail estates occupied by large, low buildings and extensive parking and hard standing areas. The buildings are unsightly and generally fail to address the road/public realm except with their signage. There is a lack of definition and enclosure to the public realm, a lack of legibility and of permeability. There is minimal green infrastructure (GI) and poor connectivity between the GI features that do exist. This character extends along the Naas Road, the Long Mile Road to the south and Walkinstown Avenue to the west of the site – i.e. throughout the Naas Road LAP area.

Overall, the townscape quality of the receiving environment is poor, and the sensitivity to change can be classified 'low' (definition: *'Areas where the landscape has few valued elements, features or characteristics and the character is weak. The character is such that it has capacity for change; where development would make no significant change or would make a positive change. Such landscapes are generally unrecognised in policy and the principle management objective may be to facilitate change through development, repair, restoration or enhancement'*).

The only sensitive landscape receptor in the receiving environment is Drimnagh Castle to the south east. The castle is situated on a campus including two schools, accessed off the Long Mile Road. It is some 300m from the site, separated from the site by the schools' playing pitch (zoned open space) and a large development site known as Carriglea, for which planning permission exists for several hundred apartments in 11 no. bocks of up to 7 storeys. To the east of the Carrriglea site is 'Lansdowne Gate', a high density development which has initiated the transformation of the Naas Road area into a modern, mixed use urban quarter, as prescribed in the Naas Road LAP.

6.3.2 Visual Character

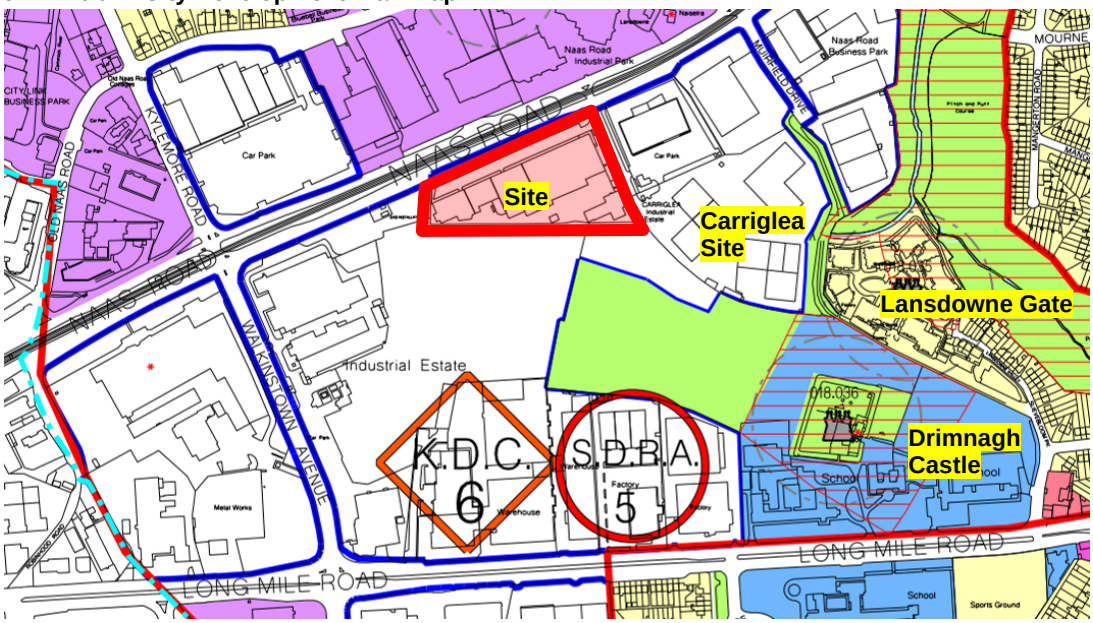
Visual amenity in the Naas Road area is poor. There are few features (buildings, vegetation or topography) of aesthetic value or interest. Views are typically characterised by wide, traffic dominated road corridors flanked by a clutter of signage, fencing and car parking, and large, low buildings of commercial or industrial character, with little vegetation.

6.3.3 Relevant Policy

The site is located at the centre of the Naas Road LAP area. The vision of the LAP is as follows: *"To create a great place to work and live, and create a new urban identity for the Naas Road lands area plan by regenerating existing developed lands as a sustainable mixed use area, capitalising on the area's locational advantages and improving the relationship of the lands to their immediate surroundings through improved linkages, green infrastructure and permeability. As part of this transformation there will be an increase in the range of land-uses, and improvements in the visual environment, resulting in an increase in street level activity and the general revitalisation the area"* (own emphasis).

The area is also identified as a 'Strategic Development and Regeneration Area' (SDRA) and 'Key District Centre' (KDC) in the Core Strategy of the Dublin City Development Plan 2016. The site itself and most of the adjoining lands are zoned Z14: *"To seek the social, economic and physical development and/or rejuvenation of an area with mixed use, of which residential and 'Z6'* [enterprise and employment] *would be the predominant uses"*.

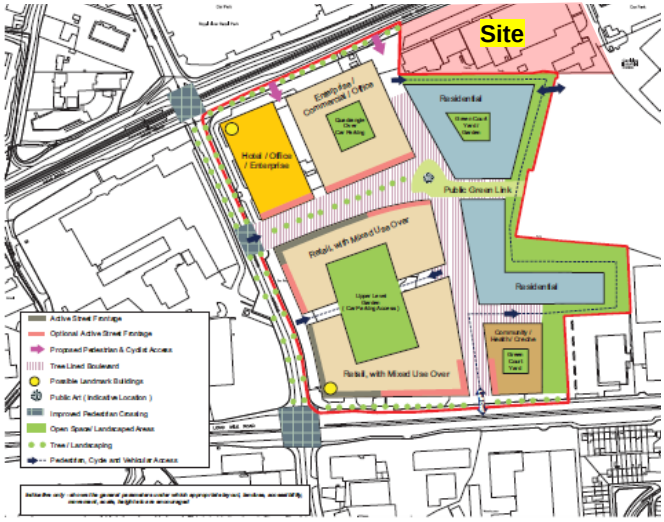
Figure 6.2 – Dublin City Development Plan Map

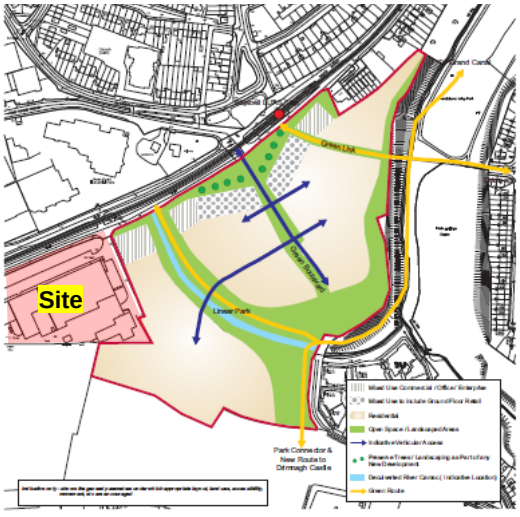


The townscape of the receiving environment (including the site) is thus designated for fundamental change through redevelopment. Concerns that typically arise in the assessment of development proposals, such as the protection of townscape character, integration of key landscape elements or features and protection of visual amenity, do not arise is such situations. The proposed development will rather be judged on its compliance with - or contribution to the realisation of - the objectives of the Naas Road LAP (particularly the policies on 'Urban Form, Design and Public Realm' and 'Green Infrastructure').

The site is not one of the four 'Key Sites' identified in the LAP, for which detailed objectives including spatial arrangement of buildings and open space are prescribed (see LAP Chapter 5). Nor does the site fall into either of the 'Mixed Use Nodes' (see LAP Map 4.2). There are thus no specific objectives for the site's development in the LAP. However, objectives can be derived from those applying to the neighbouring 'Former Nissan Plant' site to the west and south, and the 'Muirfield Drive' site to the east.

Figure 6.3 – Naas Road LAP spatial development objectives for the 'Former Nissan Plant' site to the west and south, and the 'Muirfield Drive' site to the east of the subject site





The objectives for these sites, which are relevant to the subject site, include:

a) a continuous landscape/tree belt along the south side of the Naas Road;
b) a common building line along the Naas Road, with the buildings set well back from the road behind the landscape/tree belt;
c) pedestrian/cycle access points at regular intervals between/through the buildings fronting the Naas Road;
d) an open space/green corridor along the southern site boundary, providing access between the lands to the west and east of the site.

Other notable principles/objectives for the neighbouring sites, which are not stated explicitly but which may be inferred – and which should apply to the subject site - include:

a) the positioning of open spaces predominantly to the rear (south) of the buildings fronting the Naas Road, within the sites, so that the main public realm areas are separated/protected from the Naas Road, and to improve permeability through the very large sites;
b) a fine grain of linear public open spaces (variously named 'boulevard', 'green link', 'green boulevard' in the LAP), aligned east-west and north-south, connecting with the surrounding circulation network and green infrastructure, to maximise pedestrian and cycle permeability and connectivity of green infrastructure.

The LAP specifies a building height of up to 6 storeys along the Naas Road, with buildings stepping down in height away from the main road, into the sites. Landmark buildings of up to 10 storeys are to mark the junctions of Walkinstown Avenue with the Naas Road and Long Mile Road. The LAP however cross refers to the building height policy of the Dublin City Development Plan.

It should be noted that planning decisions subsequent to the preparation of the LAP have permitted buildings taller than 6 storeys, including the existing Lansdowne Gate development (7 storeys) and the Carriglea site (7 storeys).

The LAP building height policy has also been superseded by the publication of the *Urban Development and Building Heights – Guidelines for Planning Authorities*. This national policy document seeks to ensure substantially higher development density than heretofore in urban areas where the supporting infrastructure, particularly public transport, and services can sustain it - through increased building height. The Naas Road area benefits from good public transport services. There is also a general lack of sensitivity and constraints to taller buildings due to the historic pattern of development in the area (e.g. the absence of low-rise residential development, the wide streets, the relative sparsity of cultural-historic sites/structures).

6.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development, the design process and alternatives considered are described in detail in the Urban Design Report accompanying the planning application and in Chapter 2 of the EIAR. The key characteristics of the proposals with regard to potential townscape and visual impacts are as follows:

Buildings

- A building of eight storeys is proposed along the 180m frontage to the Naas Road, wrapping around the corner and along the side access road to form an L shape. Three 'fingers' extend back from the building fronting the Naas Road, stepping down in height towards the rear of the site.
- The predominant material in the building facades is buff coloured brick. The facades feature projecting winter gardens on the Naas Road façade, and a combination of winter gardens and open balconies on the courtyard facades, clad in metal, aligned in vertical strips. Recessed elements, of brick (matching the colour of the metal cladding) in the Naas Road façade, and of

render in the courtyard facades, add further articulation to the building, reducing its apparent mass.

- There are four main entrances to the site/building along the Naas Road frontage, regularly spaced. These take the form of broad, deep recesses in the facade, with glazed curtain walling to three storey lobbies, above which the façade is metal-clad. In addition, there are several entrances to retail units on the ground floor of the building fronting the Naas Road.

Landscape/Public Realm – Naas Road Frontage

- The building is set back 20m from the edge of the Naas Road. Between the building and the road there is a footpath along the front of the building, an internal access road with perpendicular parking, a strip of planting approximately 5m wide, and a footpath along the edge of the road.
- In the planting strip there are clipped hedges (to screen parked cars) and beds of low, flowering plants. There are also trees in the planting strip, selected for their slender form and light canopies or clear stem with elevated canopy. This treatment is intended to soften the road corridor and improve visual amenity while allowing visibility of the retail and office uses at ground and first floor levels in the building.
- In front of the four main entrances there are broad pedestrian crossings over the internal access road, extending to the edge of the Naas Road and forming plaza-type spaces made legible by the detail in the surface materials, seating and lighting.

Landscape/Public Realm – Courtyards and Southern Boundary

- The fingers extending back from the building fronting the Naas Road form a series of south-facing courtyards opening onto a corridor of open space along the southern boundary. The courtyards have communal space at their centres, and private terraces protected by hedges at their edges against the building. Trees are placed selectively in the more enclosed parts of the courtyard (to avoid excessive shadowing), and more liberally where the space is wider. Surface changes, furniture, berming and vegetation indicate changes in usage and 'ownership' of space within the courtyards.
- A playground is proposed in the south eastern corner of the site, as part of the largest courtyard, where the site abuts the playing field (zoned open space) of the schools fronting the Long Mile Road to the south.
- Along the southern boundary of the site, an open space corridor incorporates a footpath, a two-way cycle path, a structural grass emergency access route, and green verges. This corridor extends between the east and west boundaries of the site, allowing public access across the site and potentially connecting with future developments on the neighbouring lands.

6.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

6.5.1 Construction Phase – Landscape and Visual Impacts

During construction the landscape of the site would be severely disturbed by site establishment, demolition works, transport of materials to and from the site, and construction activity. The magnitude of change would be high but it would be (a) confined to the site, and (b) temporary. The significance of the impact on the townscape would be low.

Visual impacts would be confined to the site's immediate environs, particularly the Naas Road as it passes the site. The magnitude of change would be low-medium, the change being experienced fleetingly as road users and Luas passengers pass the site. The sensitivity of these visual receptors is low. The significance of the visual effects during the construction phase would be slight and negative.

6.5.2 Operational Phase – Landscape Impacts

Following construction, the changes to the townscape can be summarised as follows:

Naas Road Frontage

- The existing retail warehouse building fronting the Naas Road would be replaced by a building of similar length but substantially greater height and high architectural and finish quality. The change in use and in building typology, scale, architectural character and quality would dramatically alter the street and townscape character locally.
- The height of the building, at eight storeys, would be one storey higher than the Carriglea (permitted) and Lansdowne Gate developments. This modest step up in height (encouraged by national policy) is appropriate for the following reasons: (a) the Naas Road corridor is wide and substantial height is required to create the built enclosure to generate a sense of 'streetscape', which is lacking in the area; (b) the context townscape is free of any sensitivities which might constrain building height; (c) the eight storey height would still allow for the positioning of taller (10+ storey) landmark buildings at the nearby junctions as prescribed in the LAP.
- Along the Naas Road frontage of the building, the footpaths, pedestrian plaza spaces and planting strip would soften the road corridor and improve visual amenity, while maintaining visibility of the shopfronts and entrances from the Naas Road.
- The retail uses, the footpaths and the pedestrian plaza spaces would activate and animate the Naas Road frontage of the site to a much greater extent than the current development. This would have the effect of 'urbanising' the streetscape.

Rear Frontage

- Along the southern boundary of the site, the broad public open space corridor incorporating a footpath, cycle path and green verges, would significantly improve the connectivity and permeability of the site, and the local townscape.
- This green corridor would connect to the courtyards within the site, including a publicly accessible area in the largest courtyard in the eastern part of the site, in which the playground is located. This space abuts the playing pitch (zoned open space) of the schools fronting the Long Mile Road to the south; this is significant in terms of green infrastructure connectivity.

The above summarises the landscape/townscape changes that would result from the proposed development. At both the site and neighbourhood scale the magnitude of change would be high (definition: *'Change that is moderate to large in extent, resulting in major alteration to key elements, features or characteristics of the landscape and/or introduction of large elements considered uncharacteristic in the context. Such development results in change to the character of the landscape'*).

Measuring the magnitude of change (high) against the sensitivity of the receiving environment (low – see 6.3.1 above), the potential townscape impacts can be classified 'moderate'.

The change would be positive since (a) an existing detractor in the townscape (the existing building) would be replaced by a building and associated landscaping/public realm of appreciably high design and finish quality, changing and significantly enhancing the townscape character locally; (b) the change would contribute to the realisation of the LAP objectives for the area, particularly the objectives for Urban Form, Design and Public Realm' and 'Green Infrastructure'.

6.5.3 Operational Phase – Visual Impacts

Due to the area's sparse urban grain and large commercial and industrial plots, the public realm potentially affected by the proposed development is limited in extent; a large proportion of the area is inaccessible (for example the large area directly north of the site across the Naas Road). Except for Drimnagh Castle to the south east of the site, the only views towards the site available to the public are from the public roads and the parking areas of commercial or industrial premises.

Six viewpoints were selected for assessment visual impacts on the key receptors in the receiving environment:

- Viewpoints 1 and 2 are on the Naas Road, representing the largest group of potential visual receptors.
- Viewpoint 3 is the view from the access road to the Lansdowne Gate development beyond the Carriglea site to the east of the subject site. Lansdowne Gate is the location of the nearest residential visual receptors.
- Viewpoints 4a and 4b are at Drimnagh Castle, alongside Lansdowne Gate the location of the nearest sensitive visual receptors to development in the area.
- Viewpoint 5 is a view from one of the commercial properties to the south of the site fronting the Longmile Road.
- Viewpoint 6 is a view from the entrance to the former Nissan Plant site on Walkinstown Avenue to the south west.

Figure 6.4 – Viewpoints for visual impact assessment

The viewpoints are individually assessed below (refer to 6.2.3 for the methodology and terms used). The assessments should be read in conjunction with the book of photomontages provided under separate cover.

6.5.3.1 Viewpoint 1 – Naas Road Adjacent to Site

Existing View

The viewpoint represents the view experienced along the Naas Road when travelling west from the city centre. The transition from residential to commercial-industrial starts some 400m back, to the east, and at this point the surrounding townscape is entirely commercial-industrial in character. The broad road corridor dominates the view, but the low building is nonetheless prominent, its coloured shopfronts and

signage competing for attention and the parked cars in front of the building contributing further to the commercial streetscape character and poor visual amenity. The viewpoint sensitivity is low - due to (a) the occupation of the visual receptors, i.e. traveling along a busy urban road, (b) the poor quality of the existing views, and (c) the designation of the area for development/regeneration).

Proposed Change

Two photomontages are provided for this viewpoint, the first showing the winter view and the second showing the same view in the summer. The low, unsightly warehouse building would be replaced by a new mixed use building of eight storeys - the height comfortably in proportion with the wide road corridor. The predominant material in the facades is buff coloured brick but the façade is articulated with projecting winter gardens aligned in vertical strips - glazed, with metal facias and soffits - and recessed elements of brown brick matching the metal cladding in colour. The main entrances are marked by broad, deep recesses in the facade, with glazed curtain walling to the three storey lobbies, above which the façade is metal-clad. Clipped hedges and beds of low, flowering plants will partially screen the car parking in front of the building but the shopfronts along the Naas Road will be visible/legible above this low planting. The trees planted in this strip have slender form and light canopies or clear stems with elevated canopy to maintain visibility of the building, particularly the shopfronts. The magnitude of change would be very high.

Significance of Effects

Measuring the viewpoint sensitivity against the magnitude of change, the significance of the potential visual impact is moderate. The change would be positive. The character of the Naas Road corridor would be transformed by a mixed use building and public realm of appreciably high design and finish quality.

6.5.3.2 Viewpoint 2 – Naas Road Approaching the Site from the West

Existing View

This view – taken from the bus stop near the Walkinstown Avenue junction - is also experienced when travelling east on the Naas Road towards the city centre. The wide road corridor dominates the view, with low, warehouse-type buildings set back behind parking or hard standing areas, with palisade fencing on the boundaries. Although less than 200m from the site, the existing building is barely discernible. For an urban environment (particularly an important route into the city) there is a lack of built enclosure, an absence of buildings or any other features of note/value, poor legibility and visual amenity. The viewpoint sensitivity is low.

Proposed Change

The new building would stand prominently on the roadside, its height comfortably in proportion with the wide road corridor. The long frontage and strong form of the building would initiate the enclosure of the road corridor and the creation of an urban streetscape – although this will only be fully realised with the development of neighbouring sites and the lands across the road (all designated for redevelopment). Even from a distance of 175m the design and finish quality of the building would be appreciable, and the townscape otherwise devoid of built assets would be enhanced. The magnitude of change would be high.

Significance of Effects

The potential visual impact is of moderate significance. The change would be positive. The development would initiate the transformation of the Naas Road corridor in line with the relevant policy.

6.5.3.3 Viewpoint 3 – Lansdowne Gate

Existing View

The access road to Lansdowne Gate is aligned in such a way as to provide a view towards the site, which is some 300m distant beyond the playing fields of the nearby schools and the Carriglea development site.

A warehouse building on the Carriglea site is visible in the middle distance of the existing view. The Lansdowne Gate buildings, up to seven storeys tall, are to the right of the road, and an area of open space is to the left behind a tall fence. The viewpoint sensitivity is medium.

Proposed Change
The new building would protrude only marginally above the warehouse, in the distance, causing only minor change to the composition and no change to the character of the view. The magnitude of change would be negligible. When the Carriglea site is developed (as permitted), the proposed development would no longer be visible.

Significance of Effects
The potential visual impact is 'not significant'. The change would be neutral, i.e. there would be no discernible improvement or disimprovement to visual amenity.

6.5.3.4 Viewpoints 4a and 4b – Drimnagh Castle

Existing View
Two photomontages have been produced - to assess the visibility and visual effects of the development on the approach to the castle through the school campus (4a), and from within the castle enclosure (4b). On the approach the castle is in the foreground to the right and a row of mature trees extends across the view to the left, beyond the school buildings. From within the castle enclosure the westward view is framed by the castle and outbuildings, across the formal garden and through the canopies of a row of trees that surrounds the castle. The viewpoint sensitivity is high.

Proposed Change
The proposed development is over 300m to the north west beyond the playing fields of the schools. In both views, from outside and within the castle enclosure, the new building would be largely screened by the trees surrounding the castle, even in winter when the trees are bare. In summer the development would not be visible. The magnitude of change would be negligible to none.

Significance of Effects
The potential visual impact is 'not significant'. The change would be neutral.

6.5.3.5 Viewpoint 5 – Commercial Property Fronting Longmile Road

Existing View
There is a broad belt of commercial-industrial development north of the Longmile Road. These buildings, although low, block all views towards the site from the Longmile Road (the nearest road/public realm area to the south of the site). The viewpoint sensitivity is low.

Proposed Change
The proposed development would not be visible.

Significance of Effects
There would be no visual impact.

6.5.3.6 Viewpoint 6 – Industrial Property Fronting Walkinstown Avenue

Existing View
The view is taken from the entrance to the 'Former Nissan Plant' to the west of the subject site on Walkinstown Avenue. In the foreground beyond the gate there is a large hard standing area, with low warehouse type building to the left. The site is some 240m to the north east beyond the extensive

industrial property, which is identified as a 'key development site' in the Naas Road LAP. The viewpoint sensitivity is low.

Proposed Change

The proposed development would be visible in the distance beyond the industrial lands in the foreground (designated for future high density mixed use development). Although indistinct from this distance the steps down in the height can be discerned from this angle, from eight storeys along the Naas Road to four, five and six storeys towards the rear of the site where the building is intended to have a more domestic scale. The magnitude of change would be low. Once the Former Nissan Plant site is developed, as prescribed in the LAP, the subject development would most likely not be visible.

Significance of Effects

The potential visual impact is 'not significant'. The change, although minor, would be positive in that it would visibly initiate the intended transformation of the townscape from industrial to mixed use.

6.6 POTENTIAL CUMULATIVE IMPACTS

The site is at the centre of a large area zoned for 'Strategic Development and Regeneration'. The proposed development in combination with (a) development of the Carriglea site to the east as permitted, and (b) development of the 'Former Nissan Plant' and the remainder of the Naas Road LAP lands as prescribed in the LAP, would result in the transformation of the townscape. An area characterised by industrial and commercial use, buildings and public realm of poor quality and limited visual amenity, would be transformed into a mixed use urban quarter of high quality. The proposed development would make a significant contribution to this intended change and would set a high standard for future development in the LAP area to follow.

6.7 'DO NOTHING' IMPACT

Were the site not to be developed it would continue to detract from the character and quality of the townscape and maintain the poor visual amenity in the Naas Road area. Its negative impacts would be amplified if the surrounding lands were developed in accordance with the Naas Road LAP.

6.8 AVOIDANCE, REMEDIAL & MITIGATION MEASURES

The proposed development takes account of the physical context and the policy for development of the area. The potential impacts on the townscape and visual amenity are all positive. Therefore no measures to avoid, reduce or mitigate negative impacts have been identified.

6.9 PREDICTED IMPACTS OF THE PROPOSED DEVELOPMENT

Since no measures to avoid, reduce or mitigate negative impacts have been recommended, the potential impacts as described in Section 6.5, are predicted to result from the development. The predicted impacts can be summarised as follows:

6.9.1 Operational Phase – Landscape/Townscape Impact

The significance of the townscape impacts is 'moderate'. The impacts would be positive since (a) an existing detractor in the townscape would be replaced by a building and public realm of high design and finish quality, changing and enhancing the townscape character, and (b) the change would contribute to the realisation of the LAP objectives for the area, particularly the objectives for Urban Form, Design and Public Realm and Green Infrastructure.

6.9.2 Operational Phase – Visual Impacts

The predicted visual impacts on the six viewpoints assessed are as follows:

Table 6.7 Predicted Visual Impacts

No	Location	Sensitivity	Magnitude of Change	Significance of Effects
1	Naas Road adjacent to site	Low	Very High	Moderate, Positive
2	Naas Road approaching the site from the west	Low	High	Moderate, Positive
3	Lansdowne Gate	Medium	Negligible	Not Significant, Neutral
4a	Drimnagh Castle approach	High	Negligible to None	Not Significant, Neutral
4b	Drimnagh Castle enclosure	High	Negligible to None	Not Significant, Neutral
5	Commercial property fronting Longmile Road	Low	None	No impact
6	Industrial property fronting Walkinstown Avenue	Low	Low	Not Significant, Positive

In summary, the development would significantly improve visual amenity along the Naas Road in the vicinity of the site. The visual impacts elsewhere would be of lower significance, but where visible the development would have a positive effect on views.

6.10 MONITORING

n/a

6.11 REINSTATEMENT

n/a

6.12 INTERACTIONS

n/a

6.13 DIFFICULTIES ENCOUNTERED IN COMPILING

n/a

6.14 REFERENCES

Dublin City Development Plan 2016-2022
Naas Road Lands Local Area Plan (Adopted January 2013)
Urban Development and Building Heights – Guidelines for Planning Authorities

Chapter 7:

Lands and Soils

7.0 Land and Soils

7.1 Introduction

Author: John Considine, (B Eng MIEI MIStruct E C Eng FConsEI IEI Mem No. 022256)

This chapter of the EIAR assesses the impacts of the proposed residential development, at the Concorde Industrial Estate on the Naas Road, on the land and soils in the area. This section should be read in conjunction with the architectural drawings for the development & the project description sections of this EIAR. The proposed residential development consists of one large building divided into 5no. blocks (A-E) and a second smaller building in the south-east corner of the site (block F) along with landscaping works carried out to the surrounding locale.

Existing:

The subject site is currently occupied by a number of small business focused towards automobile repair/sale, along with one unit being used as a gym. The overall site totals 1.88 hectares with the proposed building footprint 0.58 hectares, (31% of the overall site). The building at the south-east corner of the site and the last unit to the west end of the site are currently unoccupied.

The immediate vicinity of the site is shown in Figure 7.1.1 below. The site is bounded to the north by the Nass Road, to the east by an un-named public access road (cul de sac), to the west by an ESB high voltage mast and compound and to the south by a car yard and Drimnagh Castle playing fields. The main point of access to the site will be via the un-named road to the east which, in turn, is accessed from the Naas Road via a proposed new signalised junction. The site surface is generally flat, at approximately +39.65m. The surface levels drop in the south-east corner by 0.5 m to 39.15m. There is a low retaining wall along the south boundary. There is also a low level retaining wall (circa 0.75m in height) along the full northern (Naas Road) boundary.

Proposed:

Planning permission is being sought for a mixed-use residential development at the Concorde Industrial Estate on the Naas Road.

The proposal is for a mixed-use residential development of 492 no. apartment units over 8 no. storeys, over the ground and first floor levels of retail / restaurant floor space and a single level basement.

The proposed apartment mix consists of 104 no. studio units, 136 no. 1 bed units, 21 no. 2 bed units (3 person) and 231 no. 2 bed units (4 person). Balconies are provided for the residential apartments on the north eastern, north western, south eastern and south western elevations of the respective buildings. Access to the residential units will be provided via a stair and lift core from basement and ground floor level. A total of 238 no. car parking spaces will be provided, with 200 no. provided in the basement car park allocated to the residential units with 38 no. surface car parking spaces provided for the commercial units incorporating 10 no. car club spaces. The development includes 516 no. bicycle parking spaces for the apartments and commercial units, located at basement and ground floor level. The development also includes a bin store and plant area at ground floor level and plant enclosures at roof level.

It is envisaged that all structural loads will be carried via concrete foundations to either bedrock or the over-lying layers of stiff black boulder clay.

Surface water drainage (including Sustainable Drainage Systems - SuDS), foul water drainage, water supply and road network will be constructed to service the proposed development.

Figure 7.1.1 – Site Location

7.2 Study Methodology

This section of Chapter 5.0 was prepared in accordance with the Guidelines on the Information to be contained in Environmental Impact Statements (EPA 2015 (draft)) and Advice Notes for Preparing Environmental Impact Statements (EPA 2015 (draft)) and Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessments August 2018.

The following sources of information were used in the completion of this assessment:

- Site Visit
- Geotechnical Site Investigation Report
- Geological Survey of Ireland (GSI) online maps and databases
- Eastern CFRAMS Flood Mapping from OPW
- EPA online maps and databases
- Topographical Survey
- Teagasc soil and sub-soil data.

7.3 The Existing Receiving Environment

7.3.1 Bedrock Geology

The bedrock geology of this area is of the Lucan Formation. The bedrock is identified as a combination of calp limestone and shale, refer to Figure 7.3.1 below. Bedrock was located approximately 8.5m below ground level, per the site investigation report.

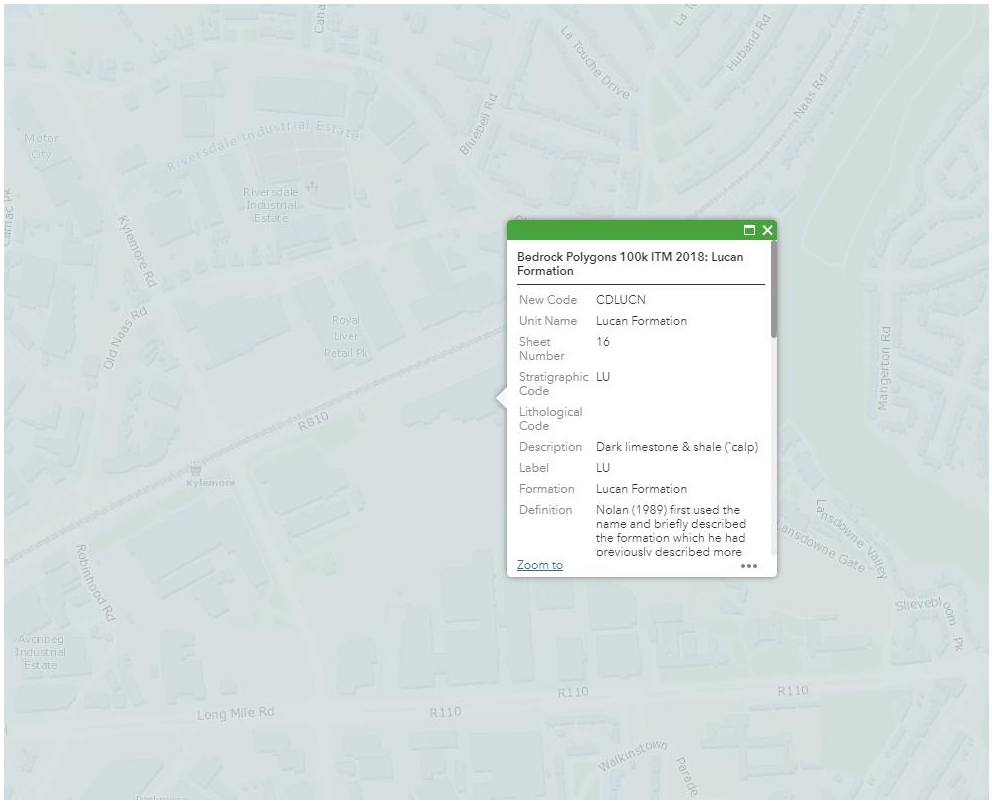


Figure 7.3.1 – Bedrock Mapping of Site by GSI ***(https://gis.epa.ie/EPAMaps/, n.d.)***

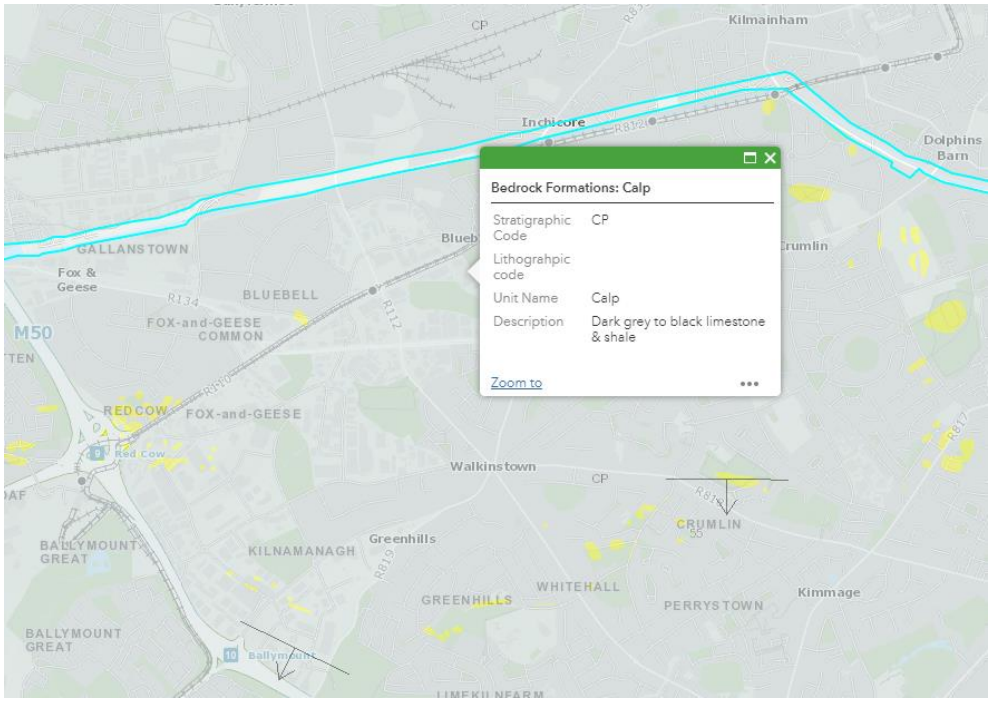


Figure 7.3.2 – Bedrock Mapping of Site by GSI ***(https://gis.epa.ie/EPAMaps/, n.d.)***

7.3.2 Subsoil (Quaternary) Geology

As can be seen in Figure 7.3.3 below, the near surface subsoil is predominantly comprised of made ground.

The quaternary period is the most recent stage of the geological period. It marks the period of the Ice Age and the postglacial period which extends to the present day. Most surface deposits were deposited in the Quaternary Period and provide the parent materials for the soils in the area.

Most sediments of the Quaternary period were deposited during the Ice Age itself either directly from the huge ice sheets or by meltwater from the sheets as they melted. Ice sheets would have slowly eroded the underlying bedrock producing sediment. This sediment may include particles of all sizes ranging from clay to boulder and which when spread over the surface by glacial ice, takes the form of till (boulder clay). Alternatively, sediment may be carried and sorted by meltwater and deposited as sand and gravel, with silt and clay deposited separately in lake systems or carried away to the sea. Glacial deposits therefore contain fragments of the type of bedrock over which the ice originally passed.

A site investigation was performed for the existing development. Groundwater was observed at depths of 2.1m – 2.48m below ground level in the two ground water monitoring standpipes established as part of the site investigation, which has been attached in Appendix 7.1.

Figure 7.3.3 – Subsoil Mapping of Site by GSI ***(GSI, n.d.)***

7.3.3 Soils

The GSI soils map indicates the predominant soil type in the development area to be till derived from limestones. An extract from the GSI soils map relevant to the site is detailed in Figure 7.3.4 below.

Teagasc soil maps classify soils beneath most of the site as Urban, Figure 7.3.5.

The site investigation identified the typical Dublin stratigraphy of firm Brown Boulder Clay and Stiff Black Boulder Clay overlying strong Calp Limestone. The uppermost layer is Made Ground varying in depth from 0.4m – 2.5m in the investigation locations. It consists of concrete, bitmac construction waste and weathered boulder clay. The boulder clay is described as slightly sandy gravelly clay with low cobbles and boulder content.

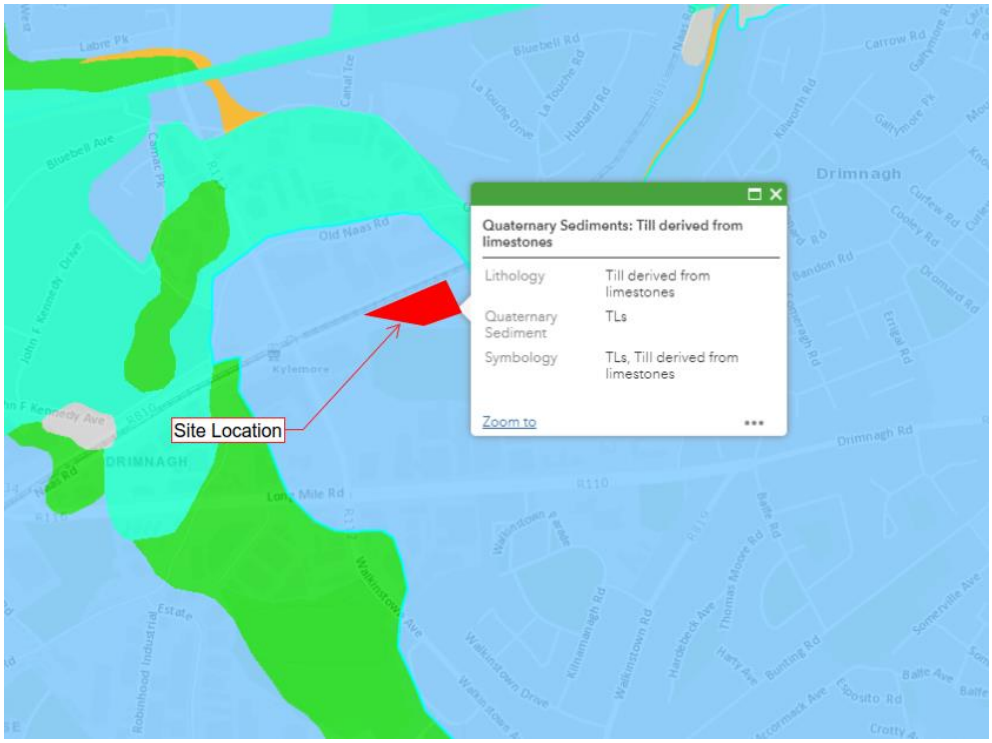


Figure 7.3.4 – Extract from GSI Quaternary Mapping – Till Derived from Limestones ***(GSI, n.d.)***

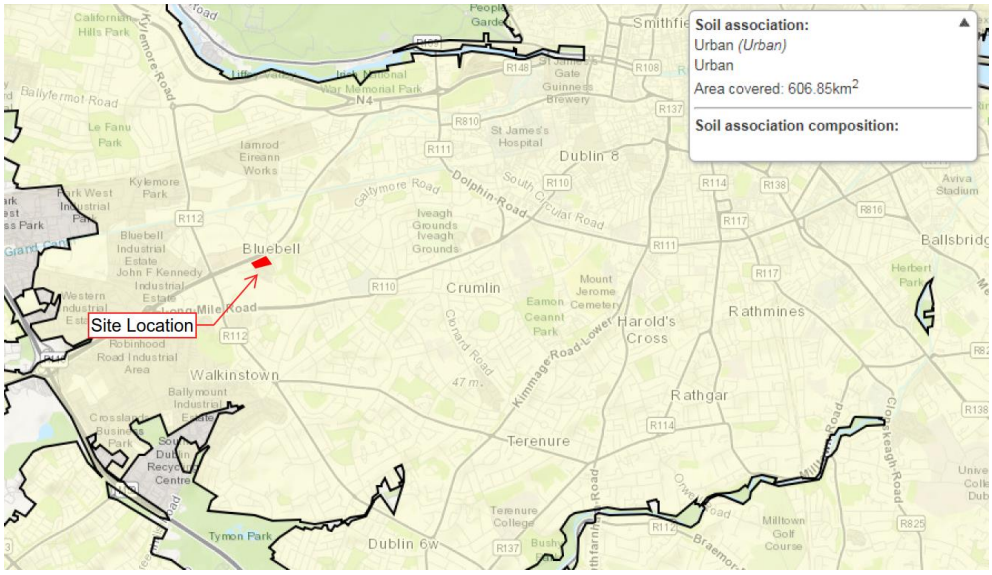


Figure 7.3.5 – Extract from Teagasc Soil Map ***(Teagasc, n.d.)***

7.3.4 Hydrogeology

7.3.4.1 Regional Hydrogeology:

Groundwater can be defined as water that is stored in, or moves through, pores and cracks in sub soils. Aquifers are rocks or deposits that contain sufficient void spaces and which are permeable enough to allow water to flow through them in significant quantities. The potential of the rock to store and transport water is governed by permeability, of which there are two types, intergranular and fissure permeability.

Intergranular permeability is found in sediments, sands, gravels and clays. Fissure permeability is found in bedrock, where water moves through (and is stored in) cracks, fissures, planes and solution openings.

When considering groundwater, it is important to consider the underlying geology, its complexity including faults, the large amounts of water and rainfall available for recharge and the overlying Quaternary deposits. The bedrock geology of this area is defined in Figure 7.3.6 as limestone with shale, (Dublin Calp Limestone). The bedrock mapping for the area as defined in the GSI is included as above.

The Geological Survey of Ireland has devised a system for classifying the aquifers in Ireland based on the hydrogeological characteristics, size and productivity of the groundwater resource. The three main classifications are Regionally Important Aquifers, Locally Important Aquifers and Poor Aquifers.

In Figure 7.3.6 the site area is classified by the GSI as a Locally Important Aquifer which is moderately productive only in local zones. This is an aquifer with a limited and relatively poorly connected network of fractures, fissures and joints, giving a low fissure permeability which tends to decrease further with depth. A shallow zone of higher permeability may exist within the top few metres of more fractured/weathered rock, and higher permeability may also occur along fault zones. These zones may be able to provide larger 'locally important' supplies of water. In general, the lack of connection between the limited fissures results in relatively poor aquifer storage and flow paths that may only extend a few hundred metres and the site consists primarily of Till (TLs) with no karst features in this area.

There are no groundwater wells or springs recorded on the GSI Groundwater Data Viewer mapping on or near the site. Limestones with this aquifer classification typically exhibit low storability.

A site investigation was carried out in 2018 which included assessment of soil infiltration rates based on the requirements of BRE digest 365. The results of these tests are included in the site investigation report and further detail on the methodology used is included within the infrastructure report appendices.

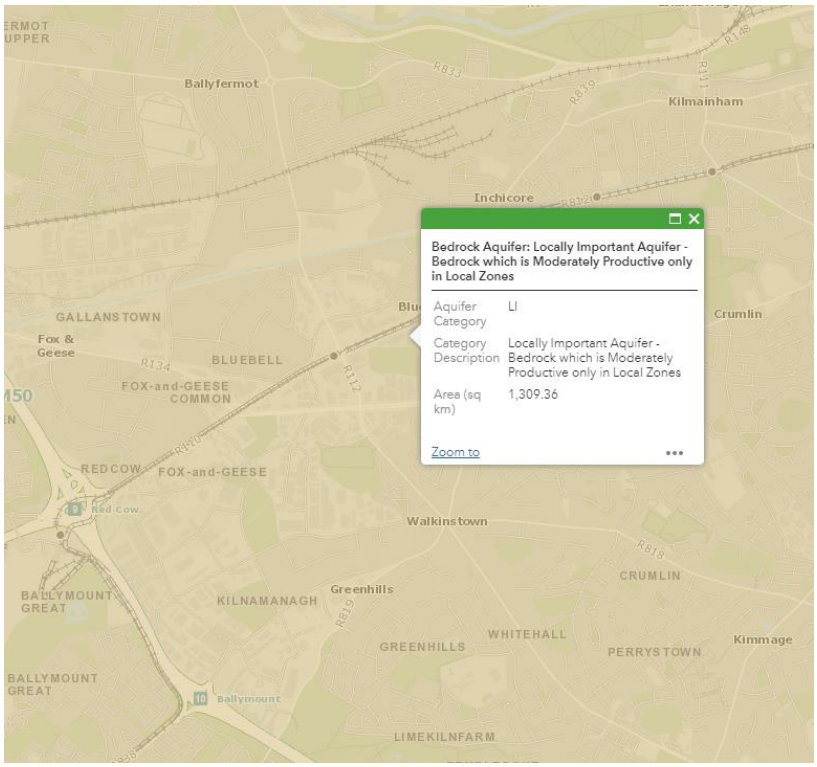


Figure 7.3.6 – Extract from GSI Groundwater Aquifers – Bedrock Poor Aquifer ***(GSI, n.d.)***

7.3.4.2 Groundwater Vulnerability:

Aquifer or groundwater vulnerability is a relative measure of the ease with which the groundwater could be contaminated by human activity and depends on the aquifer's intrinsic geological and hydrogeological characteristics. The vulnerability is determined by the permeability of any overlying deposits. For example, bedrock with a thick, low permeability, clay-rich overburden is less vulnerable than bedrock with a thin, high permeability, gravelly overburden.

Groundwater vulnerability categories are defined by the GSI as:

- X - Extreme rock at or near surface or karst
- E - Extreme
- H - High
- M - Moderate
- L - Low

These categories are used for mapping purposes and in the assessment of risk to ground waters. The classifications are based on the thickness and permeability of the sub-soils overlying the aquifer. The GSI has classified the aquifer vulnerability underlying the site in Figure 7.3.7 as "M" (moderate) which infers the bedrock is at a depth of 10m below moderately permeable till. This corresponds with the ground investigation which was undertaken. Of the 3no. boreholes 2no. reached a depth of 10m with only one borehole hitting the bedrock at a depth of 8.5m.

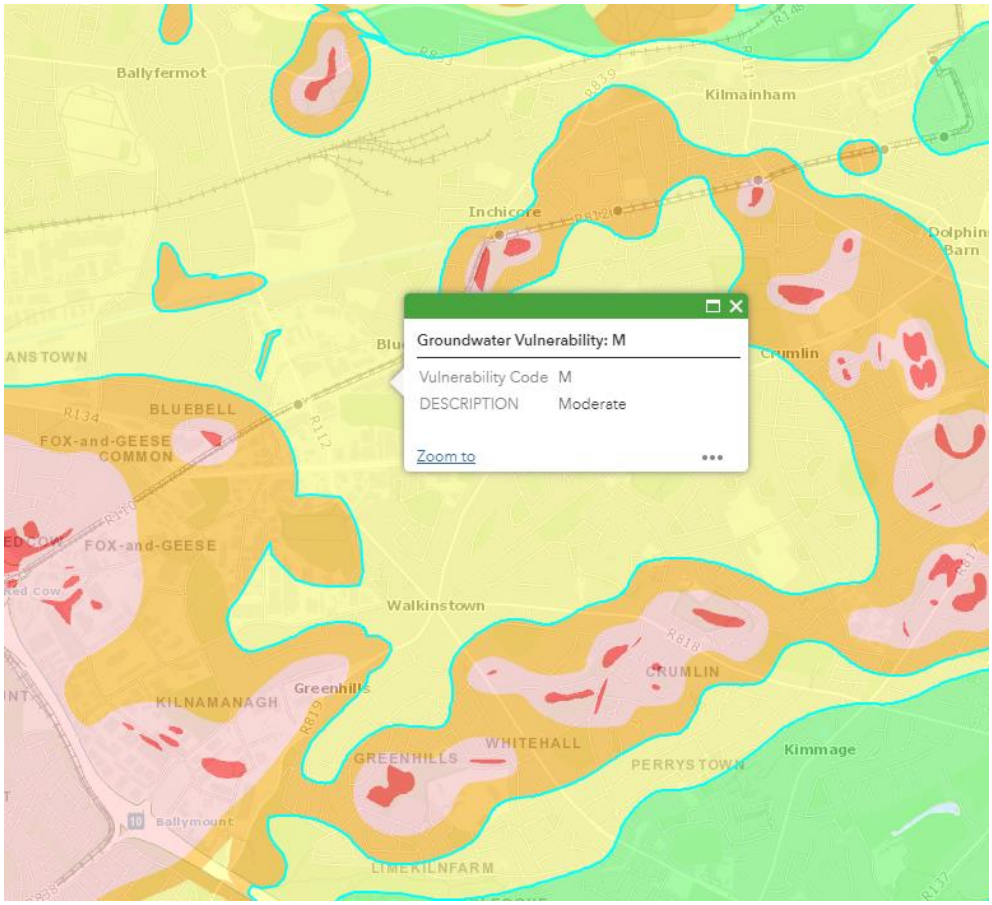


Figure 7.3.7 – Extract from GSI Ground Water Data – Site has "M" Vulnerability ***(GSI, n.d.)***

7.3.4.3 Local groundwater usage and source protection area:

The GSI online map does not identify any significant or notable abstraction wells within the vicinity of the proposed development. No groundwater protection zones are marked in proximity to the site.

7.3.4.4 Recharge:

Effective rainfall is the amount of rainfall available as either recharge to ground or run-off to surface water after evaporation or taken up by plants and is 417mm/yr. The recharge coefficient, which is the proportion of effective rainfall to recharge groundwater, is estimated at 20% on the site. Recharge is the amount of rainfall that replenishes the aquifer, it is a function of the effective rainfall, the permeability and thickness of the subsoil and the aquifer characteristics. According to GSI the maximum recharge capacity to the bedrock is 200 mm/yr across the site.

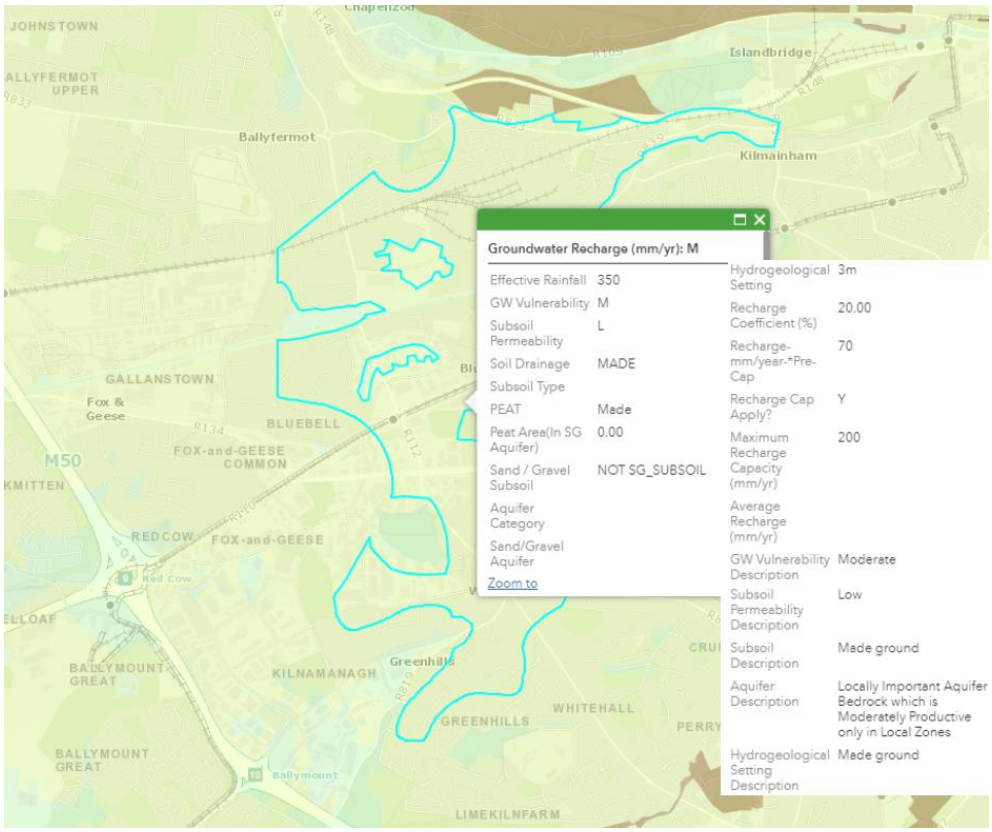


Figure 7.3.8 – Extract from GSI Groundwater Recharge Map *(GSI, n.d.)*

7.3.4.5 Site Hydrogeology:

The characteristics of the underlying limestone bedrock and local topography appear to have a strong influence in the hydrogeology of the site. Groundwater is likely present within the upper levels of the bedrock with little or no groundwater present within the subsoils. Groundwater flows follow the topographical relief of the area and generally flow towards the nearby River Carmac.

7.3.4.6 Groundwater Quality:

Under the requirements of the Water Framework Directive, the Dublin groundwater body was classified as having an overall good status for water quality and quantity 2010-2015. However, it is classified as 'at risk' of not achieving at least good ecological or good chemical status/potential by 2015. No site specific water quality data is available from the site investigation.

7.3.4.7 Groundwater Flood Risk:

Groundwater flooding can occur during lengthy periods of heavy rainfall, typically during later winter/early spring when the groundwater table is already high. If the groundwater level rises above surface level, it can pond at local points and cause periods of flooding.

7.4 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 proposed environment that could arise. For this chapter the potential impact on land and soils is discussed.

The proposal is for a mixed-use residential development of 492 no. apartment units over 8 no. storeys, over the ground and first floor levels of retail / restaurant floor space and a single level basement.

The proposed apartment mix consists of 104 no. studio units, 136 no. 1 bed units, 21 no. 2 bed units (3 person) and 231 no. 2 bed units (4 person). Balconies are provided for the residential apartments on the north eastern, north western, south eastern and south western elevations of the respective buildings. Access to the residential units will be provided via a stair and lift core from basement and ground floor level. A total of 238 no. car parking spaces will be provided, with 200 no. provided in the basement car park allocated to the residential units and 38 no. surface car parking spaces provided for the commercial units, incorporating 10 no. car club spaces. The development includes 516 no. bicycle parking spaces for the apartments and commercial units, located at basement and ground floor level. The development also includes a bin store and plant area at ground floor level and plant enclosures at roof level.

Surface water drainage (including Sustainable Drainage Systems - SuDS), foul water drainage, water supply and road network will be constructed to service the proposed development.

It is envisaged that all structural loads will be carried via concrete foundations to either bedrock or the over-lying layers of stiff black boulder clay.

Surplus materials from these excavations will be disposed of off-site.

7.5 Potential Impact on the Proposed Development

The predicted impacts of the proposed development with regard to the land and soil environment will be assessed for the construction and operational phases.

7.5.1 Construction Phase

It is anticipated that the development site works and excavation proposals will not be deep enough to impact the underlying bedrock geology during the construction phase. The maximum excavation depth for foundations and lift pits are anticipated to extend to a depth of 4.5m below ground level. Bedrock was encountered in only one of the site investigation boreholes at a depth of 8.5m.

It is therefore considered that the greatest impact of the construction will arise from the extensive stripping and wide scale excavation of soils and sub-soils to prepare and construct the basement.

The main volume of excavation will be from the planned single-storey basement to be constructed as part of the proposed development. In addition, excavation will be necessary for the proposed underground surface water attenuation systems. Reusable excavated soils and rock will be retained on-site for backfilling or drainage purposes to reduce the total volume of imported & exported material. It is anticipated that the impact on soils arising from the construction phase will be short term and moderate.

The initial development of the site would involve extensive stripping of the topsoil (approximately the upper 300mm of soil). Excavation of subsoil layers would be required to facilitate site development works, in particular the construction of foul and surface water sewers and underground surface water storage structures (attenuation). It is envisaged that non-reusable excavated material will be removed off-site.

Removal of the upper soil layers would be necessary across a large area of the site. Top-soil will initially be stripped from the lands and stored for later re-use in the landscaping for the developments. However, given that the entire site is currently covered with hardstand, it is envisaged that there will be little or no surplus top-soil produced by the site.

The installation of the proposed basement and surface water storage structure will require a significant quantity of subsoil to be excavated to provide sufficient storage volumes for storm events.

Earthworks and the removal of topsoil would expose subsoil layers to the effects of weathering and may result in the erosion of soil, particularly in times of adverse weather conditions. Surplus subsoil caused by excavations for foundations, roads and drainage should be stockpiled and taken off-site to a licensed landfill facility.

Increased traffic associated with the construction works would have the effect of compacting existing subsoil layers within the site. The regular movement of heavy machinery and plant to and from the site would also result in an increased risk to the integrity of the surrounding road network, as well as facilitating the unwelcome transfer of mud and dust to surrounding access routes in the absence of mitigation.

It will be necessary to import materials to the site; in particular large volumes of stone will be required for construction of the roads, foundations and services. Also, large quantities of concrete, bricks, steel, tar etc. will all be delivered to site by lorry.

Landscaping for the development will reduce the initial impact from the construction phase and will protect the exposed soils from ongoing weathering and erosion. The impacts on the underlying bedrock geology arising from the construction phase will be minimal, with maximum excavation depths terminating 4.5m above encountered bedrock levels. The greatest impact will be to the soils from the construction activity as soil levels will be greatly altered throughout. However final landscaping will reduce and address these impacts. It is anticipated that the impact on soils arising from the construction phase will be short term and moderate.

There is a potential risk of localised contamination from construction materials leeching into the underlying soils by exposure, dewatering or construction related spillages resulting in a Permanent Negative impact on the soils. In the case of soils, the magnitude of this impact is Small Adverse as it may result in the requirement to excavate/remediate a small proportion of contamination or result in a low risk of pollution to the soils. As a result, its significance is imperceptible for all important soils features.

There is a potential risk of localised contamination of the groundwater due to construction activities i.e. construction spillages, leaks etc. resulting in a Permanent Negative impact on the groundwater, however, the low permeability Boulder Clay will effectively eliminate the potential for contamination to infiltrate into the underlying aquifer. For this reasons, the impact on the groundwater contained within the bedrock aquifer is considered as Small Adverse.

The potential impact on hydrogeology during the construction phase is considered to be short term, temporary and moderate without mitigation measures in place.

7.5.2 Operational Phase

The day-to-day activities of the completed development would be unlikely to have any direct impact on the groundwater environment. Minor impacts may include increased infiltration and therefore slightly increased recharge volumes entering the groundwater. This is directly related to the creation of permeable development areas which, pending their arrangement will reduce run-off volumes and increase infiltration potential. The risk of spills or leaks of fuels and oils from residential vehicles may impact if the surface water system is not designed to address this.

On completion of the construction phase, it is not envisaged that there would be a further direct impact on the soil or geological structure. Ensuring appropriately designed and constructed site services will protect the soils and geology from future contamination arising from operation of the developments.

The impacts on soils and geology arising from the operational phase will be temporary and very minor.

7.6 Potential Cumulative Impacts

Given the scale of the proposed development, and the capacity of the surrounding environment to accommodate a development of this nature, it is not likely to give rise to any significant effects cumulatively or, in combination with, other developments in the area.

7.7 'Do-Nothing' Impact

Under a '*do-nothing'* scenario there would be no change to the soil environment at the application site.

7.8 Avoidance, Remedial and Mitigation Measures

7.8.1 Construction Phase

In order to minimise the impact of construction on the sites soils and geology the following mitigation measures should be implemented:

7.8.1.1.1 Land and Soils Construction Stage Measures to be Implemented:

- In order to prevent the accidental release of hazardous materials (fuels, paints, cleaning agents, etc.) during construction site activity all hazardous materials should be stored within secondary containment designed to retain at least 110% of the storage contents. Temporary bunds for oil/diesel storage tanks should be used on the site during the construction phase of the project. Safe materials handling of all potentially hazardous materials should be emphasised to all construction personnel employed during this phase of the project.
- Sediment runoff will be minimised by standard engineering measures including sediment skirts around soil stockpiles, sediment retention barriers in surface water drains and the use of adequate construction roads.
- Construction access to the site will be from the Naas Road. The provision of wheel wash areas at the construction entrances to the development will minimise the amount of soil deposited on the surrounding road network.
- Measures will be implemented throughout the construction stage to minimise the risk of contamination of the soil from accidental oil and petrol leakage from site plant. Bunding of storage areas and refueling areas will be incorporated into the site compound. The bund walls will be designed to the appropriate level to ensure no over-spilling occurs in the event of an accidental spillage. All lock up/storage areas will have a metal or concrete leak proof floor. Any accidental chemical spillages should be cleaned up and disposed of in an approved landfill site in accordance with the chemical manufacturer's recommendations.

7.8.2 Operational Phase

No significant long-term impact on the soil resulting from the proposed operational phase of the development is predicted. Once the development is completed, risks to the land and soils will be from pollutants deriving from the use of the dwellings and/or from contaminated surface water run-off.

The only mitigating measures envisaged during the operational phase are to ensure regular maintenance of SuDS features.

Ensuring appropriately designed, constructed and maintained site services will protect the soils and geology from future contamination arising from operation of the developments.

In order to minimise the impact of operation on the sites soils and geology the following mitigation measures should be implemented:

7.8.2.1.1 Land and Soils Operational Stage Measures to be Implemented:

- The surface water run-off from the development should be collected by an appropriately designed system. This system should ensure that contaminants are removed prior to discharge e.g. via a light liquids separator or by an appropriate treatment train of Sustainable Urban Drainage Systems as outlined in the Greater Dublin Strategic Drainage Study (GDSDS). Any separators and drainage systems should be maintained and operated by the facilities management company (prior to taking in charge by the Local Authority) in accordance with the manufacturers recommendations.
- All waste generated by the everyday operation of the development should be securely stored within designated collection areas. These should have positive drainage collection systems to collect potential run off. Operational waste should be removed from site using licensed waste management contractors.
- Foul effluent should be collected and discharged from the site via properly constructed sewers to the Public Foul Sewer.
- Fuel Storage areas, if required, should be within secured, bunded, designated areas.

7.9 Predicted Impact of the Proposed Development

7.9.1.1 Construction Phase:

Due to the implementation of the remedial or reductive measures described above, the proposed development will not give rise to significant adverse impacts with regard to soils. Any impacts during the construction phase are likely to be only short term in duration.

7.9.1.2 Operational Phase:

No significant impacts are predicted for the operational phase.

7.9.1.3 'Worst Case' Scenario

Under a '*worst case'* scenario, the accidental release of diesel fuel or similar hazardous material occurs on site during the construction phase, through the failure of secondary containment or a materials handling accident on the site. If this were to occur over open ground then these materials could infiltrate through the soil contaminating the soil zone and any underlying groundwater. Appropriate remediation measures would be required depending on the nature and extent of any contamination caused under such a scenario. Potential remediation measures may include the excavation and treatment of contaminated soil and in-situ remediation techniques.

7.10 Monitoring

Monitoring during the construction phase is recommended, in particular in relation to the following:-

- Adequate protection of any topsoil stockpiled for re-use.
- Adequate protection from contamination of soils for removal.
- Monitoring of surface water discharged to the existing culverted watercourses in the vicinity.
- Monitoring cleanliness of the adjoining road network.
- Monitoring measures for prevention of oil and petrol spillages.

- Dust control by dampening down measures as & when required by unusually dry weather conditions.

The Construction Management Plan (CMP) prepared by the contractor will cover these mitigation measures in more detail.

7.11 Reinstatement

In open space areas where finished ground levels are altered and extensive excavation of topsoil and subsoil is required, the areas should be seeded and landscaped in a timely manner to ensure weathering of subsoils is limited.

7.12 Interactions

The design team has been in regular contact with each other throughout the design process to minimise environmental impacts and to ensure a sustainable and integrated approach to the design of the proposed development. There is an interaction between soil and waste management which may require the removal of soil off site to a suitable licensed facility during construction.

There is an interaction between geology for the site and hydrogeology.

7.13 Difficulties Encountered in Compiling

No particular difficulties were encountered in completing this section.

7.14 References

- Guidelines on the information to be contained in Environmental Impact Statements (EPA 2002) and Advice Notes on Current Practice in the preparations of Environmental Impact Statements (EPA 2003).
- The Geotechnical Site Investigation Report for the Site by Causeway Geotech Ltd No. 18-1234 dated December 2018.
- The National Bedrock online data viewer produced by the Geological Survey of Ireland.

Chapter 8:
Water

8.0 Water

8.1 Introduction

Author: John Considine, (B Eng MIEI MIStruct E C Eng FConsEI IEI Mem No. 022256)

This chapter of the EIAR assesses the impacts of the proposed residential development, at the Concorde Industrial Estate on the Naas Road, on the on surface water drainage, foul water drainage and water supply in the area. This section should be read in conjunction with the architectural drawings for the development & the project description sections of this EIAR. The proposed residential development consists of one large building divided into 5no. blocks (A-E) and a second smaller building in the south-east corner of the site (block F) along with landscaping works carried out to the surrounding locale.

Existing:

The subject site is currently occupied by several small business focused towards automobile repair/sale, along with one unit being used as a gym. The overall site totals 1.88 hectares with the proposed building footprint 0.58 hectares, (31% of the overall site). The building at the south-east corner of the site and the last unit to the west end of the site are currently unoccupied.

The immediate vicinity of the site is shown in Figure 8.1.1 below. The site is bounded to the north by the Nass Road, to the east by an un-named public access road (cul de sac), to the west by an ESB high voltage mast and compound and to the south by a car yard and Drimnagh Castle playing fields. The main point of access to the site will be via the un-named road to the east which, in turn, is accessed from the Naas Road via a proposed new signalised junction. The site surface is generally flat, at approximately +39.65m. The surface levels drop in the south-east corner by 0.5 m to 39.15m. There is a low retaining wall along the south boundary. There is also a low level retaining wall (circa 0.75m in height) along the full northern (Naas Road) boundary.

Proposed:

Planning permission is being sought for a mixed-use residential development at the Concorde Industrial Estate on the Naas Road.

The proposal is for a mixed-use residential development of 492 no. apartment units over 8 no. storeys, over the ground and first floor levels of retail / restaurant floor space and a single level basement.

The proposed apartment mix consists of 104 no. studio units, 136 no. 1 bed units, 21 no. 2 bed units (3 person) and 231 no. 2 bed units (4 person). Balconies are provided for the residential apartments on the north eastern, north western, south eastern and south western elevations of the respective buildings. Access to the residential units will be provided via a stair and lift core from basement and ground floor level. A total of 238 no. car parking spaces will be provided, with 200 no. provided in the basement car park allocated to the residential units with 38 no. surface car parking spaces provided for the commercial units incorporating 10 no. car club spaces. The development includes 516 no. bicycle parking spaces for the apartments and commercial units, located at basement and ground floor level. The development also includes a bin store and plant area at ground floor level and plant enclosures at roof level.

It is envisaged that all structural loads will be carried via concrete foundations to either bedrock or the over-lying layers of stiff black boulder clay.

Surface water drainage (including Sustainable Drainage Systems - SuDS), foul water drainage, water supply and road network will be constructed to service the proposed development.

Figure 8.1.1 – Site Location

8.2 Study Methodology

The assessment of the potential impact of the proposed development on the water bodies 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 Statement (EPA 2002 and 2017 (Draft)), EIA Directive 2014/EU/52, 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), Development Management Guidelines (DoEHLG, 2007) and Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessments August 2018.

The following sources of information were used in the completion of this assessment:

- Site Visit
- Site Investigation Report
- Geological Survey of Ireland (GSI) online maps and databases
- Eastern CFRAMS Flood Mapping from OPW
- EPA online maps and databases
- Topographical Survey
- Local authority record drawings

All drainage (surface and foul) and water supply will be provided in accordance with the requirements of Dublin City County Council, Irish Water and in particular in accordance with the following:

- Greater Dublin Regional Code of Practice for Drainage Works
- Greater Dublin Strategic Drainage Study (GDSDS)
- Planning System and Flood Risk Management Guidelines
- Building Regulations (Part H)
- Irish Water Standard Details and Codes of Practice for Water and Wastewater Infrastructure
- CIRIA SuDS manual C753 (2015).

This chapter also encompasses knowledge obtained from site visits, drainage and water services record information received from Irish Water and the Local Authority. Additionally, information from the EPA and GSI websites has been utilised.

8.3 The Existing Receiving Environment

The site is currently occupied by the Concorde Industrial Estate. There is no existing natural water features in the region, according to the EPA mapping of the area, Figure 8.3.1 .

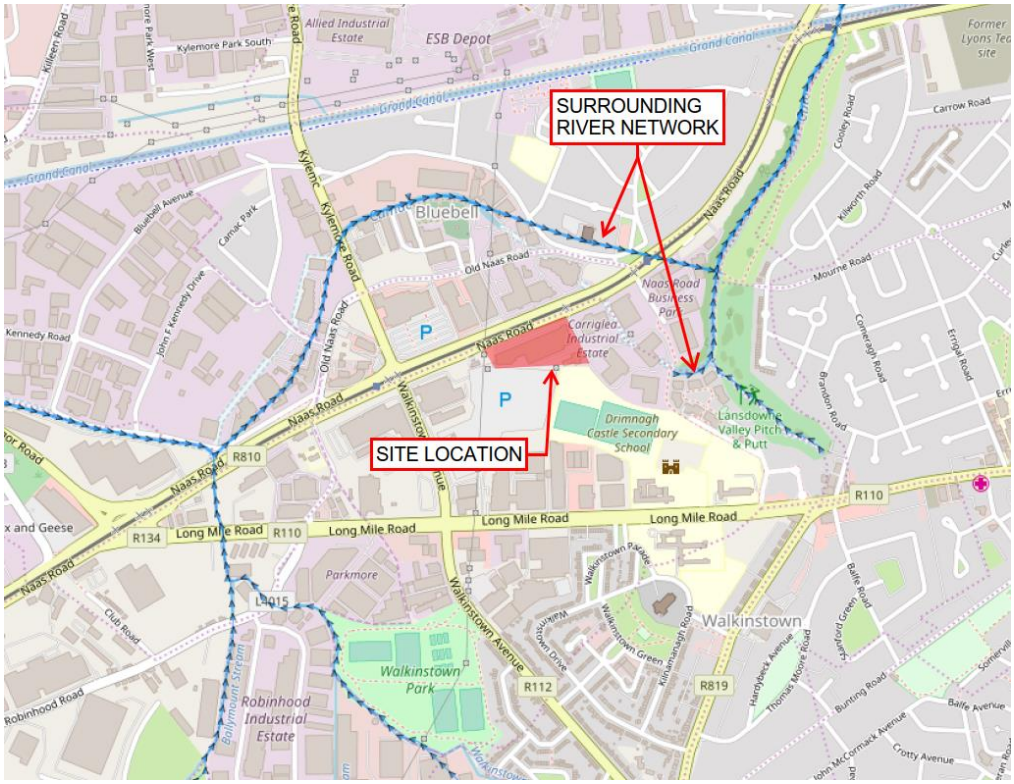


Figure 8.3.1 – EPA Water Network Map *(https://gis.epa.ie/EPAMaps/, n.d.)*

8.3.1 Existing Surface Water

The surface water system will need to be redesigned to accommodate the proposed mixed-use residential development. There is provisions for a large amount of landscaping works to be undertaken, which will also affect the natural surface water drainage.

The nearest surface water sewer is a 450mm diameter concrete sewer on the south side of the Naas Road, parallel to the northern boundary of the site, flowing north-east. At approximately 25m north east of the development site boundary, the surface water sewer discharges to a manhole and subsequently, to the culverted River Camac.

There is also a 300mm diameter surface water sewer on the north side of the Naas Road flowing north-east, which also discharges to the culverted River Camac.

It is unclear how the existing site drains into the adjacent sewer network. There are currently no SuDS measures in place on the site.

8.3.1.1 Watercourse

There is no watercourse within the site boundary.

8.3.1.2 Surface Water Sewers

There are no surface water sewers located within the site boundary.

8.3.2 Existing Foul Water Drainage

There is a 1350mm Concrete Combined Sewer running parallel to the Naas Road which runs west to east inside the northern site boundary and north-south inside the eastern site boundary, parallel to the side road. There is a 225mm foul sewer from the north east, crossing the Naas Road and running parallel to the 1350mm combined sewer along the eastern boundary of the site. The foul outflow from the site is directed to the municipal treatment plant at Ringsend. Upgrade works are needed as the plant is not currently meeting its requirements under the Urban Wastewater Treatment Directive. However, planning permission has recently been granted, under Bord Order ABP-301798-18 for an expansion to the WWTP at Ringsend which will increase network capacity by 50%.

Refer to Appendix 8.1 for existing public drainage and water supply infrastructure maps in the vicinity of the site.

8.3.3 Existing Water Supply

The Greater Dublin Water Supply is supplied from raw water sources at Leixlip, Roundwood, Ballyboden and Ballymore Eustace and supplies approximately 1.3 million people within the Dublin City, Fingal, Dun Laoghaire Rathdown, South Dublin, Wicklow, Kildare and Meath Council areas.

The water supply in this area of the Naas Road region comes from Ballymore Eustace Water Treatment Works in County Kildare. This reservoir is fed from the Pollaphuca reservoir. From Ballymore Eustace the water is piped to the Saggart and Belgard reservoirs.

The Dublin Region Water Services Strategic Plan 2009 summarizes the current strategic plan in place for the Dublin region and incorporates the output from the Greater Dublin Strategic Drainage Study and the 1996 Water Services Strategic Plan. The three primary objectives of the plan are Quality, Quantity and Sustainability of the water supply. During the construction of the new development the existing services will need to be uncovered and compared against the strategic plan's primary objectives.

There is an existing 9" watermain located in the Nass Road to the north of the site. There is a 30" steel trunk watermain running from the north east to the south west, this watermain extends through the south east corner of the site. There is also an existing 110mm MoPVC within the site.

Refer to Appendix 8.1 for existing public drainage and water supply infrastructure maps in the vicinity of the site.

8.4 Characteristics of the Proposed Development

Consideration of the Characteristics of the Proposed Development allows for a projection of the 'level of impact' on any aspect of the proposed environment that could arise. For this chapter the potential impact on land and soils is discussed.

The proposal is for a mixed-use residential development of 492 no. apartment units over 8 no. storeys, over the ground and first floor levels of retail / restaurant floor space and a single level basement.

The proposed apartment mix consists of 104 no. studio units, 136 no. 1 bed units, 21 no. 2 bed units (3 person) and 231 no. 2 bed units (4 person). Balconies are provided for the residential apartments on the north eastern, north western, south eastern and south western elevations of the respective buildings. Access to the residential units will be provided via a stair and lift core from basement and ground floor level. A total of 238 no. car parking spaces will be provided, with 200 no. provided in the basement car park allocated to the residential units with 38 no. surface car parking spaces provided for the commercial units incorporating 10 no. car club spaces. The development includes 516 no. bicycle parking spaces for the apartments and commercial units, located at basement and ground floor level. The development also includes a bin store and plant area at ground floor level and plant enclosures at roof level.

Surface water drainage (including Sustainable Drainage Systems - SuDS), foul water drainage, water supply and road network will be constructed to service the proposed development.

It is envisaged that all structural loads will be carried via concrete foundations to either bedrock or the over-lying layers of stiff black boulder clay.

Surplus materials from these excavations will be disposed of off-site

8.4.1 Surface Water

8.4.1.1 Separate System

A pre-planning meeting with Dublin City Council Drainage engineer (Ms. Maria Treacy) took place on Friday 5th of October 2018 to discuss proposals for the site surface water drainage. The advice given at this meeting, to employ two stage treatment, has been accounted for in the planning proposals in as much as is practical.

A new separate surface buried drainage system has been designed and will be implemented within the site as part of the proposed development. The new surface water drainage system is designed using the Micro Drainage Windes software.

8.4.1.2 SUDS Measures

The principles of Sustainable Urban Drainage Systems (SUDS) are embodied in the recommendations of the Greater Dublin Strategic Drainage Study (GDSDS). The GDSDS addresses the issue of sustainability by requiring designs to comply with a set of drainage criteria which aim to minimize the impact of urbanisation by replicating the run-off characteristics of the greenfield site. The criteria provide a consistent approach to addressing the increase in both rate and volume of run-off as well as ensuring the environment is protected from pollution that is washed off roads and buildings.

The existing site layout is almost entirely hardstanding or roofs, with unattenuated outflow to the public drainage network. The proposed development will be designed in accordance with the principles of Sustainable Drainage Systems (SuDS) and will significantly reduce run-off rates and improve storm water quality discharging to the public storm water system.
These drainage design criteria are as follows:

- Criterion 1 – River Water Quality Protection
- Criterion 2 – River Regime Protection
- Criterion 3 – Flood Risk Assessment
- Criterion 4 – River Flood Protection

The requirements of SUDS are typically addressed by provision of the following:

- Interception storage
- Treatment storage
- Attenuation storage
- Long term storage (not required if growth factors are not applied to Qbar when designing attenuation storage)

For the purposes of the SuDS calculations, relevant areas in m² are as follows:

Table 8.4.1.1 – Summary of drained areas for SuDS calculations

Area Type	Area (m^2)
Total Roof	6,403
Podium Slab Over Basement	3,872
Total roof + Basement Podium slab	**10,275**
Permeable Paving (External Parking)	495
Impermeable Road	1,567
Impermeable Footpath	569
Total Drained Area	**12,906**

8.4.1.3 Criterion 1 – River Water Quality Protection

Run-off from natural Greenfield areas contributes very little pollution and sediment to rivers and for most rainfall events direct run-off from Greenfield sites to rivers does not take place as rainfall percolates into the ground. By contrast, urban run-off, when drained by pipe systems, results in run-off from virtually every rainfall event with high levels of pollution, particularly in the first phase of run-off, with little rainfall percolating to the ground. To prevent this happening, Criterion 1 requires that interception storage and/or treatment storage is provided, thereby replicating the run-off characteristics of the pre-development Greenfield site.

Interception Storage

Interception storage where provided, should ensure that at a minimum, the first 5mm and preferably the first 10mm of rainfall is intercepted on site and does not find its way to the receiving water.

In the context of the subject site the total area discharging to the drainage system = 12,906m²

Providing a 10mm interception storage equates to a volume of 129.06m³. Interception storage for the new development will be provided as follows:

- **Green Roof:** Green Roof over full extent of the ground floor podium slab surface area. A proprietary drainage underlay mat will be provided, a "Retention Spacer RSX 65" or similar, designed to retain 65mm of rainwater which can dissipate by evaporation.

- **Permeable Paving:** Permeable paving over external parking bays.

The green roof has the effect of providing some initial storage of rainwater, while also reducing the rate at which rainwater from heavier rainfall events will discharge to the main attenuation tank. It can also help to filter the run-off, removing any pollutants and resulting in a higher quality of water discharging to the drainage system. A "Retention Spacer RSX 65" or similar, will be provided on the podium slab to intercept and retain 65 litres/m² (i.e. 65mm) as outlined below.

The proposed podium roof will be an intensive green roof incorporating a mixture of hard and soft landscaping for recreational use. (An extensive green roof on the other hand is a low maintenance lightweight roof, not intended for general access or leisure purposes.)

To model this in Micro drainage, an equivalent depth of storage over the entire area to be captured is modelled, as follows:

Podium interception Storage Volume	3,8728 m² x 0.065 x 0.95	= 239.10m²
Equivalent Depth	239.10 m³ / 10,275m²	= 0.023m Over the entire building/podium area

In the external area at the north of the site, car parking bays will be constructed using permeable paving. Adjoining impermeable areas finished in bituminous surfacing will be drained where possible towards the permeable paved parking bays. This will not be a tanked system but the design conservatively assumes no direct infiltration to the ground. (This is based on the BRE365 soakaway tests carried out in the area which indicate very low permeability overburden).

By providing a raised drainage outlet above the base of the coarse graded gravel bed it is possible to achieve interception storage. Raising the invert of the drainage pipe to 75mm above the gravel bed gives the following interception storage @ 40% voids in the gravel:

Volume of Interception Storage	495m x 0.075m x 0.4m	= 14.85m³ Storage

To model this in Microdrainage, an equivalent depth of storage over the entire to be captured is modelled, as follows:

Equivalent Depth	14.85m³ / 2,631m²	= 0.0056m Over the entire area

The proposed interception storage methods, green roof and permeable pavement, provide 239.10 m³ and 14.85 m³ of storage respectively. As outlined in the GDSDS Criterion 1, a new development should provide interception storage to retain the first 5mm to 10mm to fall over the new impermeable area of the site. In this case, the impermeable area of the site amounts to 12,095 m² requiring the storage of 64.53m³ to 129.06m³.
The cumulative interception storage provided therefore is as follows:

Table 8.4.1.2 – Interception Storage: Required and Provided

Desirable Interception Storage (10mm criteria)	
Total Drained Area within Proposed Development Site	1.2906ha
Optimum level of interception storage as per GDSDS	10mm
∴ Minimum Required Interception Storage = (0.005 x 1.326 x 10^4) = 66.30m^3	
Optimum Interception Storage	**129.06m^3**
Interception Storage Provided	
Intensive Green Roof on Podium Slab: Area = 4,178m^2	
(e.g. Bauder DSE60 Board & raised threshold to provide 27 litres/m^2 storage)	239.10m^3
Permeable area= 495m^2	
(Drained gravel bed with raised outlet invert designed to achieve 30 litres/m^2 storage)	14.85m^3
Interception Storage Provided	**253.95 m^3**

It is noted that although the provided interception volume is slightly below the optimum value, it is well excess of the minimum requirement.

8.4.1.4 Criterion 3 GDSDS – Site Flooding

The GDSDS requires that no flooding should occur on site for storms up to and including the 1 in 30 year event. The pipe network and the attenuation storage volumes should, therefore, be checked for such storms to ensure that no site flooding occurs although partial surcharging of the system is allowed as long as it does not threaten to flood.
For the 1 in 100 year event, the pipe network can fully surcharge and cause site flooding, but the top water level due to any such flooding must be at least 500mm below any vulnerable internal floor levels, and the flood waters should be contained within the site. In addition, the top water level in any attenuation device during the 100 year storm must be at least 500mm below any vulnerable internal floor levels.
The pipe network is limited in extent by the site size of the proposed development. Therefore, the pipes have been oversized to ensure the following:

- The system does not surcharge for the 1 year event.
- The system does not surcharge for the 30 year event.
- The system surcharges but does not flood for the 100 year event

The surcharging of the system is based on the system being allowed to fill as the attenuation tank fills, because the invert of the incoming pipes is below the top of the attenuation tank. This is not a function of the pipe size.
The basement car park is drained by a separate system that outfalls to a petrol interceptor followed by a pump sump buried below the basement slab. From there, the car park drainage is pumped to the nearest foul manhole, and is not at risk of any backflow from the surface water system during storm conditions.

GDSDS Criterion 3 is therefore complied with.

8.4.1.5 Criterion 2 & 4 – River Regime and Flood Protection

Regardless of the rainfall event, unchecked run-off from the developed site through traditional pipe networks will discharge into receiving waters at rates that are an order of magnitude greater than that prior to development. This can cause flash flow in the outfall river / stream that can cause scour and erosion. Attenuation storage is provided to prevent this occurring by limiting the rate of run-off to that which took place from the pre-development Greenfield site. In practice, the rate of run-off needs to be appropriately low for the majority of rainfall events, and attenuation storage volumes should be provided for the 1 and 100 year storm event. The rate of outflow from such storage should be controlled so that it

does not exceed the greenfield run-off rate of QBAR, which can be factored upwards by factors appropriate to the various return periods (given in the Flood Studies Report) if long term storage is provided. Notwithstanding that significant long-term storage will be provided in the form of interception storage, this does not equate to full long term storage volume provision and so growth factors will not be applied to QBAR when calculating the attenuation storage volume required.

Qbar for the site has been calculated in accordance with the IH124 method as 7.12l/s. Refer to Appendix 8.2 for HR Wallingford calculation outputs. A hydrobrake downstream of the attenuation tank will be limited to the max site discharge of Qbar for the site.

As the surface runoff flow rate generated on site does not exceed Qbar, there is no requirement for long-term storage to limit the impact on the receiving watercourse.

Criterion 4 is intended to prevent flooding of the receiving system / watercourse by either;

- Limiting the volume of run-off to the pre-development greenfield volume using 'long-term storage' Option 1 or by

- Limiting the rate of run-off for the 1 in 100 year storm to QBAR without applying growth factors using 'extended attenuation storage' Option 2

Significant long-term storage will be provided in the form of interception storage. This does not, however, equate to full long term storage volumes and it is not feasible to provide additional storage areas elsewhere on site to achieve the required volume.

Option 2 has therefore been used to comply with Criterion 4 and an attenuation volume will be provided in the proposed attenuation tank to limit the rate of discharge in the 1 in 100 year storm event to QBAR without growth factors applied.

8.4.1.6 Attenuation Tank Design

As can be seen in the MicroDrainage computer output, provided with the submitted infrastructure report, the rate of outflow from the attenuation tank towards the receiving 450mm diameter stormwater sewer does not exceed QBAR during the 1 in 100 year storm event (i.e. no overflow volume is produced).

A tank volume of 585m^3 is required to provide adequate storage based on the calculations. Dimensions of 3m x 7.5m x 2.0m deep are proposed for the below ground floor attenuation tank. This level also allows for the network to fill in the critical storm event but manholes will not surcharge as the highest water level modelled is 40.0mOD, and all manholes, green roof outlets and permeable paving are above 40.5mOD.

8.4.1.7 Pipe Network Design

The pipe network has been designed using MicroDrainage software to determine the optimum pipe sizes that will prevent surcharging of the system during critical duration storm events. The network has been modelled with a pipe for the water discharging from the green roof area and a separate pipe for the permeable area both discharging rain into an attenuation tank. The output is given in Appendix 8.1 of the submitted infrastructure report.

8.4.1.8 Tree Pits & Permeable Paving

It is proposed to install tree pits in the planted verge on boundary with the Naas Road. The details and size of these pits are not yet finalized; therefore, the storage capacity of them has not yet been included in the permeable paving storage volume. When included at detailed design stage, the volume of the attenuation tank will drop based on the number of tree pits and interception storage provided by each. In addition, they will provide some level of direct infiltration to the ground. This will be dependent on the infiltration characteristics of the natural soil in the area, which will be investigated with soakaway tests during preliminary site investigations.

A collector land drain will also run along this boundary, connecting permeable paving and tree pits to the attenuation tank. This will also provide some additional storage volume. At this stage this volume has not been included in SUDS calculations.

8.4.2 Pollution prevention through SUDS measures

The granular sub base and geotextiles below the new green roof area acts to improve the quality of discharge through a number of processes including; sedimentation, filtration, absorption and bio-degradation. The permeable pavement is effective in the removal of organic matter, silt, loam and heavy metals. Additionally hydrocarbons are digested within the sub base by naturally occurring microbes.

8.4.3 Existing & Proposed Drainage Flow Paths

The proposed development will not alter the flow path from the site i.e. the gravity drainage connection to the buried culverted watercourse outlined. By employing SUDS measures the rate, quantity and quality of the surface water will be reduced.

8.4.3.1 Overland Flow Routes for Exceedances

As described in Section 4.5.7 of the CIRIA SUDS Manual and NA 4.5.1 of BS EN 752:2008 designing for exceedances means considering the effect of what happens when rainfall intensity exceeds the capacity of the gullies or drains and storm water runs overland to low points. This can occur in short periods of heavy rainfall – up to 150mm/hr. The site is primarily served by green roofs and permeable paved areas, with direct inflow to these without gullies. The high permeability of these areas eliminates run-off as rainwater infiltrates the surface of the system at a rate of approximately 900mm/hour.

8.4.3.2 Protection from Overland Flows

Overland flow can be cater for across east and west sides of the proposed buildings within the development site. Additionally, the proposed drainage infrastructure within the development has been designed to ensure no onsite flood can occur within the 1:100 year return period. Therefore, overland flow does not constitute a significant risk to this project.

8.4.4 Foul Water Drainage

A new separate foul drainage system will be provided within the site. The outfall from the proposed development will be directed to the existing 1350mm diameter combined sewer along the east side of the site. Irish Water have provided confirmation, via the pre-connection application process, and subsequently through the design verification process, that the existing public infrastructure in the vicinity of the site can cater for the proposed development foul wastewater flows.

8.4.4.1 Foul Water Flow & BOD_5 Calculation:

1. Apartments:

Total no. of Apartments	=	492
Total Population *(492 x 2.7) (2.7 residents per apt)*	=	1,328
Flow per resident	=	150 L/day
Additional 10% Infiltration of Flow *((150/100) x 10)*	=	15 L/day
BOD_5 per resident	=	60 g/day

Total Flow *(1,328 (150 + 15)) /1,000*	=	219 m^3/day
Total BOD_5 *(1,328 x 60)/1,000*	=	80 kg/day

2. Casual Dining / Café:

Total Net Area	=	463 m^2
Flow: 4 Workers (*45 L/day)*	=	180 L/day
Flow: 20 Visitors (*30 L/day)*	=	600 L/day
BOD_5: 4 Workers *(30g/day)*	=	120g /day
BOD_5: 20 Visitors *(15g/day)*	=	300g /day
No. of Stores	=	4
Total Flow *((180 + 600) x 4)/1,000*	=	3.12 m^3/day
Total BOD_5 *((120 + 300) x 4)/1,000*	=	1.68 kg/day

3. Crèche

Total Net Area	=	347 m^2
Flow: 4 Workers (*45 L/day)*	=	180 L/day
Flow: 20 Children (*30 L/day)*	=	600 L/day
BOD_5: 4 Workers *(30g/day)*	=	120g /day
BOD_5: 20 Children *(15g/day)*	=	300g /day
Total Flow *(180 + 600)/1,000*	=	0.78 m^3/day
Total BOD_5 *(120 + 300)/1,000*	=	0.42 kg/day

4. Car Showroom

Total Net Area	=	364 m^2
Flow: 4 Workers (*45 L/day)*	=	180 L/day
Flow: 10 Visitors (*30 L/day)*	=	300 L/day
BOD_5: 4 Workers *(30g/day)*	=	120g /day
BOD_5: 10 Visitors *(15g/day)*	=	150g /day
Total Flow *(180 + 300)/1,000*	=	0.48 m^3/day
Total BOD_5 *(120 + 150)/1,000*	=	0.27 kg/day

5. Pharmacy

Total Net Area	=	144 m^2
Flow: 4 Workers (*45 L/day)*	=	180 L/day
BOD_5: 4 Workers *(30g/day)*	=	120g /day
Total Flow *(180)/1,000*	=	0.18 m^3/day
Total BOD_5 *(120)/1,000*	=	0.12 kg/day

6. Convenience Store

Total Net Area	=	439 m^2
Flow: 6 Workers (*45 L/day)*	=	270 L/day
BOD_5: 6 Workers *(30g/day)*	=	180g /day
Total Flow *(270)/1,000*	=	0.27 m^3/day
Total BOD_5 *(180)/1,000*	=	0.18 kg/day

7. Medical Centre

Total Net Area	=	518 m²
Flow: 6 Workers (*45 L/day)*	=	270 L/day
Flow: 40 Visitors (*30 L/day)*	=	1,200 L/day
BOD_5: 6 Workers *(30g/day)*	=	180g /day
BOD_5: 40 Visitors *(15g/day)*	=	600g /day
Total Flow *(270 + 1,200)/1,000*	=	1.47 m³/day
Total BOD_5 *(180 + 600)/1,000*	=	0.78 kg/day

8. Shared Offices

Total Net Area	=	723 m²
Flow: 40 Workers (*45 L/day)*	=	1,800 L/day
BOD_5: 40 Workers *(30g/day)*	=	1,200g /day
Total Flow *(1,800)/1,000*	=	1.8 m³/day
Total BOD_5 *(1,200)/1,000*	=	1.2 kg/day

8.4.4.2 Sum of Foul Water Flow & BOD_5 Calculation

	Type		Foul Water Flow	BOD_5
1.	Apartment	=	219 m³/day	80 kg/day
2.	Casual Dining / Café	=	3.12 m³/day	1.68 kg/day
3.	Crèche	=	0.78 m³/day	0.42 kg/day
4.	Car Showroom	=	0.48 m³/day	0.27 kg/day
5.	Pharmacy	=	0.18 m³/day	0.12 kg/day
6.	Convenience Store	=	0.27 m³/day	0.18 kg/day
7.	Medical Centre	=	1.47 m³/day	0.78 kg/day
8.	Shared Offices	=	1.8 m³/day	1.2 kg/day
Total		=	225.3 m³/day	84.65 kg/day
Average Daily Flow		=	2.66 L/s	0.98 g
Peak Daily Flow		=	15.9 L/s	5.87g

The proposed foul outfall pipe is 225mm diameter pipe at 1:100 minimum fall has a capacity = 47 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 1:100) respectively will be used for all other foul pipework within the site.

8.4.5 Water Supply

It is proposed to connect to the existing 30" watermain to the east of the site. This connection point has been specified by Irish Water through the pre-connection enquiry process and subsequently through the design verification process. Irish Water have confirmed that the existing infrastructure in the vicinity of the site has capacity to cater for the required development water supply flows. The water demand for the proposed development has been calculated in as:

Total Demand = 225.3 m³/day
Average Flow = 2.66 l/s
Peak Flow = 15.9 l/s

Twenty-four-hour storage will be provided to cater for possible shut-downs in the system.

Hydrants will be provided on the loop main in accordance with Part B of the Building Regulations and the Fire Safety Certificate's Requirements. Sluice valves will be provided at appropriate locations to facilitate isolation and purging of the system.

8.5 Potential Impact of the Proposed Development

The following provides an assessment of the potential impact on the water environment of the proposed development without mitigation measures being incorporated into the detailed design and construction phase. The mitigation measures and predicted impact of the proposed development are set out below.

8.5.1 Surface Water

8.5.1.1 Construction Phase

The following are the potential impacts of the proposed scheme during the construction stage:

- Mobilisation of sediments and harmful substances during the construction phase, due to exposed soil and earth movement/excavation, which may be flushed into the culverted stream during rainfall events;
- 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 surface water system, causing blockages and pollution.

8.5.1.2 Operational Phase

There are currently no SUDS measures in place on site. There will be an impact on the surface water in the area due to the new development. However, the surface water system detailed in section 8.4.1 will ensure the impact from the operational phase on surface water will be minimal and constitute a significant improvement from existing conditions.

There will be a decrease in the rate of surface water run-off from the new development due to the SUDS measures proposed. Surface water run-off will also improve in quality due to these measures.

There is very little risk of accidental spillages resulting in water quality issues during the operational stage.

8.5.2 Foul Water Drainage

8.5.2.1 Construction Phase

The following are the potential impacts of the proposed scheme 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 culverted stream 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.

8.5.2.2 Operational Phase

The development will result in an increase in the waste water discharged from the site to the public sewer system. The foul outflow from the site will be directed to the municipal treatment plant at Ringsend. Upgrade works are needed as the plant is not currently meeting its requirements under the Urban Wastewater Treatment Directive and increased outflow from development such as the proposed development will increase loading on the Ringsend WWTP. However, planning permission has recently been granted, under Bord Order ABP-301798-18 for an expansion to the WWTP at Ringsend which will increase network capacity by 50%. Irish Water have also confirmed feasibility for connection of the proposed development within the existing public drainage system. Therefore, any impact from the increased wastewater flows on the existing drainage network will be temporary and not significant.

There exists a minor risk associated with the possibility of leakage from damaged foul sewers and drains within the development site. Any foul water leakage could result in minor contamination of groundwater in the area. The current foul water drainage system that is on site will need to be replaced. Placing a new system on site reduces the overall risk of leakage from damaged sewers.

The basement car park discharges to the foul system via a petrol interceptor to prevent pollution from accidental oil spills.

As discussed in section 8.4.4 the current surrounding foul water system has the capacity for the proposed development. The potential impact from the operational phase of the development is therefore likely to be minimal.

8.5.3 Water Supply

8.5.3.1 Construction Phase

During the connection of new mains to existing mains on site there is a small risk that contamination of the existing supply may occur. The potential impact on the local public water supply network would be short term and imperceptible.

8.5.3.2 Operational Phase

The new development will have an increase in the water supply demand. The calculations for these figures are set out in section 8.4.5.

8.6 Potential Cumulative Impacts

Given the scale of the proposed residential development, and the capacity of the surrounding environment to accommodate a development of this nature, it is not likely to give rise to any significant effects cumulatively or, in combination with, other developments in the area.

8.7 Do Nothing Impact

8.7.1 Surface Water

If the proposed development were not constructed there would be no effect on the existing surface water network and storm water from the lands will continue to be discharged to the sewerage system without attenuation or SUDs measures in place.

8.7.2 Foul Water Drainage

If the proposed development were not constructed there would be no effect on the existing foul water network and foul water from the site would continue to be discharged to the existing system.

8.7.3 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.

8.8 Remedial and Mitigation Measures

Remedial and mitigation measures describe any corrective measures that are either practicable or reasonable, having regard to the potential impacts discussed above. This includes avoidance, reduction and remedy measures as per the guidance set out in Section 4.7 of the Development Management Guidelines 2007 to reduce or eliminate any significant adverse impacts identified.

8.8.1 Surface Water

8.8.1.1 Construction Phase

The following remedial or reductive measures to mitigate the impact of the construction phase on the existing environment are proposed with reference to water:

8.8.1.1.1 Surface Water Construction Stage Measures to be Implemented:

- A method statement for all works to be carried out will be prepared by the contractor and agreed with Dublin City County Council prior to commencement of works to outline what measures are to be taken to ensure there is no loss of service during the works;
- Dewatering measures should only be employed where necessary;
- If concrete mixing is carried out on site, the mixing plant should be sited in a designated area with an impervious surface;
- Existing surface drainage channels within the lands that serve adjacent lands should be retained where possible to prevent causing increased flooding impacts;
- Construction methods used should be tailored to reduce, as much as possible, dust and noise pollution;
- Comprehensive traffic management procedures, including the provision of access to all roads, and access/egress points should be prepared and agreed with the Local Authority. These traffic management measures should be implemented at times when traffic disruption may be experienced;
- Road sweeping and/or wheel wash facilities should be provided, as required;
- All oils/diesel stored on site for construction equipment are to be located in appropriately bunded areas;
- Filters and silt traps will be used to prevent rain washing silts and other materials into the surface water network and creating blockages.

- Adjacent watercourses/groundwater need to be protected from sedimentation and erosion due to direct surface water runoff generated onsite during the construction phase. To prevent this from occurring surface water discharge from the site will be managed and controlled for the duration of the construction works until the permanently attenuated surface water drainage system of the proposed site is complete. A temporary positive drainage system shall be installed prior to the commencement of the construction works to collect surface water runoff from the site during construction. A series of geotextile lined cascading, high level outfall, settling basins will be installed upstream of the agreed discharge point. This temporary surface water management facility will throttle runoff and allow suspended solids to be settled out and removed before being discharged in a control manner to the agreed outfall. Inlet to the cascading settling basins will be riprapped to prevent scour and erosion in the vicinity of the inlet.

8.8.1.2 Operational Phase

The following mitigation measures are proposed for the operational phase of the proposed development with reference to water:

8.8.1.2.1 Surface Water Operational Stage Measures to be Implemented:

- Water Quality: The green roof for the apartments on the podium and the car park permeable paving will improve the quality of surface water run from the site.

8.8.2 Foul Water Drainage

8.8.2.1 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 DCC Drainage Division.

The following remedial or reductive measures to mitigate the impact of the construction phase on the existing environment are proposed: -

8.8.2.1.1 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.

8.8.2.2 Operational Phase

8.8.2.2.1 Foul Water Drainage Operational Stage Measures to be Implemented:

- Dual & low flush toilets and water economy outlets will be used to reduce flows from the development.

8.8.3 Water Supply

8.8.3.1 Construction Phase

8.8.3.1.1 Water Supply Construction Stage Measures to be Implemented:

- Contact the local authority to adhere to the measures required for introducing a new watermain connection.
- Testing of the system meter & telemetry system is required.

8.8.3.2 Operational Phase

8.8.3.2.1 Water Supply Operational Stage Measures to be Implemented:

- 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.

8.9 Predicted Impacts of the Proposed Development

8.9.1 Surface Water

8.9.1.1 Construction Phase

Provided that the proposed remedial or reductive measures are implemented, the impact of the proposed development during the construction stage will be of a temporary nature and will be minimised.

8.9.1.2 Operational Phase

There will be a decrease in surface water run-off from the new development due to the SUDS measures proposed. Surface water run-off will also improve in quality due to these measures.

8.9.1.3 'Worst-case' scenario

The worst-case scenario is that flooding occurs on-site and in the surrounding area due to this development. The design of the new drainage system ensures that the pipe sizes, gradients etc. will be adequate for the design stormwater flows. The depth, size, gradient of the receiving culverted watercourse means that blockage downstream of the site is not deemed to be a risk.

8.9.2 Foul Water Drainage

8.9.2.1 Construction Phase

Provided that the proposed remedial or reductive measures are implemented, the impact of the proposed development during the construction stage will be of a temporary nature and will be minimised. There will be a temporary increase in traffic due to the delivery of materials and other construction related traffic.

The contractor's operations will result in the generation of effluent and sanitary waste from facilities provided for the workforce on site.

8.9.2.2 Operational Phase

The increase in water consumption and resulting foul water flow is a function of the usage of the development.

8.9.2.3 'Worst-case' scenario

A '*worst-case'* scenario resulting from the construction of the development would result in the contamination of groundwater and the local streams by foul effluent from the development. However the mitigation measures outlined will ensure that this should not occur.

8.9.3 Water Supply

8.9.3.1 Construction Phase

Provided that the proposed remedial or reductive measures are implemented, there will be no appreciable impact of the proposed development during the construction stage on the water supply in the area.

8.9.3.2 Operational Phase

The increase in water consumption is a function of the usage of the development.

The installation of water saving devices will further reduce the impact of the re-development on the existing water supply network.

8.9.3.3 'Worst-case' scenario

The '*worst case'* scenario would be the pollution of the water supply by an accidental spillage or contamination during the connection process. However, the mitigation measures proposed should ensure that this will not occur. Prior to connection to the public watermain, all watermains in the development will be tested and cleaned to the requirements of Irish Water.

8.9.4 Monitoring

All surface water drainage works will be approved by Dublin City County Council, Drainage Division, and will be carried out in accordance with the GDRCOP (Greater Dublin Regional Code of Practice for Drainage Works). Foul and water works will be carried out in accordance with Irish Water Codes of Practice.

8.9.5 Hydrogeology

Although no specific monitoring will be required as part of the proposed development it is envisaged that EPA Monitoring will continue in the area through the life of the development.

8.9.6 Surface Water

8.9.6.1 Construction Phase

Monitoring during the Construction Phase of the development should consist of the following:

- Normal quality control inspection of the works
- Monitoring of possible discharges to the existing culverted watercourse at its outfall may also be required by DCC to ensure that no unauthorised discharges are occurring.
- Pressure testing and CCTV inspections of the surface water drains following completion of stages of the construction is recommended to ensure that the required construction standards are being maintained.
- Upon completion of the development, monitoring of the discharges from the development will be undertaken as required.

8.9.6.2 Operational Phase

Monitoring during the operational phase of the development is recommended as follows:

- All filters, silt traps, hydro-brakes and overflows should be inspected regularly and in particular after heavy rainfall events to ensure that they are not blocked.
- Gullies in the public road should be inspected and cleaned as required
- Pollutants which accumulate within the oil petrol interceptor on site should be regularly monitored and removed as necessary.

8.9.7 Foul Water Drainage

8.9.7.1 Construction Phase

Monitoring during the Construction Phase of the development should consist of the following:

- Normal quality control inspection of the works;
- Monitoring of possible discharges to the existing culverted watercourse is also required by DCC to ensure that no unauthorised discharges are occurring;
- Pressure testing and CCTV inspections of the foul sewers following completion of stages of the construction is recommended to ensure that the required construction standards are being maintained;
- Upon completion of the development, monitoring of the discharges from the development will be undertaken as required.

8.9.7.2 Operational Phase

No monitoring of foul effluent from the development is considered to be necessary.

8.9.8 Water Supply

Metering will allow the water supply to the development to be monitored, this is to be done to the requirements of Irish Water.

8.10 Reinstatement

8.10.1 Hydrogeology

No specific reinstatement measures are required.

8.10.2 Surface Water

8.10.2.1 Construction Phase

Reinstatement at completion of the works will involve:

- The cleaning of the existing sewers in the vicinity of the development as required.
- All excavations will be fully reinstated to the requirements of DCC.
- Leaving the area in a neat and clean condition, removing all deleterious materials that may have been deposited during construction works.

8.10.2.2 Operational Phase

Following completion of the development no reinstatement works are envisaged.

8.10.3 Foul Water Drainage

8.10.3.1 Construction Phase

Reinstatement at completion of the works will involve:

- The cleaning and sterilisation of the existing sewers in the vicinity of the development as required;
- All excavations will be fully reinstated to the requirements of DCC.
- Leaving the area in a neat and clean condition, removing all deleterious materials that may have been deposited during the construction works.

8.10.3.2 Operational Phase

No reinstatement works are envisaged upon completion of the development.

8.10.4 Water Supply

All excavations will be fully reinstated to the requirements of Irish Water.

8.11 Interactions

8.11.1 Surface Water

The design team has been in regular contact with each other throughout the design process to minimise environmental impacts and to ensure a sustainable and integrated approach to the design of the proposed development.

8.11.2 Foul Water Drainage

The design team has been in regular contact with each other throughout the design process to minimise environmental impacts and to ensure a sustainable and integrated approach to the design of the proposed development.

8.11.3 Water Supply

The design team has been in regular contact with each other throughout the design process to minimise environmental impacts and to ensure a sustainable and integrated approach to the design of the proposed development.

8.12 Difficulties Encountered in Compiling

8.12.1 Surface Water

None.

8.12.2 Foul Water Drainage

None.

8.12.3 Water Supply

None.

8.13 References

- Guidelines on the information to be contained in Environmental Impact Statements (EPA 2002) and Advice Notes on Current Practice in the preparations of Environmental Impact Statements (EPA 2003)
- 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 Statements (EPA 2002) and Advice Notes on Current Practice in the preparations of Environmental Impact Statements (EPA 2003)
- 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 Statements (EPA 2002) and Advice Notes on Current Practice in the preparations of Environmental Impact Statements (EPA 2003).
- Dun Laoghaire Rathdown County Council Water Main Map.

Chapter 9:

Air Quality and Climate

9.0 AIR QUALITY & CLIMATE

9.1 INTRODUCTION

This chapter assesses the likely air quality and climate impacts, if any, associated with the proposed development at the former Concorde Industrial Estate, Dublin 12. The proposed development comprises a mix of residential and retail units. The total gross site area comprises 1.8 hectares and is a brownfield site located adjacent to the southern side of the Naas Road (R810), Dublin 12.

This chapter was completed by Ciara Nolan, an environmental consultant in the air quality section of AWN Consulting Ltd. She holds an MSc. (First Class) in Environmental Science from University College Dublin and has also completed a BSc. in Energy Systems Engineering. She is an Associate Member of both the Institute of Air Quality Management and the Institution of Environmental Science. She has been active in the field of air quality for 2 years, with a primary focus on consultancy.

9.2 STUDY METHODOLOGY

9.2.1 Background Information

Ambient Air Quality Standards

In order to reduce the risk to health from poor air quality, national and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values or "Air Quality Standards" are health or environmental-based levels for which additional factors may be considered. For example, natural background levels, environmental conditions and socio-economic factors may all play a part in the limit value which is set (see Table 9.1 and Appendix 9.1).

Air quality significance criteria are assessed on the basis of compliance with the appropriate standards or limit values. The applicable standards in Ireland include the Air Quality Standards Regulations 2011, which incorporate EU Directive 2008/50/EC, which has set limit values for NO_2, PM_{10}, $PM_{2.5}$, benzene and CO (see Table 9.1). Although the EU Air Quality Limit Values are the basis of legislation, other thresholds outlined by the EU Directives are used which are triggers for particular actions (see Appendix 9.1).

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/m^3
		Annual limit for protection of human health	40 µg/m^3
		Critical level for protection of vegetation	30 µg/m^3 $NO + NO_2$
Particulate Matter (as PM_{10})	2008/50/EC	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50 µg/m^3
		Annual limit for protection of human health	40 µg/m^3
Particulate Matter (as $PM_{2.5}$)	2008/50/EC	Annual limit for protection of human health	25 µg/m^3
Benzene	2008/50/EC	Annual limit for protection of human health	5 µg/m^3
Carbon Monoxide	2008/50/EC	8-hour limit (on a rolling basis) for protection of human health	10 mg/m^3 (8.6 ppm)

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

Table 9.1 Air Quality Standards Regulations

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 9.1 have set ambient air quality limit values for PM_{10} and $PM_{2.5}$.

With regards to larger dust particles that can give rise to nuisance dust, there are no statutory guidelines regarding the maximum dust deposition levels that may be generated during the construction phase of a development in Ireland. Furthermore, no specific criteria have been stipulated for nuisance dust in respect of 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/(m^2*day) averaged over a one year period at any receptors outside the site boundary. Recommendations from the Department of the Environment, Health & Local Government (DEHLG, 2004) apply the Bergerhoff limit of 350 mg/(m^2*day) to the site boundary of quarries. This limit value can also be implemented with regard to dust impacts from 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 (UNFCC, 1997, 1999). For the purposes of the EU burden sharing agreement under Article 4 of the Kyoto Protocol, in June 1998, Ireland agreed to limit the net growth of the six GHGs under the Kyoto Protocol to 13% above the 1990 level over the period 2008 to 2012 (ERM, 1998; EC 2014). 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 adaption onto the same level as action to cut and curb emissions.

The EU, in 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 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 27% for the share of renewable energy consumed in the EU in 2030.

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 $PM_{2.5}$. In relation to Ireland, 2020 emission targets are 25 kt for SO_2 (65% on 2005 levels), 65 kt for NO_X (49% reduction on 2005 levels), 43 kt for VOCs (25% reduction on 2005 levels), 108 kt for NH_3 (1% reduction on 2005 levels) and 10 kt for $PM_{2.5}$ (18% reduction on 2005 levels).

European Commission Directive 2001/81/EC, 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 (DEHLG, 2004; 2007). Data available from the EU in 2010 indicated that Ireland complied with the emissions ceilings for SO_2, VOCs and NH_3 but failed to comply with the ceiling for NO_X (EEA, 2012). Directive (EU) 2016/2284 "*On the Reduction of National Emissions of Certain Atmospheric Pollutants and Amending Directive 2003/35/EC and Repealing Directive 2001/81/EC*" was published in December 2016. The Directive will apply the 2010 NECD limits until 2020 and establish new national emission reduction commitments which will be applicable from 2020 and 2030 for SO_2, NO_X, NMVOC, NH_3, $PM_{2.5}$ and CH_4. In relation to Ireland, 2020 emission targets are 25 kt for SO_2 (65% on 2005 levels), 65 kt for NO_X (49% reduction on 2005 levels), 43 kt for VOCs (25% reduction on 2005 levels), 108 kt for NH_3 (1% reduction on 2005 levels) and 10 kt for $PM_{2.5}$ (18% reduction on 2005 levels). In relation to 2030, Ireland's emission targets are 85% below 2005 levels for SO_2, 69% reduction for NO_x, 32% reduction for VOCs, 5% reduction for NH_3 and 41% reduction for $PM_{2.5}$.

9.2.2 Local Air Quality Assessment

The air quality assessment has been carried out following procedures described in the publications by the EPA (EPA, 2002; 2003; 2015; 2017) and using the methodology outlined in the guidance documents published by the UK DEFRA (UK DEFRA 2016a, 2016b; UK DETR, 1998). The assessment of air quality was carried out using a phased approach as recommended by the UK DEFRA (UK Highways Agency, 2007). The 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 possible key pollutants was carried out and the likely location of air pollution "*hot-spots*" identified. An examination of recent EPA and Local Authority data in Ireland (EPA, 2018; 2019) has indicated that SO_2 and smoke 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 issues in regards to nitrogen dioxide (NO_2), PM_{10} and $PM_{2.5}$ at busy junctions in urban centres (EPA, 2018; 2019). Benzene, although previously reported at quite high levels in urban centres, has recently been measured at several city centre locations to be well below the EU limit value (EPA, 2018; 2019). Historically, CO levels in urban areas were a cause for concern. However, CO concentrations have decreased significantly over the past number of years and are now measured to be well below the limits even in urban centres (EPA, 2019). The key pollutants reviewed in the assessments are NO_2, PM_{10}, $PM_{2.5}$, benzene and CO, with particular focus on NO_2 and PM_{10}.

Key pollutant concentrations will be predicted for nearby sensitive receptors for the following scenarios:

- The Existing Baseline scenario, for model verification;
- Opening Year Do-Nothing scenario (DN), which assumes the retention of present site usage with no development in place;
- Opening Year Do-Something scenario (DS), which assumes the proposed development in place;
- Design Year Do-Nothing scenario (DN), which assumes the retention of present site usage with no development in place; and
- Design Year Do-Something scenario (DS), which assumes the proposed development in place.

The assessment methodology involved air dispersion modelling using the UK DMRB Screening Model (UK Highways Agency, 2007) (Version 1.03c, July 2007), the NO_x to NO_2 Conversion Spreadsheet (UK DEFRA, 2017) (Version 6.1, October 2017), and following guidance issued by the TII (2011), UK Highways Agency (2007), UK DEFRA (2016a, 2016b) and the EPA (2002, 2003, 2015, 2017).

The TII guidance (2011) states that the assessment must progress to detailed modelling if:

- Concentrations exceed 90% of the air quality limit values when assessed by the screening method; or
- Sensitive receptors exist within 50m of a complex road layout (e.g. grade separated junctions, hills etc).

The UK DMRB guidance (UK Highways Agency, 2007), on which the TII guidance was based, states that road links meeting one or more of the following criteria can be defined as being 'affected' by a proposed 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.

Concentrations of key pollutants are calculated at sensitive receptors that 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 200 m 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 DMRB guidance states that road links at a distance of greater than 200 m from a sensitive receptor will not influence pollutant concentrations at the receptor. Using this input data the model predicts the road traffic contribution to ambient ground level concentrations at the worst-case sensitive receptors using generic meteorological data. The DMRB model uses conservative emission factors, the formulae for which are outlined in the DMRB Volume 11 Section 3 Part 1 – HA 207/07 Annexes B3 and B4. These worst-case

road contributions are then added to the existing background concentrations to give the worst-case predicted ambient concentrations. The worst-case 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. The TII *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Scheme* (2011) detail a methodology for determining air quality impact significance criteria for road schemes and this can be applied to any project that causes a change in traffic flows. The degree of impact is determined based on both the absolute and relative impact of the proposed development. The TII significance criteria have been adopted for the proposed development and are detailed in Appendix 9.2 Table A1 to Table A3. The significance criteria are based on PM_{10} and NO_2 as these pollutants are most likely to exceed the annual mean limit values (40 µg/m^3). However, the criteria have also been applied to the predicted 8-hour CO, annual benzene and annual $PM_{2.5}$ concentrations for the purposes of this assessment.

9.2.3 Regional Air Quality and Climate Assessment

The impact of the proposed development at a national / international level has been determined using the procedures given by Transport Infrastructure Ireland (2011) and the methodology provided in Annex 2 in the UK Design Manual for Roads and Bridges (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.

9.2.4 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 NOx 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*" (2011). The TII guidelines recommend the use of DEFRAs NO_x to NO_2 calculator (UK DEFRA, 2017) which was originally published in 2009 and is currently on version 6.1. This calculator (which can be downloaded in the form of an excel spreadsheet) accounts for the predicted availability of O_3 and proportion of NO_x emitted as NO for each local authority across the UK. O_3 is a regional pollutant and therefore concentrations do not vary in the same way as concentrations of NO_2 or PM_{10}.

The calculator includes Local Authorities in Northern Ireland and the TII guidance recommends the use of 'Armagh, Banbridge and Craigavon' as the choice for local authority when using the calculator. The choice of Craigavon provides the most suitable relationship between NO_2 and NO_x for Ireland. The "*All other Urban UK Traffic"* traffic mix option was used.

9.3 THE EXISTING RECEIVING ENVIRONMENT (BASELINE SITUATION)

9.3.2 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 13 km north 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 9.1). For data collated during five representative years (2014 - 2018), the predominant wind direction is westerly to south-westerly with a mean wind speed of 5.3 m/s over the period 2005 - 2018.

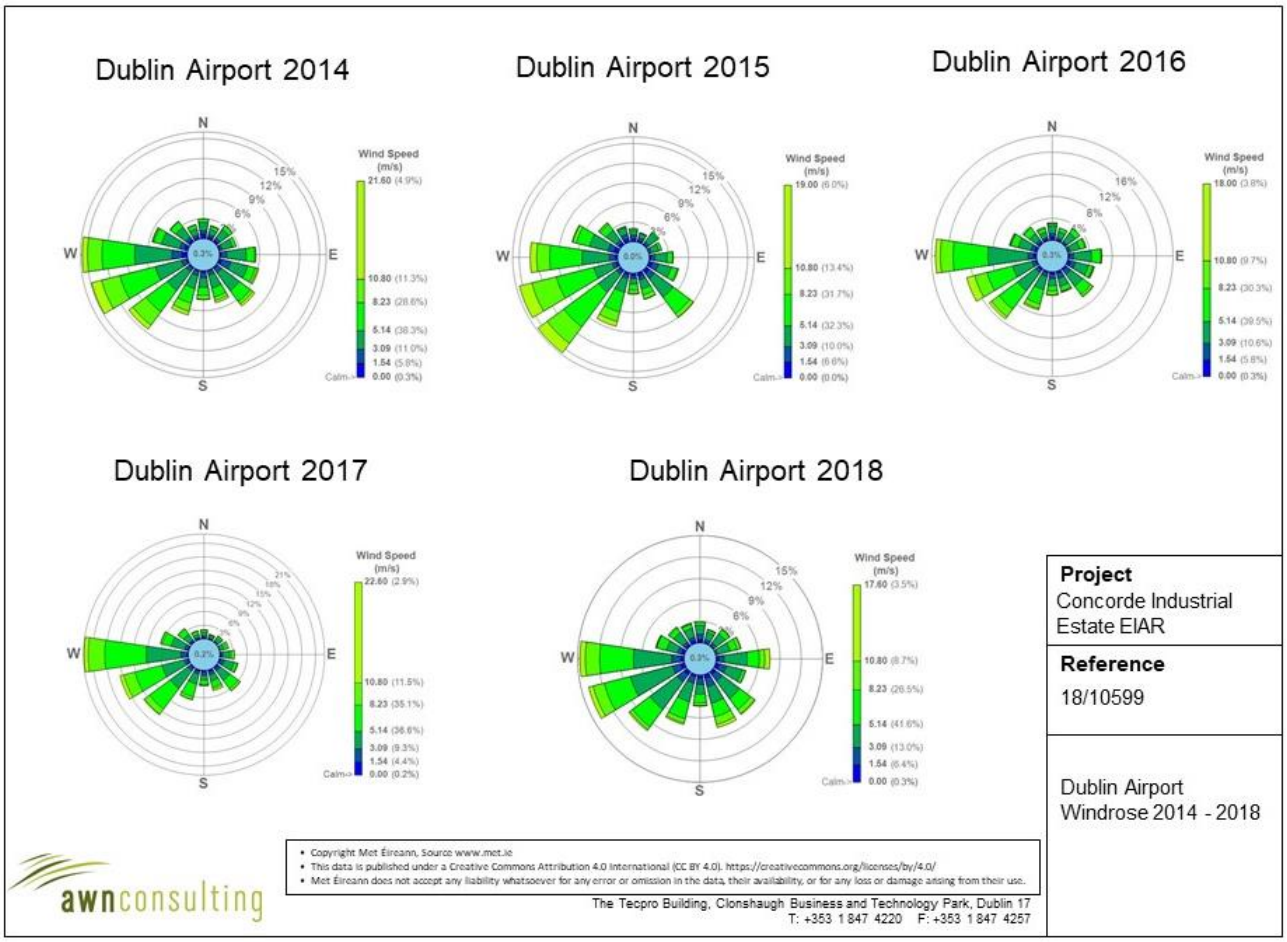


Figure 9.1 Dublin Airport Windrose 2014 – 2018

9.3.2 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 assessing baseline air quality, two tools are generally used: ambient air monitoring and air dispersion modelling. In order to adequately characterise the current baseline environment through monitoring, comprehensive measurements would be required at a number of key receptors for PM_{10}, NO_2 and benzene. In addition, two of the key pollutants identified in the scoping study (PM_{10} and NO_2) have limit values which require assessment over time periods varying from one hour to one year. Thus, continuous monitoring over at least a one-year period at a number of locations would be necessary in order to fully determine compliance for these pollutants. Although this study would provide information on current air quality it would not be able to provide predictive information on baseline conditions (UK DEFRA, 2016b), which are the conditions which prevail just prior to opening in the absence of the development. Hence the impacts of the development were fully assessed by air dispersion modelling (UK DEFRA, 2016b), which is the most practical tool for this purpose. The baseline environment has also been assessed using modelling, since the use of the same predictive technique for both the 'do-nothing' and 'do-something' scenario will minimise errors and allow an accurate determination of the relative impact of the development.

In 2011 the UK DEFRA published research (Highways England, 2013) on the long term trends in NO_2 and NO_X for roadside monitoring sites in the UK. This study marked a decrease in NO_2 concentrations between 1996 and 2002, after which the concentrations stabilised with little reduction between 2004 and 2010. The result of this is that there now exists a gap between projected NO_2 concentrations which UK DEFRA previously published and monitored concentrations. The impact of this 'gap' is that the DMRB screening model can under-predict NO_2 concentrations for predicted future years. Subsequently, the UK Highways Agency (HA) published an Interim advice note (IAN 170/12) in order to correct the DMRB results for future years.

9.3.3 Baseline Air Quality

Air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities. The most recent annual report on air quality in Ireland is "*Air Quality In Ireland 2017 – Indicators of Air Quality*" (EPA, 2018). The EPA website details the range and scope of monitoring undertaken throughout Ireland and provides both monitoring data and the results of previous air quality assessments (EPA, 2019).

As part of the implementation of the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), four air quality zones have been defined in Ireland for air quality management and assessment purposes (EPA, 2019). Dublin is defined as Zone A and Cork as Zone B. Zone C is composed of 23 towns with a population of greater than 15,000. The remainder of the country, which represents rural Ireland but also includes all towns with a population of less than 15,000, is defined as Zone D.

In terms of air monitoring and assessment, the proposed development site is within Zone A (EPA, 2019) . The long-term monitoring data has been used to determine background concentrations for the key pollutants in the region of the proposed development. The background concentration accounts for all non-traffic derived emissions (e.g. natural sources, industry, home heating etc.).

Long-term NO_2 monitoring was carried out at the Zone A roadside location of Winetavern Street and the urban background locations of Rathmines, Dún Laoighaire, Swords and Ballyfermot for the period 2013 - 2017 (EPA, 2018). Long term average concentrations are significantly below the annual average limit of 40 $\mu g/m^3$, average results range from 13 – 20 $\mu g/m^3$ for the suburban background locations. The NO_2 annual average for this five year period suggests an upper average limit of no more than 18 $\mu g/m^3$ (Table 9.2) for the urban background locations. The station at Ballyfermot is approximately 1.5 km from the proposed development site and would experience similar background concentrations of NO_2 to the proposed development. 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	Winetavern Street	Rathmines	Dún Laoghaire	Swords	Ballyfermot
2013	31	19	16	15	16
2014	31	17	15	14	16
2015	31	18	16	13	16
2016	37	20	19	16	17
2017	27	17	17	14	17
Average	**31.3**	**18.2**	**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 9.2 Trends In Zone A Air Quality - Nitrogen Dioxide (NO_2)

Continuous PM_{10} monitoring was carried out at five Zone A locations from 2013 - 2017, Winetavern Street, Rathmines, Dún Laoghaire, Tallaght and Phoenix Park. These showed an upper average limit of no more than 15 µg/m^3 (Table 9.3). 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,2017). 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	Winetavern Street	Rathmines	Dún Laoghaire	Tallaght	Phoenix Park
2013	14	17	17	17	4
2014	14	14	14	15	12
2015	14	15	13	14	12
2016	14	15	13	14	11
2017	13	13	12	12	9
Average	**13.8**	**14.8**	**13.8**	**14.4**	**11.5**

Note1 Annual average limit value - 40 µg/m^3 (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).

Table 9.3 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/m^3, with a $PM_{2.5}/PM_{10}$ ratio ranging from 0.64 – 0.68 (EPA, 2017). 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 development of 10.5 µg/m^3.

In terms of benzene, the annual mean concentration in the Zone A monitoring location of Rathmines for 2017 was 0.92 µg/m^3. This is well below the limit value of 5 µg/m^3. Between 2013 - 2017 annual mean concentrations at the Zone A site ranged from 0.92 – 1.01 µg/m^3. Based on this EPA data a conservative estimate of the current background benzene concentration in the region of the proposed development is 1.0 µg/m^3.

With regard to CO, annual averages at the Zone A, locations of Winetavern Street and Coleraine Street over the 2013 – 2017 period are low, peaking at 5% of the limit value (10 mg/m^3) (EPA, 2018). Based on this EPA data, a conservative estimate of the current background CO concentration in the region of the proposed development is 0.5 mg/m^3.

Table 9.4 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/m^3	15 µg/m^3	10.5 µg/m^3	1.0 µg/m^3	0.5 mg/m^3

Table 9.4 Estimated Background Concentrations

9.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development comprises a mix of residential and retail units. The total gross site area comprises 1.8 hectares and is a brownfield site located adjacent to the southern side of the Naas Road (R810), Dublin 12. A full description of the development can be found in Chapter 2.

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 change in traffic flows or congestion in the local areas which are associated with the development.

The following describes the primary sources of potential air quality and climate impacts which have been assessed as part of this EIAR.

9.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

9.5.1 Construction Stage

Air Quality

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 and PM_{10}/$PM_{2.5}$ emissions. The proposed development can be considered moderate in scale and therefore there is the potential for significant dust soiling 50 m from the source (TII, 2011) (Table 9.5). While construction dust tends to be deposited within 200 m of a construction site, the majority of the deposition occurs within the first 50 m. There are a number of sensitive receptors, predominantly commercial properties in close proximity to the site. 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 9.3) are adhered to, the air quality impacts during the construction phase will not be significant. These measures are summarised in Section 9.8.

Source		Potential Distance for Significant Effects (Distance From Source)		
Scale	Description	Soiling	PM_{10}	Vegetation Effects
Major	Large construction sites, with high use of haul roads	100m	25m	25m
Moderate	Moderate sized construction sites, with moderate use of haul roads	50m	15m	15m
Minor	Minor construction sites, with limited use of haul roads	25m	10m	10m

Table 9.5 Assessment Criteria for the Impact of Dust from Construction, with Standard Mitigation in Place (TII, 2011)

Climate

There is the potential for a number of greenhouse gas emissions to atmosphere during the construction of the development. Construction vehicles, generators etc., may give rise to CO_2 and N_2O emissions. However, the impact on the climate is considered to be imperceptible in the short and long term.

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.

9.5.2 Operational Stage

Local Air Quality

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 Barret Mahony, the consulting engineers on this project and has been used to model pollutant levels under various traffic scenarios and under sufficient spatial resolution to assess whether any significant air quality impact on sensitive receptors may occur.

Cumulative effects have been assessed, as recommended in the EU Directive on EIA (Council Directive 97/11/EC) and using the methodology of the UK DEFRA (2016a, 2016b). Firstly, background concentrations (EPA, 2019) 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 (2019) (see Section 9.3.3). The modelling scenarios include for the cumulative impact of other developments in the vicinity of the proposed development, where such information is available.

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, opening and design years was predicted at the nearest sensitive receptors to the development. This assessment allows the significance of the development, with respect to both relative and absolute impact, to be determined.

The area in close proximity to the proposed development which would experience the worst case air quality impacts is predominantly commercial in nature and as such there are few highly sensitive receptors (typically residential properties) nearby. The receptors modelled 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 worst case traffic data is shown in Table 9.6. Two sensitive receptors (R1 and R2) in the vicinity of the proposed development have been assessed. Sensitive receptors have been chosen as they have the potential to be adversely impacted by the development, these receptors are detailed in Figure 9.2.

Road Name	Speed (kmph)	%HGV	Base	Do Nothing	Do Something	Do Nothing	Do Something
			2019	2022		2037	
Naas Rd	45	4%	24,750	25,790	28,190	29,873	32,273
Kylemore Rd	45	1%	15,500	16,151	17,151	18,709	19,709

Table 9.6 Traffic Data used in Modelling Assessment

Figure 9.2 Approximate Location of Sensitive Receptors used in Air Quality Assessment

Modelling Assessment

Transport Infrastructure Ireland *Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes* (TII, 2011) detail a methodology for determining air quality impact significance criteria for road schemes and has been adopted for this assessment, as is best practice. The degree of impact is determined based on both the absolute and relative impact of the proposed development. Results are compared against the 'Do-Nothing' scenario, which assumes that the proposed development is not in place in future years, in order to determine the degree of impact.

NO_2

The results of the assessment of the impact of the proposed development on NO_2 in the opening year 2022 and design year 2037 are shown Table 9.7 for the Highways Agency IAN 170/12 and Table 9.8 using the UK Department for Environment, Food and Rural Affairs technique respectively. The annual average concentration is in compliance with the limit value at all worst-case receptors using both techniques. Levels of NO_2 are 47% of the annual limit value in 2022 using the more conservative IAN

technique, while concentrations are 46% of the annual limit value in 2022 using the UK Department for Environment, Food and Rural Affairs technique. Concentrations in the design year of 2037 are also low, with NO_2 levels reaching 45% of the annual limit value using the more conservative IAN technique. The hourly limit value for NO_2 is 200 µg/m^3 and is expressed as a 99.8th percentile (i.e. it must not be exceeded more than 18 times per year). The maximum 1-hour NO_2 concentration is not predicted to be exceeded using either technique in 2022 or 2037 (Table 9.9).

The impact of the proposed development on annual mean NO_2 levels can be assessed relative to "Do Nothing (DN)" 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, the greatest impact on NO_2 concentrations will be an increase of 0.3% of the annual limit value at Receptor 1. Thus, using the assessment criteria outlined in Appendix 9.2 Tables A1 – A2, the impact of the proposed development in terms of NO_2 is negligible. Therefore, the overall impact of NO_2 concentrations as a result of the proposed development is long-term and imperceptible at all of the receptors assessed.

PM_{10}

The results of the modelled impact of the proposed development for PM_{10} in the opening year 2022 and design year 2037 are shown in Table 9.10. Predicted annual average concentrations at the worst-case receptor in the region of the development are at most 39% of the limit value in 2022 and 2037. The 24-hour mean limit value of 50 µg/m^3 is expressed as a 90.4th percentile (i.e. it must not be exceeded more than 35 times per year). It is predicted that the worst case receptors will not experience any days of exceedance either with or without the proposed development.

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. The greatest impact on PM_{10} concentrations in the region of the proposed development will be an increase of 0.07% of the annual limit value at Receptor 1. Thus, the magnitude of the changes in air quality are negligible at all receptors based on the criteria outlined in Appendix 9.2, Tables A1 – A3. Therefore, the overall impact of PM_{10} concentrations as a result of the proposed development is long-term and imperceptible.

$PM_{2.5}$

The results of the modelled impact of the proposed development for $PM_{2.5}$ are shown in Table 9.11. Predicted annual average concentrations in the region of the proposed development are 43% of the limit value in 2022 and 44% of the limit in 2037 at the worst-case receptor.

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 receptors assessed will experience an increase in concentrations of over 0.08% of the limit value. Therefore, using the assessment criteria outlined in Appendix 9.2, Tables A1 – A2, the impact of the proposed development with regard to $PM_{2.5}$ is negligible at all of the receptors assessed. Overall, the impact of increased $PM_{2.5}$ concentrations as a result of the proposed development is long-term and imperceptible.

CO and Benzene

The results of the modelled impact of CO and benzene are shown in Table 9.12 and Table 9.13 respectively. Predicted pollutant concentrations with the proposed development in place are below the ambient standards at all locations. Levels of CO are 28% of the limit value in 2022 and 2037 with levels of benzene reaching 22% of the limit value.

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 will be an increase of 0.09% of the CO limit and 0.14% of the benzene limit value at Receptor 1. Thus, using the assessment criteria for NO_2 and PM_{10} outlined in Appendix 9.2 and applying these criteria to CO and benzene, the impact of the proposed development in terms of CO and benzene is negligible, long-term and imperceptible.

Summary of Local Air Quality Modelling Assessment

Levels of traffic-derived air pollutants from the proposed development will not exceed the ambient air quality standards either with or without the proposed development in place. Using the assessment criteria outlined in Appendix 9.2, Tables A1 – A3, the impact of the development in terms of PM_{10}, $PM_{2.5}$, CO, NO_2 and benzene is negligible, long-term, localised negative and imperceptible.

Regional Air Quality Impact

The regional impact of the proposed development on emissions of NO_X and VOCs has been assessed using the procedures of Transport Infrastructure Ireland (2011) and the UK Department for Environment, Food and Rural Affairs (2016b). The results (see Table 9.14) 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 opening year 2022, the predicted impact of the changes in AADT is to increase NO_x levels by 0.001% of the NO_x emissions ceiling and increase VOC levels by 0.00043% of the VOC emissions ceiling to be complied with in 2020. Impacts in the design year of 2037 are also predicted to be low, with NOx levels increasing by 0.00164% of the NOx emissions ceiling and VOC levels increasing by 0.00048% of the VOC emissions ceiling to be complied with in 2035.

Therefore, the likely overall magnitude of the changes on air quality in the operational stage of the proposed development is imperceptible, long-term and not significant.

Climate

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 9.14). The results show that the impact of the proposed development in the opening year 2022 will be to increase CO_2 emissions by 0.00108% of Ireland's EU 2020 Target. The impact in the design year of 2037 is equally low with CO_2 emissions increasing by 0.00109% of the EU 2020 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, 2014).

Therefore, the likely overall magnitude of the changes on climate in the operational stage of the proposed development is imperceptible, negative, long-term and not significant.

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 and, therefore, will not result in a significant impact on human health.

Receptor	Impact Opening Year 2022					Impact Design Year 2037				
	DN	DS	DS-DN	Magnitude	Description	DN	DS	DS-DN	Magnitude	Description
1	18.6	18.7	0.12	Imperceptible	Negligible Increase	17.8	17.9	0.11	Imperceptible	Negligible Increase
2	18.1	18.2	0.08	Imperceptible	Negligible Increase	17.3	17.3	0.06	Imperceptible	Negligible Increase

Table 9.7 Annual Mean NO_2 Concentrations ($\mu g/m^3$) (using IAN 170/12 V3 Long Term NO_2 Trend Projections)

Receptor	Impact Opening Year 2022					Impact Design Year 2037				
	DN	DS	DS-DN	Magnitude	Description	DN	DS	DS-DN	Magnitude	Description
1	18.3	18.4	0.12	Imperceptible	Negligible Increase	18.4	18.5	0.11	Imperceptible	Negligible Increase
2	17.9	18.0	0.08	Imperceptible	Negligible Increase	18.0	18.0	0.06	Imperceptible	Negligible Increase

Table 9.8 Annual Mean NO_2 Concentrations ($\mu g/m^3$) (using Defra's Technical Guidance)

Receptor	IAN 170/12 V3 Long Term NO_2 Trend Projections Technique				Defra's Technical Guidance Technique			
	Opening Year 2022		Design Year 2037		Opening Year 2022		Design Year 2037	
	DN	DS	DN	DS	DN	DS	DN	DS
1	64.9	65.4	62.1	62.5	64.9	65.4	62.1	62.5
2	63.3	63.6	60.5	60.7	63.3	63.6	60.5	60.7

Table 9.9 1 Hour 99.8th%ile NO_2 Concentrations ($\mu g/m^3$)

Receptor	Impact Opening Year 2022					Impact Design Year 2037				
	DN	DS	DS-DN	Magnitude	Description	DN	DS	DS-DN	Magnitude	Description
1	15.5	15.5	0.03	Imperceptible	Negligible Increase	15.5	15.6	0.02	Imperceptible	Negligible Increase
2	15.5	15.5	0.02	Imperceptible	Negligible Increase	15.6	15.6	0.02	Imperceptible	Negligible Increase

Table 9.10 Annual Mean PM_{10} Concentrations ($\mu g/m^3$)

Receptor	Impact Opening Year 2022					Impact Design Year 2037				
	DN	DS	DS-DN	Magnitude	Description	DN	DS	DS-DN	Magnitude	Description
1	10.8	10.9	0.02	Imperceptible	Negligible Increase	10.9	10.9	0.02	Imperceptible	Negligible Increase
2	10.9	10.9	0.01	Imperceptible	Negligible Increase	10.9	10.9	0.01	Imperceptible	Negligible Increase

Table 9.11 Annual Mean $PM_{2.5}$ Concentrations ($\mu g/m^3$)

Receptor	Impact Opening Year 2022					Impact Design Year 2037				
	DN	DS	DS-DN	Magnitude	Description	DN	DS	DS-DN	Magnitude	Description
1	2.74	2.75	0.009	Imperceptible	Negligible Increase	2.75	2.76	0.008	Imperceptible	Negligible Increase
2	2.76	2.77	0.006	Imperceptible	Negligible Increase	2.78	2.79	0.006	Imperceptible	Negligible Increase

Table 9.12 Maximum 8-hour CO Concentrations (mg/m^3)

Receptor	Impact Opening Year 2022					Impact Design Year 2037				
	DN	DS	DS-DN	Magnitude	Description	DN	DS	DS-DN	Magnitude	Description
1	1.08	1.08	0.007	Imperceptible	Negligible Increase	1.09	1.10	0.007	Imperceptible	Negligible Increase
2	1.07	1.07	0.004	Imperceptible	Negligible Increase	1.08	1.08	0.004	Imperceptible	Negligible Increase

Table 9.13 Annual Mean Benzene Concentrations (µg/m^3)

Year	Scenario	VOC	NO_X	CO_2
		(kg/annum)	(kg/annum)	(tonnes/annum)
2022	Do Nothing	3,032	8,044	5,056
	Do Something	3,279	8,706	5,468
2037	Do Nothing	3,506	9,299	5,859
	Do Something	3,751	9,960	6,271
Increment in 2022		246.2 kg	662.5 kg	411.7 Tonnes
Increment in 2037		245.8 kg	661 kg	411.8 Tonnes
Emission Ceiling (kilo Tonnes) 2020		**56.8**	**66.2**	**37,943**
Emission Ceiling (kilo Tonnes) 2035		**51.5**	**40.2**	**37,943**
Impact in 2022 (%)		0.00043 %	0.00100 %	0.00108 %
Impact in 2037 (%)		0.00048 %	0.00164 %	0.00109 %

Table 9.14 Regional Air Quality and Climate Impact Assessment

9.6 POTENTIAL CUMULATIVE IMPACTS

Should the construction phase of the proposed development coincide with the construction of any other permitted developments within 350m of the site then there is the potential for cumulative dust impacts to the nearby sensitive receptors. The dust mitigation measures outlined in Appendix 9.3 should be applied throughout the construction phase of the proposed development, with similar mitigation measures applied for other permitted developments which will avoid significant cumulative impacts on air quality. With appropriate mitigation measures in place, the predicted cumulative impacts on air quality and climate associated with the construction phase of the proposed development are deemed short-term and not significant.

If additional residential or commercial developments are proposed in the future, in the vicinity of the proposed development, this has the potential to add further additional vehicles to the local road network. However, as the traffic impact for the proposed development has an imperceptible impact on air quality, it is unlikely that other future developments of similar scale would give rise to a significant impact during the construction and operational stages of those projects. Future projects of a large scale would need to conduct an EIA to ensure that no significant impacts on air quality will occur as a result of those developments.

9.7 'DO NOTHING' IMPACT

The Do Nothing scenario includes retention of the current site without the proposed development in place. In this scenario, ambient air quality at the site will remain as per the baseline and will change in accordance with trends within the wider area (including influences from potential new developments in the surrounding area, changes in road traffic, etc).

The Do Nothing scenario for the operational phase has been assessed in Section 9.5.2.

9.8 AVOIDANCE, REMEDIAL & MITIGATION MEASURES

9.8.1 Construction Phase

Air Quality

The pro-active control of fugitive dust will ensure the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released. The main contractor will be responsible for the coordination, implementation and ongoing monitoring of the dust management plan. The key aspects of controlling dust are listed below. Full details of the dust management plan can be found in Appendix 9.3.

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.
- Furthermore, any road that has the potential to give rise to fugitive dust must be regularly watered, as appropriate, during dry and/or windy conditions.
- Vehicles exiting the site shall make use of a wheel wash facility where appropriate, prior to entering onto public roads.
- Vehicles using site roads will have their speed restricted, and this speed restriction must be enforced rigidly. On any un-surfaced site road, this will be 20 kph, and on hard surfaced roads as site management dictates.

- Vehicles delivering material with dust potential (soil, aggregates) will be enclosed or covered with tarpaulin at all times to restrict the escape of dust.
- Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary.
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.
- During movement of materials both on and off-site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions.

At all times, these procedures will be strictly monitored and assessed. In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust would be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.

Climate

Construction traffic and embodied energy of construction materials are expected to be the dominant source of greenhouse gas emissions as a result of the construction phase of the development. Construction vehicles, generators etc., may give rise to some CO_2 and N_2O emissions. However, due to short-term and temporary nature of these works, the impact on climate will not be significant.

Nevertheless, some site-specific mitigation measures can be implemented during the construction phase of the proposed development to ensure emissions are reduced further. In particular the prevention of on-site or delivery vehicles from leaving engines idling, even over short periods. Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site.

9.8.2 Operational Stage

The results of the air dispersion modelling study indicate that the impact of the proposed development on air quality and climate is predicted to be imperceptible with respect to the operational phase in the long term.

9.9 PREDICTED IMPACTS OF THE PROPOSED DEVELOPMENT

9.9.1 Construction Stage

Once the dust minimisation measures outlined in Section 9.8 and Appendix 9.3 are implemented, the impact of the proposed development in terms of dust soiling or PM_{10}/$PM_{2.5}$ emissions will be short-term and not significant at nearby receptors.

Impacts to climate are considered imperceptible during the construction stage of the proposed development.

9.9.2 Operational Stage

The results of the air dispersion modelling indicate that the impact of the proposed development on air quality and climate is considered imperceptible.

9.10 MONITORING

9.10.1 Construction Stage

Monitoring of construction dust deposition at nearby sensitive receptors during the construction phase of the proposed development is recommended to ensure mitigation measures are working satisfactorily. This can be carried out 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.

9.10.2 Operational Stage

There is no monitoring recommended for the operational phase of the development as impacts to air quality and climate are predicted to be imperceptible.

9.11 REINSTATEMENT

Not applicable.

9.12 INTERACTIONS

Air quality does not have a significant number of interactions with other topics. 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 proposed 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 impacts of the proposed development on air quality are 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 considered to be not significant.

With the appropriate mitigation measures to prevent fugitive dust emissions, it is predicted that there will be no significant interactions between air quality and soil and geology. No other significant interactions with air quality have been identified.

9.13 DIFFICULTIES ENCOUNTERED IN COMPILING

There were no difficulties encountered when compiling this assessment.

9.14 REFERENCES

DEHLG (2004) National Programme for Ireland under Article 6 of Directive 2001/81/EC for the Progressive Reduction of National Emissions of Transboundary Pollutants by 2010

DEHLG (2004) Quarries and Ancillary Activities, Guidelines for Planning Authorities

DEHLG (2007) Update and Revision of the National Programme for Ireland under Article 6 of Directive 2001/81/EC for the Progressive Reduction of National Emissions of Transboundary Pollutants by 2010

Department of the Environment, Heritage and Local Government (2010) Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities

EEA (2012) NEC Directive Status Reports 2011

Environmental Protection Agency (EPA) (2002) Guidelines On Information To Be Contained in Environmental Impact Statements

Environmental Resources Management (1998) Limitation and Reduction of CO2 and Other Greenhouse Gas Emissions in Ireland

EPA (2003) Advice Notes On Current Practice (In The Preparation Of Environmental Impact Statements)

EPA (2015) Advice Notes for Preparing Environmental Impact Statements – Draft

EPA (2017) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports - Draft

EPA (2018) Air Quality Monitoring Report 2017 (& previous annual reports 2012-2016)

EPA (2019) EPA Website: http://www.epa.ie/whatwedo/monitoring/air/

EU (2014) EU 2030 Climate and Energy Framework

Framework Convention on Climate Change (1997) Kyoto Protocol To The United Nations Framework Convention On Climate Change

Framework Convention on Climate Change (1999) Ireland - Report on the in-depth review of the second national communication of Ireland

German VDI (2002) Technical Guidelines on Air Quality Control – TA Luft

Highways England (2013) Interim Advice Note 170/12 v3 Updated air quality advice on the assessment of future NO_x and NO_2 projections for users of DMRB Volume 11, Section 3, Part 1 'Air Quality

Institute of Air Quality Management (IAQM) (2014) Guidance on the Assessment of Dust from Demolition and Construction Version 1.1

Transport Infrastructure Ireland (2009) Guidelines for Assessment of Ecological Impacts of National Roads Schemes (Rev. 2, Transport Infrastructure Ireland, 2009)

Transport Infrastructure Ireland (2011) Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes

UK DEFRA (2016a) Part IV of the Environment Act 1995: Local Air Quality Management, LAQM. PG(16)

UK DEFRA (2016b) Part IV of the Environment Act 1995: Local Air Quality Management, LAQM.TG(16)

UK DEFRA (2017) NO_x to NO_2 Conversion Spreadsheet (Version 6.1)

UK Department of the Environment, Transport and Roads (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)

World Health Organisation (2006) Air Quality Guidelines - Global Update 2005 (and previous Air Quality Guideline Reports 1999 & 2000)

Chapter 10:

Noise and Vibration

10.0 NOISE & VIBRATION

10.1 INTRODUCTION

AWN Consulting Ltd. has been commissioned to carry out a noise and vibration impact assessment of the proposed mixed-use development at the former Concorde Industrial Estate, Naas Road, Walkinstown, Dublin 12.

The proposed development comprises a mix of residential and retail units. The total gross site area comprises 1.8 hectares and is a brownfield site located adjacent to the southern side of the Naas Road (R810), Dublin 12.

In terms of the site, noise and vibration will be considered in terms of two aspects. The first is the outward impact of the development (i.e. the potential impact of the buildings on existing sensitive receptors in the study area) and the inward impact of existing noise and vibration sources on the development itself.

This assessment has been prepared by Damian Kelly of AWN Consulting. Damian is Director of Acoustics at AWN and holds a BSc from DCU and an MSc from QUB. He has extensive experience as an acoustic consultant working in the field since 1997 and is a member of the Institute of Acoustics. He is currently a sitting member of the Irish committee of this organisation. He has extensive knowledge in the field of noise modelling and prediction, having developed many of the largest and most complex examples of proprietary noise models prepared in Ireland to date. He is co-author of the *EPA: Guidance Note for Noise – Licence Applications, Surveys and Assessments in Relation to Scheduled Activities NG4 (2012).*

10.2 STUDY METHODOLOGY

Assessment Overview

The study has been undertaken using the following methodology:

- Baseline noise monitoring has been undertaken across the development site to determine the range of noise levels at varying locations across the site;
- A review of the most applicable standards and guidelines has been conducted in order to set a range of acceptable noise and vibration criteria for the construction and operational phases of the proposed development, this is summarised in the following sections;
- Predictive calculations have been performed to estimate the likely noise emissions during the construction phase of the project at the nearest sensitive locations (NSL's) to the site;
- Predictive calculations have been performed to assess the potential impacts associated with the operation of the development at the most sensitive locations surrounding the development site;
- A schedule of mitigation measures has been proposed, where relevant, to control the noise and vibration emissions associated with both the construction and operational phases of the proposed development, and;
- The inward impact of noise in the surrounding environment into the proposed buildings has also been assessed to determine the requirements, for additional noise mitigation to provide suitable residential amenity.

Operational Noise Guidance (Outward & Inward Impacts)

Dublin Agglomeration Noise Action Plan

Here, consideration has been given to the content of the Dublin Agglomeration Noise Action Plan 2018 – 2023 (NAP). The document states that its 'key objective' is:

> *"as with the previous two Action Plans is to avoid, prevent and reduce, where necessary, on a prioritised basis the harmful effects, including annoyance, due to long term exposure to environmental noise from road traffic and rail sources. This will be achieved by taking a strategic*

approach to managing environmental noise and undertaking a 'balanced approach' within the context of sustainable development."

It is important to state the following extract from the document:

"The Noise Action Plan is aimed at managing Environmental Noise and excludes, for the most part, noise from domestic activities, noise created by neighbours, noise at work places or construction noise as these can be dealt with under existing legislation such as the Environmental Protection Agency Act 1992 and Health & Safety legislation. However, Dublin City Council in Volume 1 of the plan, which relates only to the Dublin City Council Area, has outlined policies and procedures related to managing noise nuisances as they wish to provide all relevant information on how it intends to manage all matters in relation to the management of environmental and nuisance noise."

This content will be reviewed and commented upon as appropriate in this and following sections.

In relation to noise limits the NAP sates:

"No national limit values exist in relation to environmental noise control. This Action Plan sets out certain criteria in relation to environmental sound levels which will be applied in identification of Quiet Areas and areas that have 'Undesirable' high sound levels or 'Desirable' low sound levels. These are set out below are and are fully described in each of the individual local authority volumes. These criteria are the same as those contained in the previous two action plans."

The NAP states the following in relation to what it considers to be "'Undesirable' high sound levels or 'Desirable' low sound levels":

Desirable Low Sound Levels	Undesirable High Sound Levels
< 50 dB(A) L_{night}	>55 dB(A) L_{night}
< 55 dB(A) L_{day}	>70 dB(A) L_{day}

Table 10.1 Review of Undesirable Hight and Desirable Low Sound Levels

The existing noise environment in the vicinity of the development will be commented upon in light of the above. The inward noise impact assessment presents in this chapter is based on the principles outlined in the Professional Guidance on Planning & Noise (ProPG) guidance document.

Internal Noise (BS 8233)

There are no statutory guidelines or specific local guidelines relating to appropriate internal noise levels in dwellings. In this instance, reference is made to BS 8233: 2014: Guidance on sound insulation and noise reduction for buildings.

BS 8233 sets out recommended internal noise levels for several different building types from external noise sources such as traffic. The guidance is primarily for use by designers and hence BS 8233 may be used as the basis for an appropriate schedule of noise control measures. The recommended indoor ambient noise levels for residential dwellings are set out in Table 10.2.

Activity	Location	Day (07:00 to 23:00hrs)	Night (23:00 to 07:00hrs)
Resting	Living Room	35	--
Dining	Dining Room/Area	40	--
Sleeping (daytime resting)	Bedroom	35	30

Table 10.2 Indoor Ambient Noise Levels for Dwellings from BS8233: 2014

BS 8233 also provides some guidance on individual noise events, it states:

> *"Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or LAFmax, depending on the character and number of events per night. Sporadic noise events could require separate values."*

Typically, a 45dB L_{AFmax} criterion is applied to individual noise events within bedrooms at night. This criterion is generally considered a noise level that should not typically be exceeded.

External Noise (BS 8233 Amenity Areas)

BS 8233 also provides desirable noise levels for external amenity areas such as gardens, patios and balconies. It states:

> *"For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited."*

Offsite Noise Impacts

Once a development of this nature becomes fully operational, a variety of electrical and mechanical plant will be required to service the development. Most of this plant will be capable of generating noise to some degree. Some of this plant may operate 24 hours a day, and hence would be most noticeable during quiet periods (i.e. overnight). Noisy plant with a direct line-of-sight to noise sensitive properties would potentially have the greatest impact. Plant contained within plantrooms has the least potential for impact once consideration is given to appropriate design of the space.

In relation to plant noise levels at noise sensitive locations DCC would typically apply the following condition to the development of this nature:

"Noise levels from the proposed development should not be so loud, so continuous, so repeated, of such duration or pitch or occurring at such times as to give reasonable cause for annoyance to a person in any premises in the neighbourhood or to a person lawfully using any public space. In particular the rated noise levels from the proposed development shall not constitute reasonable grounds for complaint as provided for in B.S. 4142. Method for rating industrial noise affecting mixed residential and industrial area.

Reason: In order to ensure a satisfactory standard of development, in the interests of residential amenity."

Guidance from DCC on noise emissions from mechanical plant items makes reference to the *British Standard BS 4142: 2014: Methods for Rating and Assessing Industrial and Commercial Sound*. This document is the industry standard method for analysing building services plant noise emissions to residential receptors and is the document used by DCC in their standard planning conditions and also in complaint investigations.

BS 4142 describes methods for rating and assessing sound of an industrial and/or commercial nature. The methods described in this British Standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

For an appropriate BS 4142 assessment it is necessary to compare the measured external background noise level (i.e. the $L_{A90,T}$ level measured in the absence of plant items) to the rating level ($L_{Ar,T}$) of the various plant items, when operational. Where noise emissions are found to be tonal, impulsive in nature or irregular enough to attract attention, BS 4142 also advises that a penalty be applied to the specific level to arrive at the rating level.

The subjective method for applying a penalty for tonal noise characteristics outlined in BS 4142 recommends the application of a 2dB penalty for a tone which is just perceptible at the noise receptor, 4dB where it is clearly perceptible, and 6dB where it is highly perceptible.

The following definitions as discussed in BS 4142 as summarised below:

"ambient noise level, $L_{Aeq,T}$"	is the noise level produced by all sources including the sources of concern, i.e. the residual noise level plus the specific noise of mechanical plant, in terms of the equivalent continuous A-weighted sound pressure level over the reference time interval [T].
"residual noise level, $L_{Aeq,T}$"	is the noise level produced by all sources excluding the sources of concern, in terms of the equivalent continuous A-weighted sound pressure level over the reference time interval [T].
"specific noise level, $L_{Aeq,T}$"	is the sound level associated with the sources of concern, i.e. noise emissions solely from the mechanical plant, in terms of the equivalent continuous A-weighted sound pressure level over the reference time interval [T].
"rating level, $L_{Ar,T}$"	is the specific sound level plus any adjustments for the characteristic features of the sound (e.g. tonal, impulsive or irregular components);
"background noise level, $L_{A90,T}$"	is the sound pressure level of the residual noise that is exceeded for 90% of the time period T.

If the rated plant noise level is +10dB or more above the pre-existing background noise level then this indicates that complaints are likely to occur and that there will be a significant adverse impact. A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.

The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact.

Change in Traffic Noise Levels

The main potential source of outward noise impact associated with the proposed development relates to additional traffic flows on the surrounding road network. Given that traffic from the 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 10.3 offers guidance as to the likely impact associated with any particular change in traffic noise level (Source DMRB, 2011).

Change in Sound Level, dB(A)	Subjective Reaction	Magnitude of Impact
0	Inaudible	Neutral
0.1 – 2.9	Barely Perceptible	Imperceptible
3 – 4.9	Perceptible	Slight
5 – 9.9	Up to a doubling of loudness	Moderate
10+	Doubling of loudness and above	Significant

Table 10.3 Likely Impact Associated with Change in Traffic Noise Level. Source: (DMRB 2011)

Construction Noise Guidance (BS 5228)

There is no published statutory Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. Local authorities normally control construction activities by imposing limits on the hours of operation and consider noise limits at their discretion.

In the absence of specific noise limits, appropriate criteria relating to permissible construction noise levels for a development of this scale may be found in the British Standard BS 5228 – 1: 2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Noise.

The approach adopted here calls for the designation of a noise sensitive location into a specific category (A, B or C) based on exiting ambient noise levels in the absence of construction noise. This then sets a threshold noise value that, if exceeded at this location, indicates a significant noise impact is associated with the construction activities.

This document sets out guidance on permissible noise levels relative to the existing noise environment. Table 10.4 sets out the values which, when exceeded, signify a significant effect at the facades of residential receptors as recommended by BS 5228 – 1. These are cumulative levels, i.e. the sum of both ambient and construction noise levels.

Assessment category and threshold value period (L_{Aeq})	**Threshold value, in decibels (dB)**		
	Category A Note A	**Category B** Note B	**Category C** Note C
Night-time (23:00 to 07:00hrs)	45	50	55
Evenings and weekends Note D	55	60	65
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75

Table 10.4 Example Threshold of Significant Effect at Dwellings

Note A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.
Note B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.
Note C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values.
Note D) 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.

It should be noted that this assessment method is only valid for residential properties.

This assessment process determines if a significant construction noise impact is likely. Notwithstanding the outcome of this assessment, the overall acceptable levels of construction noise 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 10.5 sets out these levels.

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*

Table 10.5 Maximum Permissible Noise Levels at the Facade of Dwellings during Construction

Note * Construction activity at these times, other than that required for emergency works, will normally require the explicit permission of the relevant local authority.

In exceptional circumstances there may be a requirement that certain construction works are carried out during night time periods. Therefore, based on the above the following construction noise criteria are proposed for the site:

65dB $L_{Aeq,1hr}$ at noise sensitive location
75dB $L_{Aeq,1hr}$ at commercial property

1 Guidelines for the Treatment of Noise and Vibration in National Road Schemes, Revision 1, 25 October 2004, Transport Infrastructure Ireland

Vibration Guidance

Peak Particle Velocity (PPV)

Peak particle velocity (PPV) is commonly used to assess the structural response of buildings to vibration. Reference to the following documents has been made for the purposes of this assessment in order to discuss appropriate PPV limit values.

- British Standard BS7385: 1993: Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration, and;
- British Standard BS5228-2: 2009 + A1: 2014: Code of practice for noise and vibration control on construction and open sites – Vibration.

BS5228-2 and BS7385 advise 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 (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.

The recommended vibration limits in order to avoid cosmetic damage to buildings, as set out in both documents referred to above, are reproduced in Table 10.5. The documents note that minor structural damage can occur at vibration magnitudes which are greater than twice those presented in Table 10.6. Major damage to a building structure is possible at vibration magnitudes greater than four times the values set out in the Table. It should be noted that these values refer to the base of the building.

Vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of		
4 to 15 Hz	**15 to 40Hz**	**40Hz and above**
15 mm/s	20 mm/s	50 mm/s

Table 10.6 Transient Vibration Guide Values for Cosmetic Damage

Human response to vibration stimuli occurs at orders of magnitudes below those associated with any form of building damage, hence vibration levels lower than those indicated in Table 10.6 can lead to concern. BS5228-2 also provides a useful guide relating to the assessment of human response to vibration in terms of PPV. Whilst the guide values are commonly used to compare typical human response to construction works, they tend to relate closely to general levels of vibration perception from other general sources. Table 10.7 summarises the range of vibration values and the associated potential effects on humans.

Vibration Level, PPV	**Effect**
0.14 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies. At lower frequencies people are less sensitive to vibration.
0.3 mm/s	Vibration might be just perceptible in residential environments.
1 mm/s	It is likely that a vibration level of this magnitude in residential environments will cause complaint.

Table 10.7 Guidance on Effects of Human Response to PPV Magnitudes

The standard notes that single or infrequent occurrences of these levels do not necessarily correspond to the stated effect in every case. Where these values are routinely measured or expected then an assessment in accordance with BS 6472-1 might be more appropriate to determine whether time varying exposure is likely to give rise to any degree of adverse comment.

Vibration Dose Value (VDV)

Guidance relating to human response to vibration is contained within BS 6472 Guide to evaluation of human exposure to vibration in buildings (2008): Part 1 - Vibration sources other than blasting.

BS 6472 uses the Vibration Dose Value (VDV) which is measured or forecast over the day or night-time periods in terms of $m/s^{-1.75}$. The VDV parameter takes into account how people respond to vibration in terms of frequency content, vibration magnitude and the number of vibration events during an assessment period.

The following table, as set out in the standard, details the values of VDV where various comments from occupiers are possible. The standard notes that the values are applicable for both vertical and horizontal vibration with the appropriate weighting applied. The values in Table 10.8 will be adopted for this assessment.

Building Type	Low probability of adverse comment	Adverse comment possible	Adverse comment probable
Residential building – Day	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential building – Night	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8

Table 10.8 VDV ($m/s^{-1.75}$) above which Various Degree of Adverse Comment may be Expected in Residential Buildings

10.3 THE EXISTING RECEIVING ENVIRONMENT (BASELINE SITUATION)

The site is located on the existing Concorde Industrial Estate, off the Naas Road (R810). The site is brownfield land bounded by the Naas Road to the north and commercial lands/plots to the east, south and west. The existing noise and vibration environments across the development site and in the vicinity of the nearest existing noise sensitive locations are dictated by transportation sources in the study area including the existing Naas Road and Luas line. After development of the proposed retail and residential units this is expected to remain to be the case.

The nearest existing residential noise sensitive locations to the proposed development are those located in the Lansdowne Gate development some 250m to the south east and those residential properties to the north east at some 190m distance along Bluebell Avenue.

BASELINE NOISE SURVEY

Baseline noise monitoring has been undertaken across the development site to determine the range of noise levels at varying locations across the site and to establish the existing noise climate the nearest noise sensitive locations and across the development site itself.

The survey was conducted in general accordance with *ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise*. Specific details are set out below.

Choice of Measurement Locations

Unattended noise monitoring was undertaken at one location within the development site (A). An additional three attended monitoring locations (B to D) were undertaken within the site representative of the existing noise environment at the closest noise sensitive locations and the noise climate within the development site.

The locations are described below and illustrated in Figure 10.1.

A Unattended noise monitoring was undertaken midway along the northern boundary of the Concorde Industrial Estate site with the Naas Road. The data collected at this location has been used to predict expected noise levels across the development site which in turn have been used to inform the ProPG assessment presented in the body of this chapter.

B Attended day and night noise monitoring was carried out at this location which is located in the vicinity of the nearby noise sensitive locations at Lansdowne Gate to the south east of the proposed development site.

C Attended day and night noise monitoring carried out on the eastern boundary of the site. This is considered to be representative of noise levels at the nearest commercial property to the east and is set back a comparable distance from the Naas Road when compared to the noise sensitive locations on the opposite side of the road on Bluebell Avenue. .

D Attended day and night noise monitoring was along the common boundary of the development site with commercial lands to the south.

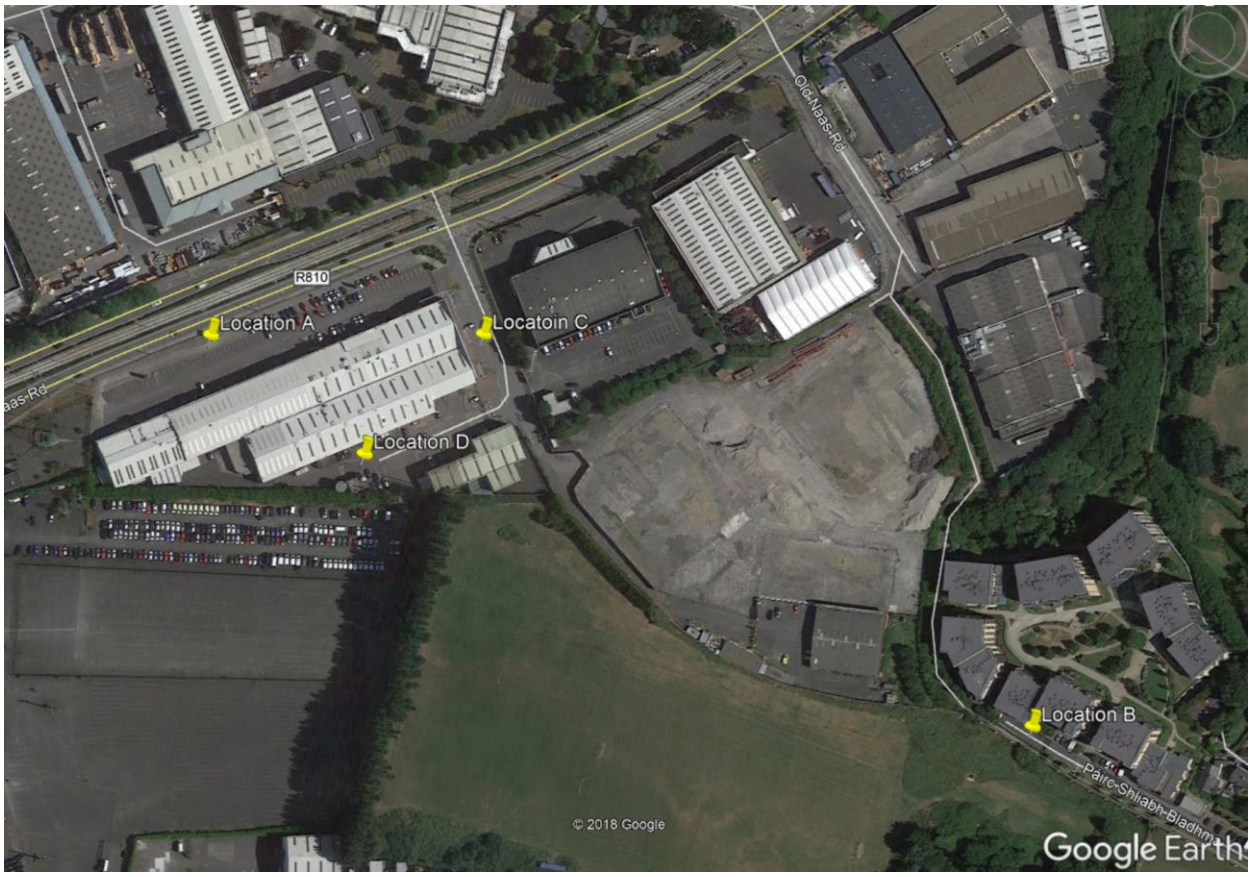


Figure 10.1 Noise Monitoring Locations (Source : Google Earth)

Survey Periods

The survey was undertaken over the following surveys periods:

- Unattended noise monitoring was undertaken at Location A was undertaken between 14:14hrs on 10 January 2019 and 09:57hrs on 18 January 2019, and 14:19hrs on 11 January 2019;
- Attended noise monitoring was undertaken at Locations B to D between 15:20 to 16:16hrs on 10 January 2019, 13:10 to 13:45hrs on 11 January 2019 and 23:00hrs on 10 January to 01:20hrs on 11 January 2019.

MONITORING EQUIPMENT

The surveys were undertaken using the following monitoring equipment:

Location	Manufacturer	Model	Serial Number
A	Rion	NL-42	186671
B - D	Brüel & Kjaer	2250	2446897

Table 10.9 Instrumentation Details

Measurement Parameters

The noise survey results are presented in terms of the following parameters.

L_{Aeq} is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period.

L_{AFmax} is the instantaneous maximum sound level measured during the sample period using the 'F' time weighting.

L_{A90} is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.

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

The results of the noise monitoring completed at the various locations are discussed in the following sections.

Location A

Table 10.10 reviews the measured noise levels at Location A. Road traffic noise and Luas activities were the dominant noise sources noted at this location.

Period	Measured Noise Levels, dB	
	$L_{Aeq,16hr}$	$L_{A90,16hr}$
Day (07:00 – 23:00hrs)	72	61
Period	Measured Noise Levels, dB	
	$L_{Aeq,8hr}$	$L_{A90,8hr}$
Night (23:00 – 07:00hrs)	67	48

Table 10.10 Noise Monitoring Results at Location A

Daytime noise levels along the boundary of the site with the Naas Road are the order of 72dB $L_{Aeq,16hr}$ with ambient and background noise levels being dictated by road traffic and to a lesser extent by Luas activities. Background noise levels across the sample day period were the order 61dB $L_{A90,16hr}$.

Again, road traffic movements along the Naas Road dictated overall ambient noise levels at this location during the night time period with levels of the order of 67dB $L_{Aeq,8hr}$ being reported. With the reduction of traffic volumes over the night period the background noise levels reduced to an average of 48dB $L_{Aeq,8hr}$.

The L_{AFmax} levels are also of an interest here, in particlaur in relation to night time periods. The L_{AFmax} values were measured at 5-minute intervals over the duration of the unattended monitoring survey. Figure 10.2 presents the distribution of the magnitude of L_{AFmax} events during the night period at the noise monitoring location considered for this assessment.

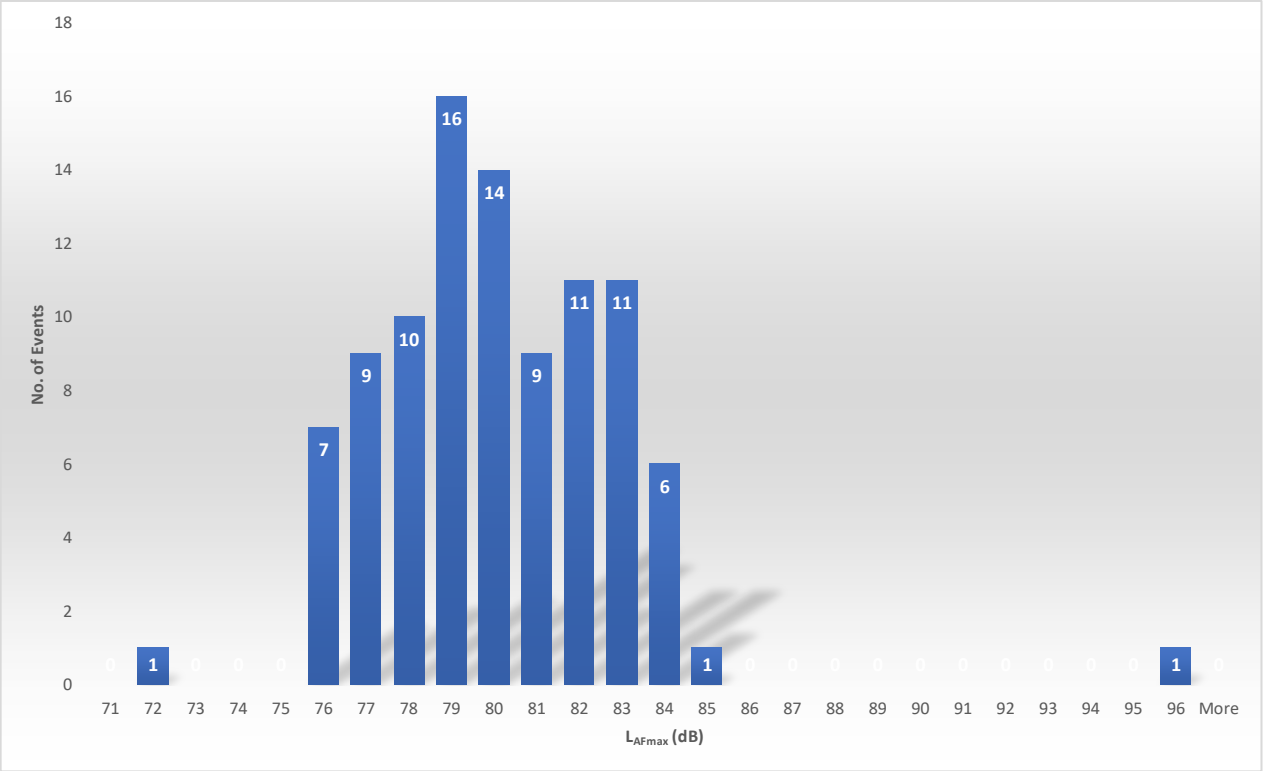


Figure 10.2 Number of L_{AFmax} Events Measured During the Night Periods

Note these levels were measured at the boundary of the site and some consideration needs to be given to slight reductions in noise levels that will be expected at the facades of the proposed buildings. This will be discussed and considered as appropriate in relation to the inward noise impact assessment presented in the body of this report.

No significant level of vibration was noted at this location during setup and removal of the equipment from site.

Location B

Table 10.11 presents the results of the noise monitoring completed at Location B (i.e. the Lansdowne Gate development).

Period	Time	Measured Noise Levels, dB		
		L_{Aeq}	L_{AFmax}	L_{A90}
Day	13:10 - 13:25	56	76	51
	15:20 - 15:35	53	74	45
	15:36 - 15:51	54	74	47
Night	00:12 - 00:27	47	66	40
	23:02 - 23:17	51	74	42

Table 10.11 Noise Monitoring Results at Location B

Daytime ambient noise levels at this location were dictated by the movement of a nearby car park gate, local car movements and a degree of bird song noise. Background noise levels were typically dictated by distant road traffic activity in the wider area. Noise levels were in the range of 53 to 56dB $L_{Aeq,15min}$ and 45 to 51dB $L_{A90,15min}$.

Ambient night time noise levels were again dictated by local road traffic movements with a reduced level of distant road traffic noise noted as the dominant background noise source. Noise levels were in the range of 47 to 51dB $L_{Aeq,15min}$ and 40 to 42dB $L_{A90,15min}$.

No significant level of vibration was noted at this location during site attendances.

Location C

Table 10.12 presents the results of the noise monitoring completed at Location C.

Period	Time	Measured Noise Levels, dB		
		L_{Aeq}	L_{AFmax}	L_{A90}
Day	13:57 - 14:12	60	71	54
	14:49 - 15:04	61	72	54
	16:21 - 16:36	61	82	53
Night	01:03 - 01:18	55	74	41
	23:51 - 00:06	58	73	47

Table 10.12 Noise Monitoring Results at Location C

Road traffic noise from the nearby Naas Road were the dominant noise source noted at this location. Intermitted local traffic and Luas was also noted as a source of noise. Noise levels were in the range of 60 to 61dB $L_{Aeq,15min}$ and 53 to 54dB $L_{A90,15min}$.

During the night time survey period completed at this location noise levels were again dictated the Naas Road (reduced volumes) with distant road traffic noise noted in relation to the significant background noise source in the area. Noise levels were in the range of 55 to 58dB $L_{Aeq,15min}$ and 41 to 47dB $L_{A90,15min}$.

No significant level of vibration was noted at this location during site attendances.

Location D

Table 10.13 presents the results of the noise monitoring completed at Location D.

Period	Time	Measured Noise Levels, dB		
		L_{Aeq}	L_{AFmax}	L_{A90}
Day	13:39 - 13:54	54	71	50
	14:30 - 14:45	50	67	44
	16:01 - 16:16	49	60	45
Night	00:40 - 00:55	44	59	41
	23:32 - 23:47	47	66	44

Table 10.13 Noise Monitoring Results at Location D

Intermittent car movements, Luas movements were noted as dominant sources at this location. General road traffic noise dictated background noise levels here. Noise levels, during the daytime, were in the range of 49 to 54dB $L_{Aeq,15min}$ and 44 to 50dB $L_{A90,15min}$.

Night time noise levels were influenced by plant noise, Luas and distant road traffic noise. Noise levels, during the night survey, were in the range of 44 to 47dB $L_{Aeq,15min}$ and 41 to 44dB $L_{A90,15min}$.

No significant level of vibration was noted at this location during site attendances.

10.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development comprises a mixed-use development of residential apartments and various ground floor commercial units. The development also includes ancillary developments including car and bicycle parking areas, internal road layouts and landscaping. A full description of the development can be found in Chapter 2.

The potential noise and vibration impact on the surroundings are considered for both the construction and operational phases of this development.

During the construction phase the main site activities will include site clearance, foundation works, 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 and building services noise associated with commercial and office spaces.

The potential associated with each phase is assessed in the following sections.

10.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

Construction Phase - Noise

A variety of items of plant will be in use for the purposes site clearance and construction. The type and number of equipment will vary between the varying construction phases depending on the phasing of the works. There will be vehicular movements to and from the site that will make use of existing roads. Due to the nature of these activities, there is potential for the generation of elevated levels of noise.

The closest noise sensitive locations to the main building works are the commercial properties immediately to the east and north (on the opposite side of the Naas Road) which are at distances of approximately 30m to 50m from building construction works respectively. Other sensitive receptors are located at distances of between 200 to 250m from closest building works. These distances relate to the closest boundaries to the nearest residential noise sensitive locations at Bluebell Avenue and Lansdowne Gate respectively. The remainder of works will take place across the site at varying distances of up to 250m. Reference to the noise baseline survey results (Section 10.3) and guidance contained in BS 5228 Part 1 for construction noise levels discussed in Table 10.3, the threshold for significance from constriction activities is set as follows for the closest residential noise sensitive locations:

Significance Category - A:

Daytime (08:00 – 19:00hrs)/ Saturdays (08:00 – 14:00hrs)	**65dB $L_{Aeq,1hr}$**
Evening and Weekends	**55dB $L_{Aeq,1hr}$**

An appropriate construction noise limit at the nearest commercial buildings is considered to be **75dB $L_{Aeq,1hr}$.**

For site clearance, building construction works and landscaping works (excavators, loaders, dozers, concreting works, mobile cranes, generators), noise source levels are quoted in the range of 70 to 80dB L_{Aeq} at distances of 10m within BS 5228-1. For the purposes of this assessment, a combined sound power value of 115dB L_w(A) has been used for construction noise calculations. This would include, for example, 5 no. items of construction plant with a sound pressure level of 80dB L_{Aeq} at 10m operating simultaneously along the closest works boundary.

Given, the type and number of construction equipment will vary over the course of the construction phase, noise levels have been calculated at the closest noise sensitive locations assuming the construction noise levels and distances noted above. For the purpose of the assessment, a standard site hoarding of 2.4m high has been included in the calculations for noise sensitive boundaries. The calculations also assume that the equipment will operate for 66% of the working time. Table 10.14 summarises the result of this assessment.

Construction Phase	Sound Power at construction works, dB L_w(A)	Calculated noise levels at varying distances, dB $L_{Aeq,1hr}$					
		20m	30m	50m	60m	100m	200m
Site Clearance General Construction Landscaping Road Works	115	71	68	63	62	57	51

Table 10.14 Indicative Construction Noise Levels at Nearest Noise Sensitive Locations.

The predicted noise levels detailed in the Table 10.14 above indicate that during the main construction phase including site clearance, building construction works etc. assuming up to 5 items of plant are operating simultaneously at the closest noise sensitive boundaries, there is potential for the residential significance threshold to be exceeded at distances of up to 30m. Considering the closet residential noise sensitive locations to the development lands are some 200m distant, and based on the predicted noise levels above, the associated construction noise impact is not considered significant.

In terms of the nearest commercial properties the predicted noise levels are the order of the significance threshold of 75dB $L_{Aeq,1hr}$. Again, the predicted associated construction noise impact is not considered significant.

A schedule of best practice noise mitigation measures is included in Section 10.8.

Construction Phase – Vibration

Potential for vibration impacts during the construction phase programme are likely to be limited given the ground breaking, piling and excavations required. There is potential for piling to be used for building and basement foundations for office and apartment buildings. For the purposes of this assessment the expected vibration levels during piling assuming augured or bored piles have been determined through reference to published empirical data. The British Standard BS 5228 – Part 2: Vibration, publishes the measured magnitude of vibration of rotary bored piling using a 600mm pile diameter for bored piling into soft ground over rock, (Table D.6, Ref. No. 106):

- 0.54mm/s at a distance of 5m, for auguring;
- 0.22mm/s at a distance of 5m, for twisting in casing;
- 0.42mm/s at a distance of 5m, for spinning off, and;
- 0.43mm/s at a distance of 5m, for boring with rock auger.

Considering the low vibration levels at very close distances to the piling rigs, vibration levels at the nearest buildings are not expected 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 are expected to be orders of magnitude below the limits set out in Table 10.5 to avoid any cosmetic damage to buildings. Vibration levels are also expected to be below a level that would cause disturbance to building occupants, as set out in Table 10.6. The potential vibration impact during the construction phase if of short-term, neutral and imperceptible impact

Operational Phase – Noise

Once the development is operational, the potential noise impacts to the surrounding environment are minimal. The residential aspect of the development is not expected to generate any significant noise sources over and above those which form part of the existing environment at neighbouring residential areas (road traffic noise, estate vehicle movements, children playing etc.) and hence no significant impact are expected from this area of the development site.

The main potential noise impact associated with the proposed development is considered therefore to relate to the generation of additional traffic to and from the site as a result of the new residential, commercial buildings. Potential noise impacts also relate to operational plant serving the commercial and apartment buildings, where relevant.

Once operational, there are no vibration sources associated with the development site.

Additional Vehicular Traffic on Surrounding Roads

A traffic impact assessment relating to the proposed development has been prepared by Barret Mahony Consulting Engineers as part of this EIAR. Information from this report has been used to determine the predicted change in noise levels in the vicinity of a number of roads in the area surrounding the proposed development, for the opening year 2022 and the design year 2037.

For the purposes of assessing potential noise impact, it is appropriate to consider the relative increase in noise level associated with traffic movements on existing roads and junctions with and without the development given that traffic from the development will make use of the existing road network. Traffic flow data for the opening year of 2022 and the design year of 2037 in terms of the Annual Average Daily Traffic (AADT) has been assessed. The calculated change in noise levels during these two years are summarised in Table 10.15.

Link	2022 Opening Year		Change in noise levels, dB	2037 Design Year		Change in noise levels, dB
	Do Nothing	Do Something		Do Nothing	Do Something	
Naas Road	25,290	28,190	+0.5	29,873	32,273	+0.3
Kylemore Road	16,151	17,151	+0.3	18,709	19,709	+0.2

Table 10.15 Change in Traffic Noise Levels with Proposed Development

The predicted increase in AADT traffic levels associated with the development is less than 1dB(A) in the vicinity of the majority of roads assessed for both the opening and design years. This is largely due to the existing volume of traffic along the surrounding road network onto which the development traffic will travel. Reference to Table 10.3 confirms that this increase is inaudible and of neutral effect.

In summary, the predicted increase in noise levels associated with vehicles at road junctions in the vicinity of the proposed development is of long-term imperceptible impact.

Building Services Plant

Once operational, there will be building services plant items required to serve the commercial and residential aspect of the development. These will typically be limited to heating and cooling plant and extract units, depending on the building design and user requirements. Given the use of these buildings, the majority of plant items are likely to be required during daytime hours only, however, there may be requirement for night-time operational plant, depending on specific requirements.

The location or type of building services plant has not yet been established, therefore it is not possible to calculate noise levels to the surrounding environment. In this instance, is it best practice to set appropriate noise limits that will inform the detailed design during the selection and layout of building services for the development,

These items will be selected at a later stage, however, they will be designed and located so that there is no negative impact on sensitive receivers within the development itself. The cumulative operational noise level from building services plant at the nearest noise sensitive location within the development (e.g. apartments, etc.) will be designed/attenuated to meet the relevant BS 4142 noise criteria for day and night-time periods as set out in this assessment. Based on the baseline noise data collected for this assessment it is considered an appropriate design criterion is the order of 40dB $L_{Aeq,15min}$. These limit is set in order to achieve acceptable internal noise levels within residential spaces based on prevailing noise levels in the area.

Taking into account that sensitive receivers within the development are much closer than off-site sensitive receivers, once the relevant noise criteria is achieved within the development it is expected that there will be no negative impact at sensitive receivers off site.

10.6 POTENTIAL CUMULATIVE IMPACTS

The proposed development combined with other permitted developments in the area have the potential to result in cumulative noise or vibration impacts at surrounding noise sensitive locations during the construction and operational phases of the development.

The baseline scenario as measured, takes into account existing road traffic, Luas activities and other noise sources in the area.

Potential operational cumulative impacts relate to increased traffic flows resulting from other developments and any building services plant from other sources. The traffic noise assessment discussed in Table 10.15 considers the cumulative impact of this proposed development combined with existing flows and those associated with the residential development permitted in the wider area and future zoned lands. The noise impacts are determined to be long-term, imperceptible.

There are no expected cumulative noise impacts associated with building services plant from the proposed development and other development in the vicinity at external noise sensitive locations. The operation of any mechanical or electrical services associated with the proposed development will be designed to ensure the overall impact is deemed to be long-term and not significant.

Should the construction phase of the proposed development coincide with the construction of other permitted developments, there is potential for cumulative construction noise levels at noise sensitive locations. The potential cumulative impacts are greatest at the noise sensitive location to the south-east (i.e. Landsdowne Gate) which adjoins one of the potential development sites (Planning Ref: 2319/18). In the event that construction works are occurring at both sites simultaneously, it is unlikely that the construction noise levels presented in Table 10.3 will increase due to the proximity of construction works assessed which is considered to be worst case.

10.7 'DO NOTHING' IMPACT

In the absence of the proposed development being constructed, the noise environment at the nearest noise sensitive locations and across the development site itself will remain largely unchanged. The noise and vibration levels measured/noted during the baseline studies are considered representative of the Do-Nothing scenario. The Do-Nothing scenario is therefore considered neutral impact.

10.8 AVOIDANCE, REMEDIAL & MITIGATION MEASURES

Construction Phase

Best practice noise and vibration control measures will be employed by the contractor during the construction phase in order to avoid significant impacts at the nearest sensitive buildings. The best practice measures set out in BS 5228 (2009 +A1 2014) Parts 1 and 2 will be complied with. This includes guidance on several aspects of construction site mitigation measures, including, but not limited to:

- selection of quiet plant;
- noise control at source;
- screening, and;
- liaison with the public.

Further comment is offered on these items in the following paragraphs. 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, where required.
Selection of Quiet Plant

This practice is recommended in relation to static plant such as compressors and generators. It is recommended that these units be supplied with manufacturers' proprietary acoustic enclosures. The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. The least noisy item should be selected wherever possible. Should a particular item of plant already on the site be found to generate high noise levels, the first action should be to identify whether or not said item can be replaced with a quieter alternative.

Noise Control at Source

If replacing a noisy item of plant is not a viable or practical option, consideration will be given to noise control "at source". This refers to the modification of an item of plant or the application of improved sound reduction methods in consultation with the supplier. For example, resonance effects in panel work or cover plates can be reduced through stiffening or application of damping compounds; rattling and grinding noises can often be controlled by fixing resilient materials in between the surfaces in contact.

The following best practice migration measures should be considered:

- Site compounds should be located away from noise sensitive boundaries within the site constraints. The use lifting bulky items, dropping and loading of materials within these areas should be restricted to normal working hours.
- For mobile plant items such as cranes, dump trucks, excavators and loaders, maintaining enclosure panels closed during operation can reduce noise levels over normal operation. Mobile plant should be switched off when not in use and not left idling.
- For steady continuous noise, such as that generated by diesel engines, it may be possible to reduce the noise emitted by fitting a more effective exhaust silencer system.
- For percussive tools such as pneumatic breakers, a number of noise control measures include fitting muffler or sound reducing equipment to the breaker 'tool' and ensure any leaks in the air lines are sealed. Erect localised screens around breaker or drill bit when in operation in close proximity to noise sensitive boundaries.
- For concrete mixers, control measures should be employed during cleaning to ensure no impulsive hammering is undertaken at the mixer drum.
- For all materials handling ensure that materials are not dropped from excessive heights, lining drops chutes and dump trucks with resilient materials.
- For compressors, generators and pumps, these can be surrounded by acoustic lagging or enclosed within acoustic enclosures providing air ventilation.
- All items of plant should be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.

Screening

Screening is an effective method of reducing the noise level at a receiver location and can be used successfully as an additional measure to all other forms of noise control. Standard construction site hoarding (2.4m in height) with a mass per unit of surface area greater than 7 kg/m^2 can provide adequate sound insulation. This is recommended, as a minimum around the south, south-east and south-west perimeters.

Liaison with the Public

A designated noise liaison officer will appointed to site during construction works. Any noise complaints should be logged and followed up in a prompt fashion by the liaison officer. In addition, prior to particularly noisy construction activity, e.g. piling, the liaison officer will inform the nearest noise sensitive locations of the time and expected duration of the noisy works.

Project Programme

The phasing programme will be arranged so as to control the amount of disturbance in noise and vibration sensitive areas at times that are considered of greatest sensitivity. If piling works are in progress on a site at the same time as other works of construction that themselves may generate significant noise and vibration, the working programme will be phased so as to ensure noise limits are not exceeded due to cumulative activities. This will be reviewed in relation to other potential cumulative works occurring on adjacent construction site in close proximity to noise sensitive properties which have the potential to lead to significant construction noise impacts.

Operational Phase

During the operational phase of the development, noise mitigation measures with respect to the outward impact of the development are not deemed necessary.

Additional Traffic on Adjacent Roads

During the operational phase of the development, noise mitigation measures with respect to the outward impact of traffic from the development are not deemed necessary.

Building Services Plant

Taking into account that sensitive receivers within the development are much closer than off-site sensitive receivers, once the relevant noise criteria included in Section 10.5 (i.e. 40dB $L_{Aeq,15min}$ at noise sensitive locations within the proposed development itself). is achieved within the development it is expected that there will be no negative impact at sensitive receivers off site, and therefore no further mitigation required.

10.9 PREDICTED IMPACTS OF THE PROPOSED DEVELOPMENT

Construction Phase

During the construction phase of the project there is the potential for temporary noise impacts on nearby noise sensitive properties due to noise emissions from site activities. The application of binding noise limits and hours of operation, along with implementation of appropriate noise and vibration control measures, will ensure that noise and vibration impact is kept to a minimum as far as practicable.

During periods when construction works are occurring at distances of up to 30m from the nearest noise sensitive locations to the site boundary, there is potential for temporary, negative, moderate to significant noise impacts to occur.

For the remainder of construction periods, construction noise impacts will be short-term, negative, slight to moderate.

Vibration impacts during the construction phase will be short-term and negligible.

Operational Phase

The predicted change noise levels associated with additional traffic is predicted to be of imperceptible impact along the existing road network. In the context of the existing noise environment, the overall contribution of induced traffic is considered to be of neutral, imperceptible and long-term impact to nearby residential locations.

Noise levels associated with building services plant are expected to be well within the adopted day and night-time noise limits at the nearest noise sensitive properties taking into account the site layout, the nature and type of units proposed and distances to nearest residences. Assuming the operational noise levels do not exceed the adopted design goals, the resultant residual noise impact from this source will be of neutral, imperceptible, long term impact

10.10 MONITORING

Construction Phase

The contractor will be required to ensure construction activities operate within the noise limits set out within this assessment. The contractor will be required to undertake regular noise monitoring at locations representative of the closest sensitive locations to ensure the relevant criteria are not exceeded.

Noise monitoring should be conducted in accordance with the International Standard ISO 1996: 2017: *Acoustics – Description, measurement and assessment of environmental noise*.

Operational Phase

Noise or vibration monitoring is not required once the development is operational.

10.11 REINSTATEMENT

Not applicable.

10.12 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 and traffic flow projections associated with the development provided by the traffic consultants.

10.13 DIFFICULTIES ENCOUNTERED IN COMPILING

None.

10.14 INWARD NOISE IMPACT

The development lands in question are in proximity to the Naas Road to the north of the site and a section of the Luas line. The operation of these transport elements are potential noise sources to the residential developments proposed for the site itself.

Existing Noise Climate

The existing noise and vibration climate within the development lands was surveyed and the results summarised in Section 10.3 of this report. The results of the survey have indicated that the Naas Road and, to a lesser extent the Luas line operations, contribute significant noise levels at the measurement locations on the northern boundary of the site.

In order to determine the inward noise impact for noise sensitive properties proposed as part of the development, it is necessary to determine the internal noise levels within the proposed buildings. These can then be compared against appropriate internal noise criteria from BS 8233, as summarised in Section 10.2 (Table 10.2).

It is possible to calculate internal noise levels within the residential properties proposed within the site, taking account of the existing and future potential noise environment, proposed constructions and the relevant sound insulation provided by the building elements (i.e. walls, roof, glazing etc.).

Noise Model of Site

In order to calculate noise levels across the site, an acoustic model was developed in order to initially calibrate against noise survey data recorded on site. Proprietary noise calculation software was used for the purposes of establishing the prevailing noise levels on the proposed site. The selected software, Brüel & Kjær Type 7810 *Predictor*, calculates noise levels in accordance with the selected source.

The following information was included in the model:

- Site layout drawings of proposed development, and;
- OS mapping of surrounding environment.

Calibration of Noise Model

Noise levels recorded during the unattended survey Locations A and C were used to calibrate the noise model. Noise levels are calculated at the same locations using the developed noise model. The results are presented in Table 10.16 below for daytime periods, i.e. 07:00 to 23:00hrs and night-time periods, 23:00 to 07:00hrs and compared against those measured on site.

Location	Time Period	Measured Noise Level, dB	Predicted Noise Level, dB
A	Daytime, $L_{Aeq,16hr}$	72	73
	Night-time, $L_{Aeq,16hr}$	67	68
C	Daytime, $L_{Aeq,16hr}$	60 – 61	60
	Night-time, $L_{Aeq,16hr}$	55 – 58	55

Table 10.16 Predicted & Measured Noise Levels at Development Site

The model results are considered an accurate representation of rail noise levels across the site, taking account other sources that contribute to the noise environment at the monitoring locations also.

Figures 10.3 and 10.4 display the calculated noise contours across the existing site for day and night-time periods at a height of 4m above ground. The results of the modelling exercise demonstrate that highest noise levels are experienced along the northern portion of the site in closest proximity to the Naas Road and that they reduce by the order of 20dB towards the rear of the site due to screening afforded by the existing buildings on the site.

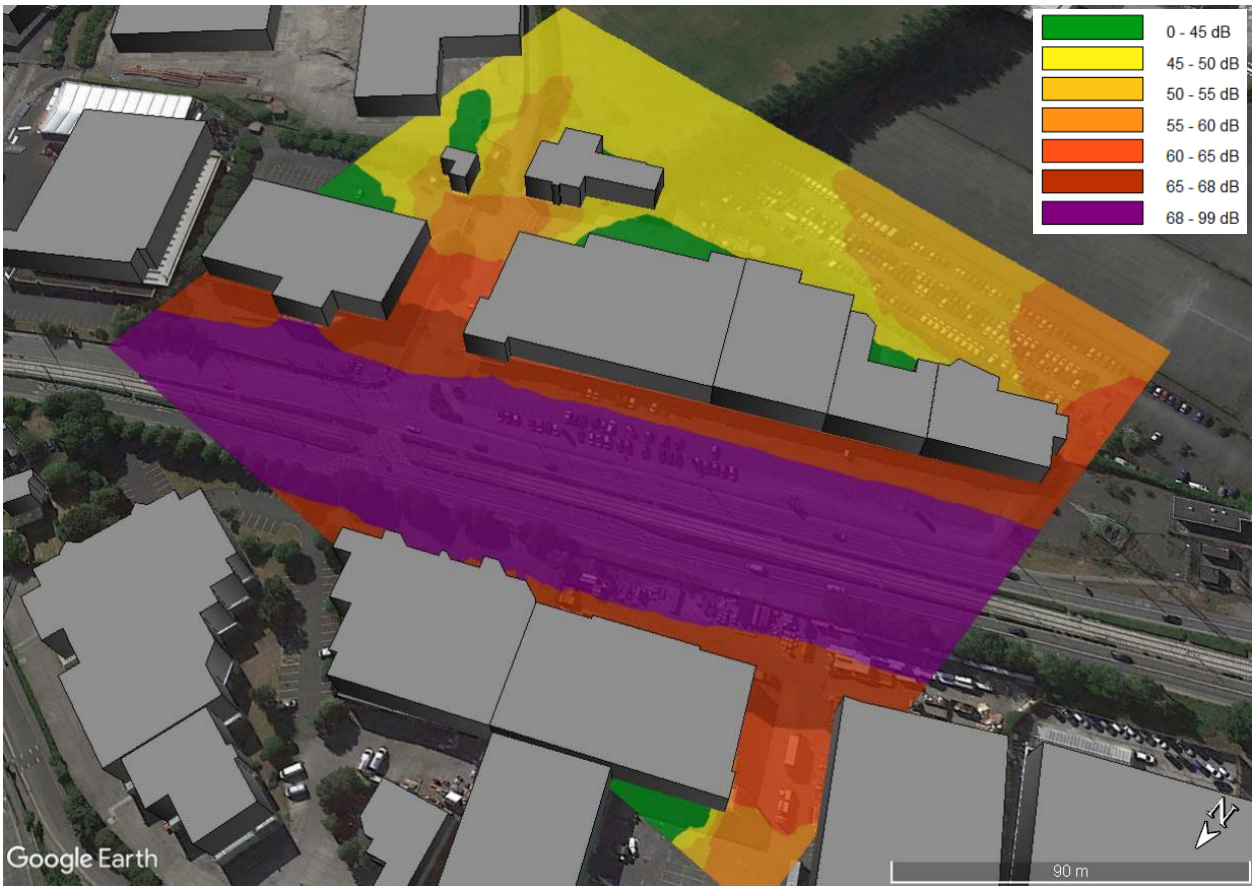


Figure 10.3 Predicted Existing Noise Contour Across the Development Site – Daytime

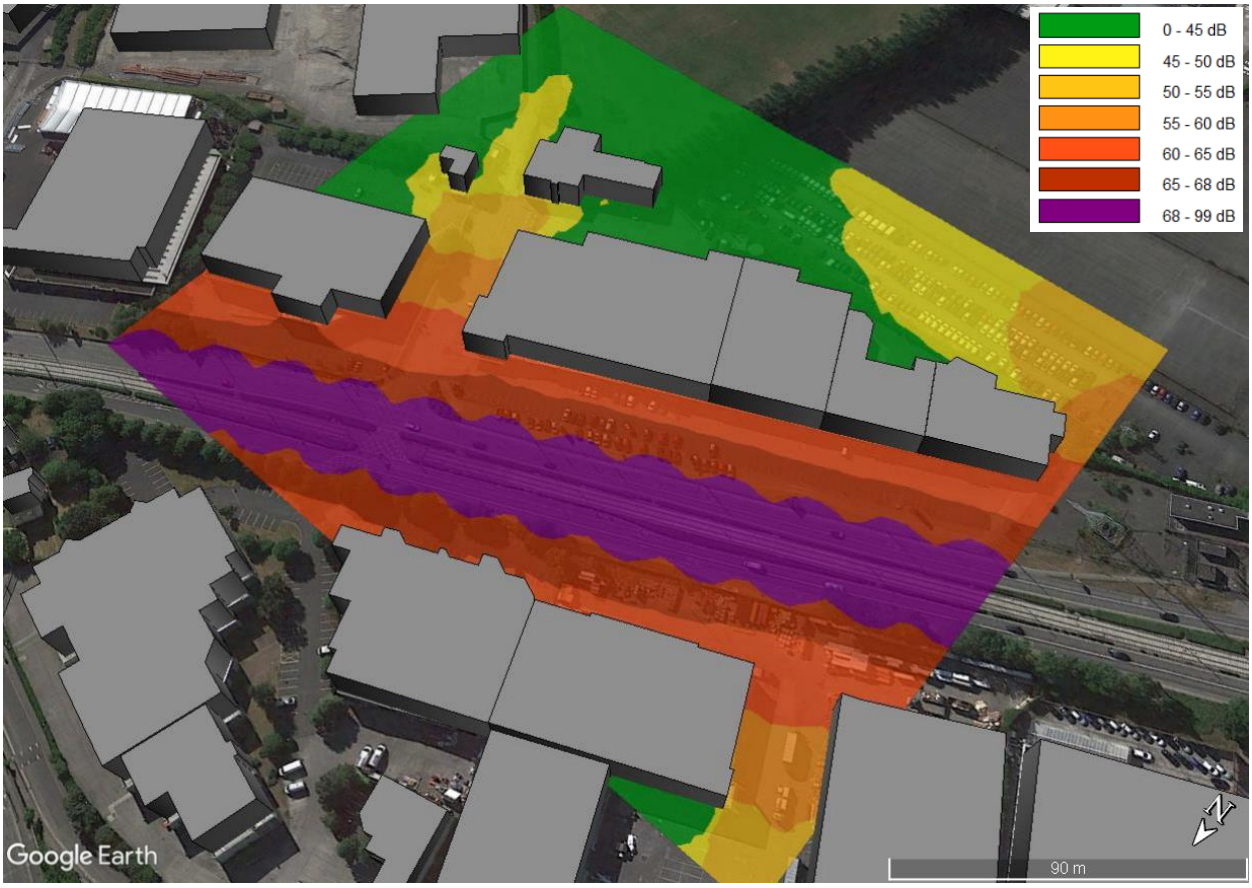


Figure 10.4 Predicted Existing Noise Contour Across the Development Site – Night

Road traffic noise levels calculated across the site during daytime periods are highest along the immediate northern boundary as expected with noise levels reducing moving north within the site. Calculated noise levels are between 69 and 73dB $L_{Aeq,16hr}$ along the immediate northern boundary reducing to <45dB $L_{Aeq,16hr}$ to the rear of the site (due to screening offered by the existing buildings).

Night time noise levels are the order of 64 to 68dB $L_{Aeq,8hr}$ on the northern section of the site with line of sight to the Naas Road with levels reducing to <45dB $L_{Aeq,8hr}$ to the rear of the site (due to screening offered by the existing buildings).

The ProPG document is the most relevant and recent document used to assess new residential development in an area with an existing climate of environmental noise. This has therefore been used for the development site in question.

ProPG (2017)

The Professional Guidance on Planning & Noise (ProPG) document was published in May 2017. The document was prepared by a working group comprising members of the Association of Noise Consultants (ANC), the Institute of Acoustics (IOA) and the Chartered Institute of Environmental Health (CIEH). Although not a government document, since it's adoption it has been generally considered as a best practice guidance and has been widely adopted in the absence of equivalent Irish guidance.

The ProPG outlines a systematic risk based 2 stage approach for evaluating noise exposure on prospective sites for residential development. The two primary stages of the approach can be summarised as follows:

- Stage 1 - Comprises a high-level initial noise risk assessment of the proposed site considering either measured and or predicted noise levels, and;
- Stage 2 – Involves a full detailed appraisal of the proposed development covering four "key elements" that include:

- Element 1 - Good Acoustic Design Process;
- Element 2 - Noise Level Guidelines;
- Element 3 - External Amenity Area Noise Assessment

A key component of the evaluation process is the preparation and delivery of an Acoustic Design Statement (ADS) which is intended for submission to the planning authority. This document is intended to clearly outline the methodology and findings of the Stage 1 and Stage 2 assessments, to illustrate overall compliance of the scheme with best practice guideline. ProPG outlines the following possible recommendations in relation to the findings of the ADS:

A) Planning consent may be granted without any need for noise conditions;
B) Planning consent may be granted subject to the inclusion of suitable noise conditions;
C) Planning consent should be refused on noise grounds in order to avoid significant adverse effects ("avoid"); or,
D) Planning consent should be refused on noise grounds in order to prevent unacceptable adverse effects ("prevent").

Section 3.0 of the ProPG provides a more detailed guide on decision making to aid local authority planners on how to interpret the findings of an accompanying Acoustic Design Statement (ADS). A summary of the ProPG approach is illustrated in Figure 10.5.

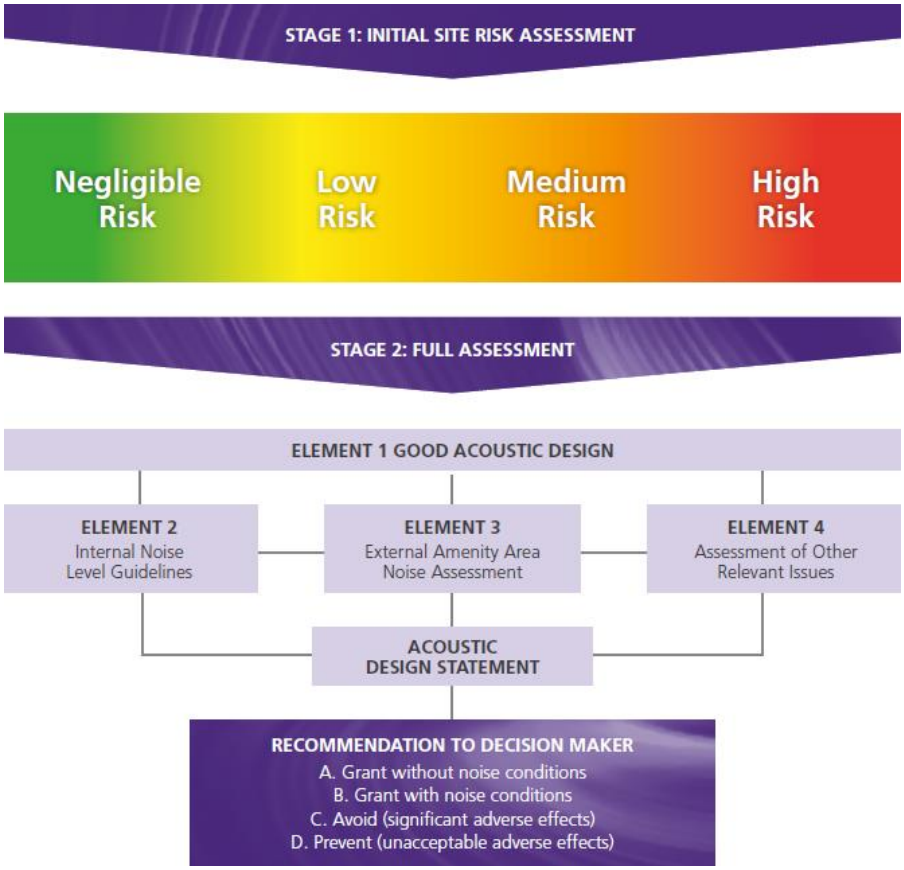


Figure 10.5 ProPG Approach (Source: ProPG)

Stage 1 – Noise Risk Assessment

The initial noise risk assessment is intended to provide an early indication of any acoustic issues that may be encountered. It calls for the categorisation of the site as a negligible, low, medium or high risk based on the pre-existing noise environment. Figure 10.6 presents the basis of the initial noise risk assessment, it provides appropriate risk categories for a range of continuous noise levels either measured and/or predicted on site. It should be noted that a site should not be considered a negligible risk if more than

10 L_{AFmax} events exceed 60 dB during the night period and the site should be considered a high risk if the L_{AFmax} events exceed 80 dB more than 20 times a night.

Paragraph 2.9 of ProPG states that:

> *"The noise risk assessment may be based on measurements or prediction (or a combination of both) as appropriate and should aim to describe noise levels over a "typical worst case" 24 hour day either now or in the foreseeable future."*

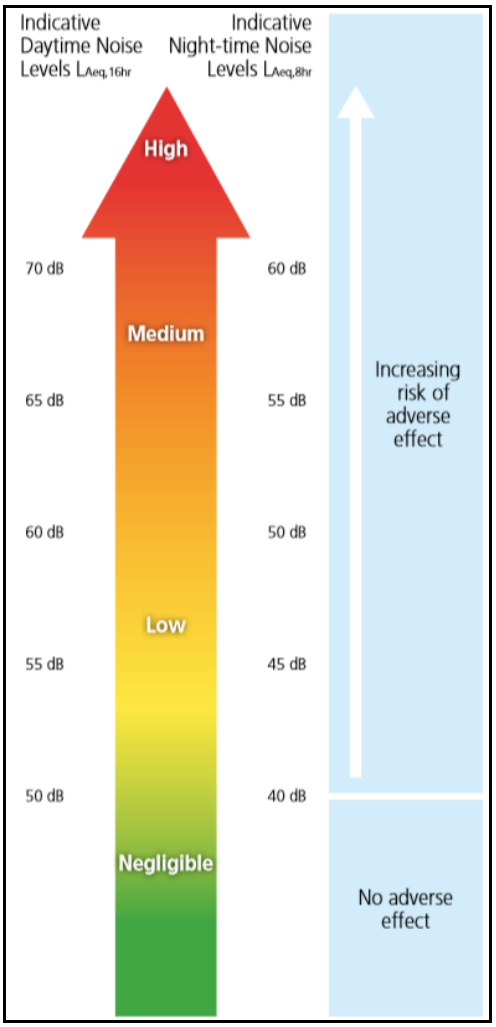


Figure 10.6 ProPG Stage 1 – Initial Noise Risk Assessment

In this instance reference is made to baseline noise surveys undertaken at the site and the noise contours calculated across the site for existing noise sources. ProPG states the following with respect to the initial risk assessment:

> *"The risk assessment should not include the impact of any new or additional mitigation measures that may subsequently be included in development proposals for the site and proposed as part of a subsequent planning application. In other words, the risk assessment should include the acoustic effect of any existing site features that will remain (e.g. retained buildings, changes in ground level) and exclude the acoustic effect of any site features that will not remain (e.g. buildings to be demolished, fences and barriers to be removed) if development proceeds."*

The noise model prepared for this assessment has been used to predict noise levels across the site assuming the existing buildings are cleared. The results of this exercise are presented in Figures 10.7 and 10.8 for day and night periods respectively.

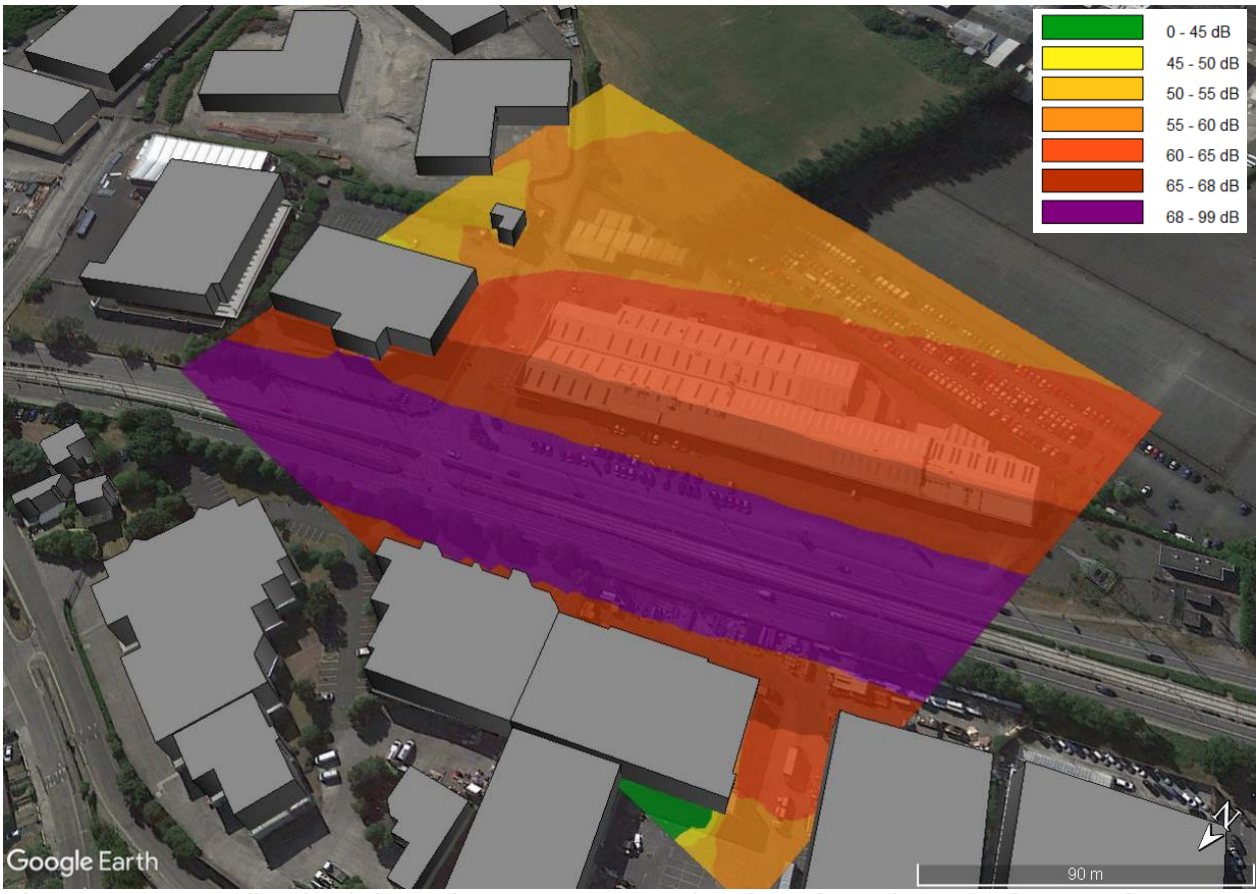


Figure 10.7 Predicted Existing Noise Contour Across the Cleared Development Site – Daytime

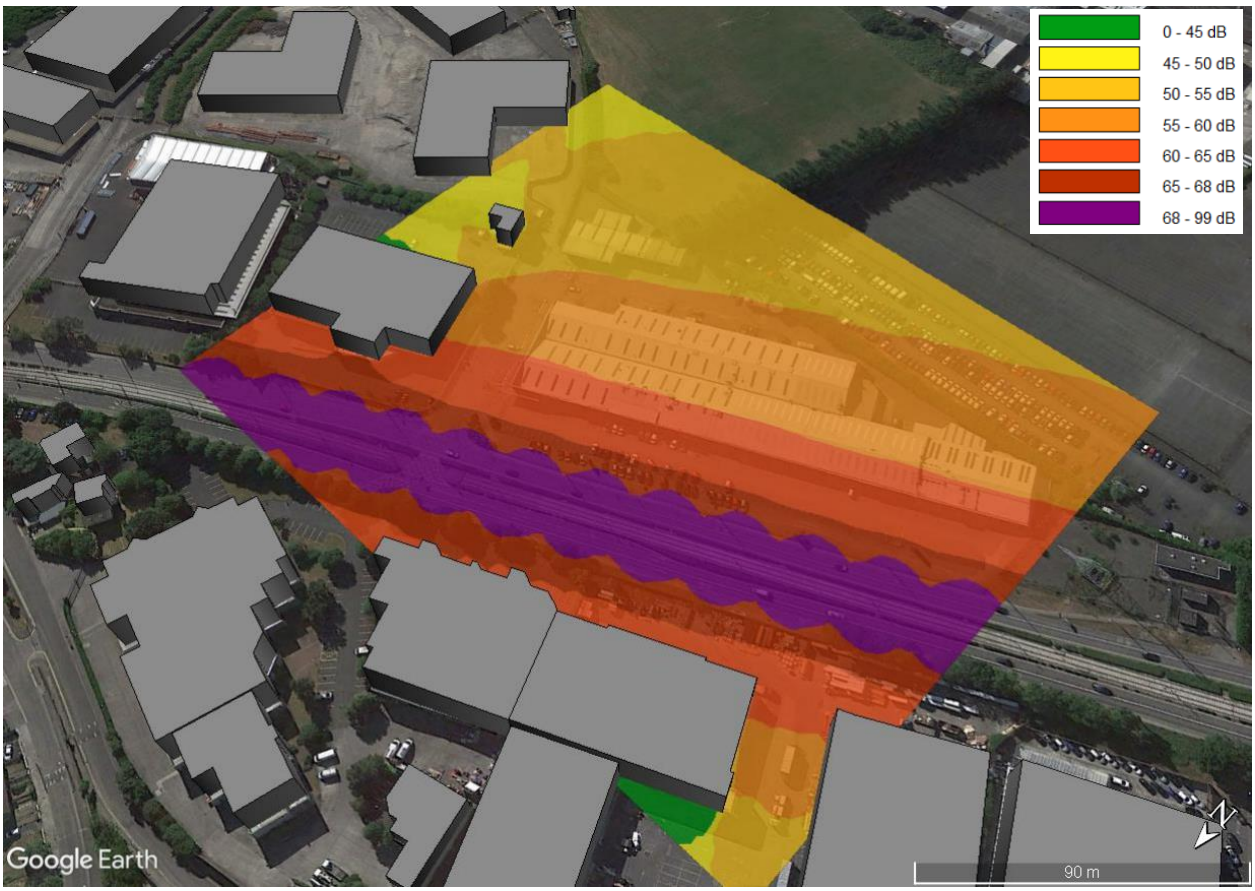


Figure 10.8 Predicted Existing Noise Contour Across the Cleared Development Site – Night

With the removal of the existing buildings road traffic noise levels calculated across the majority of the site during daytime periods are between 60 and 73dB $L_{Aeq,16hr}$. Night time noise levels are the order of 55 to 68dB $L_{Aeq,8hr}$ across the site in this situation.

Giving consideration to the measured and predicted noise levels presented in the previous sections the initial site noise risk assessment has concluded that the level of risk across the site varies from medium to high noise risk.

Additionally, the Stage 1 Noise Risk Assessment requires analyses of the L_{AFmax} noise levels. In the case of the AWN survey the L_{AFmax} noise levels typically measured up to 80dB during the night with sporadic events also recorded above this level. ProPG guidance considers 20 night events over 80dB to be a high risk, therefore this site would be considered a medium risk in terms of maxima events.

ProPG states the following with respect to medium and high risks:

Medium Risk *As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development.*

High Risk *High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice.*

Given the above it can be concluded that the development site may be categorised as *Medium to High Risk* and as such an Acoustic Design Strategy will be required to demonstrate that suitable care and attention has been applied in mitigating and minimising noise impact to such an extent that an adverse noise impact will be avoided in the final development.

It should be noted that ProPG states the following with regard to how the initial site noise risk is to be used,

"2.12 It is important that the assessment of noise risk at a proposed residential development site is not the basis for the eventual recommendation to the decision maker. The recommended approach is intended to give the developer, the noise practitioner, and the decision maker an early indication of the likely initial suitability of the site for new residential development from a noise perspective and the extent of the acoustic issues that would be faced. Thus, a site considered to be high risk will be recognised as presenting more acoustic challenges than a site considered as low risk. A site considered as negligible risk is likely to be acceptable from a noise perspective and need not normally be delayed on noise grounds. A potentially problematical site will be flagged at the earliest possible stage, with an increasing risk indicating the increasing importance of good acoustic design."

Therefore, following the guidance contained in ProPG does not preclude residential development on sites that are identified as having medium or high-risk noise levels. It merely identifies the fact that a more considered approach will be required to ensure the developments on the higher risk sites are suitable designed to mitigate the noise levels. The primary goal of the approach outlined in ProPG is to ensure that the best possible acoustic outcome is achieved for a particular site.

Proposed Development

The noise model was updated to incorporate the proposed buildings in order to determine noise levels across the site taking into account the screening effect of the new buildings and to determine specific noise levels at the most exposed residential facades Figures 10.9 and 10.10 display the calculated noise contours across the site at a height of 4m for day and night-time periods respectively.

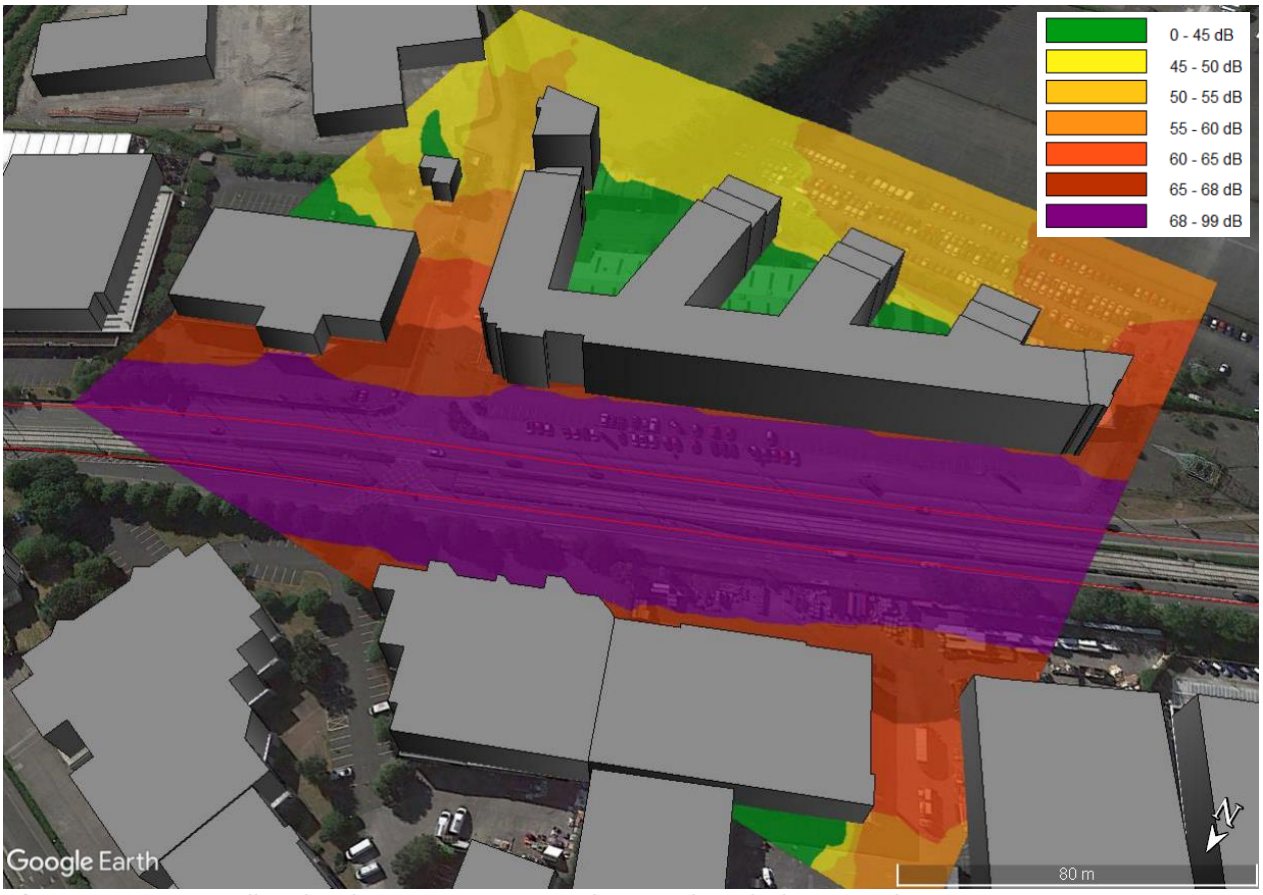


Figure 10.9 Predicted Noise Contour Across the Developed Site – Daytime

The results of the assessment indicate that during daytime periods, noise levels are highest along the northern boundary of the site at the units / apartments with a line of sight of the Naas Road. Calculated noise levels are between 70 and 72dB $L_{Aeq,16hr}$ along this section of the development. On the southern façade and along the blocks screened by the Naas Road facing building predicted noise levels 40 to 55dB $L_{Aeq,16hr}$ depending on the façade orientation. The north eastern façade of the building has predicted noise levels ranging from 55 to 70dB $L_{Aeq,16hr}$ depending on the proximity of the section of the façade to the Naas Road.

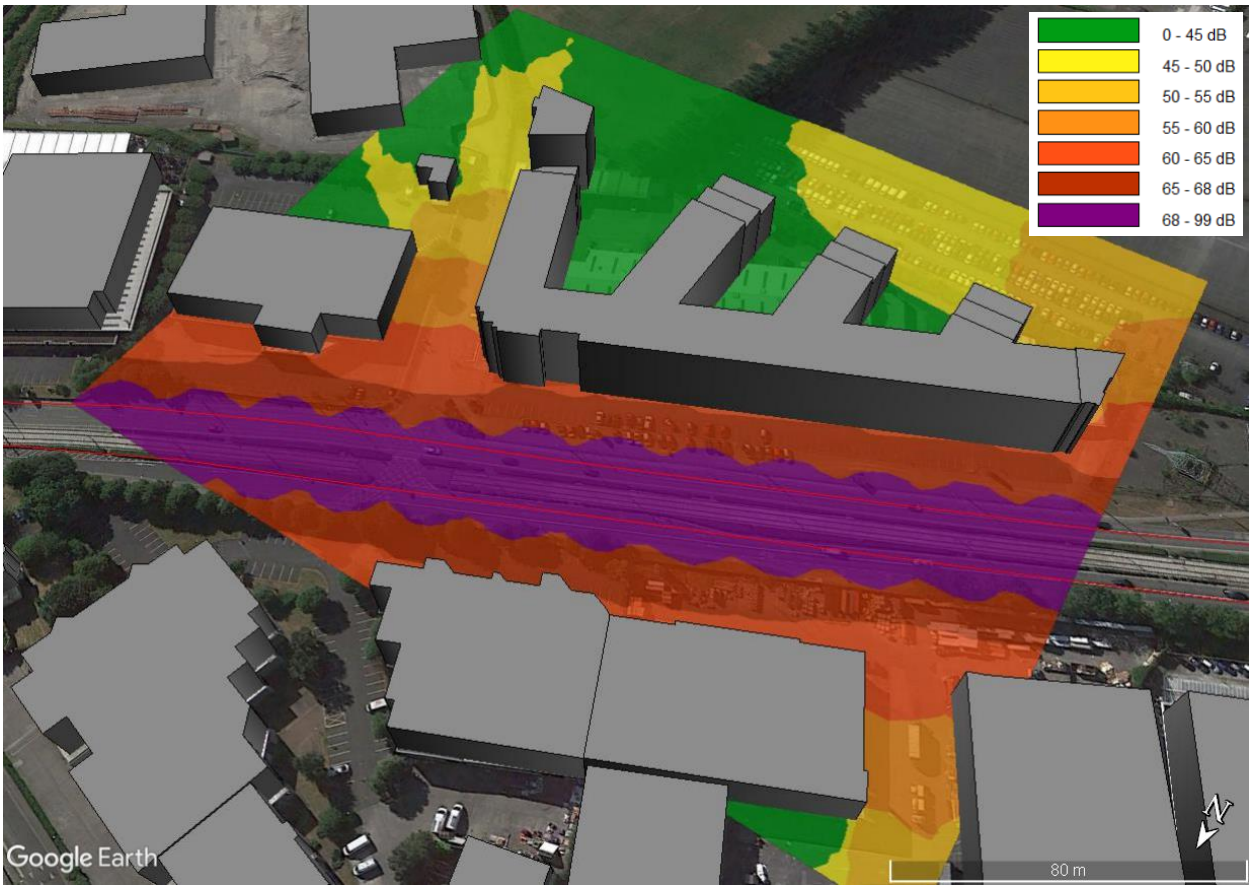


Figure 10.10 Predicted Noise Contour Across the Developed Site – Night

The results of the assessment indicate that during night time periods, noise levels are highest along the northern boundary of the site at the units / apartments with a line of sight of the Naas Road. Calculated noise levels are the order of 66dB $L_{Aeq,8hr}$ along this section of the development. On the southern façade and along the blocks screened by the Naas Road facing building predicted noise levels 35 to 50dB $L_{Aeq,8hr}$ depending on the façade orientation. The north eastern façade of the building has predicted noise levels ranging from 45 to 65dB $L_{Aeq,8hr}$ depending on the proximity of the section of the façade to the Naas Road.

Future Noise Environment

Given the location of the development there are no planned changes to the surrounding noise environment expected within future years which will significantly alter the noise environment measured. An increase of 25% in traffic is required to increase traffic noise levels by 1dB which is insignificant in the overall context of the noise environment across the site. Therefore, the future noise environment assumed for this project is expected to be within at least 1dB of the baseline scenario.

Stage 2 – Full Acoustic Assessment

Element 1 – Good Acoustic Design Process

In practice, good acoustic design should deliver the optimum acoustic design for a particular site without adversely affecting residential amenity or the quality of life or occupants or compromising other sustainable design objectives. Section 2.23 of the ProPG outlines the following checklist for Good Acoustic Design:

- Check the feasibility of relocating, or reducing noise levels from relevant sources;
- Consider options for planning the site or building layout;
- Consider the orientation of proposed building(s);
- Select construction types and methods for meeting building performance requirements;
- Examine the effects of noise control measures on ventilation, fire regulation, health and safety, cost, CDM (construction, design and management) etc;
- Assess the viability of alternative solutions; and,
- Assess external amenity area noise.

In the context of the proposed development, each of the considerations listed above have been addressed in the following subsections.

Relocation of Reduction of Noise from Source

Noise sources incident upon the development site have been determined to be medium to high. With regards to road noise, this source is located outside the redline boundary of the site and therefore it is beyond the scope of this development to introduce any noise mitigation at source. Screening proposed as part of landscaping works will benefit noise levels across the site at ground level but will have no significant benefit in terms of residential units at upper levels that retain a direct line of sight to the Naas Road.

Planning, Layout and Orientation

As part of the project design, the proposed buildings are set back from the road boundary. The orientation of the site is such that the buildings themselves screen the common external amenity areas associated with the development.

Select Construction Types for meeting Building Regulations

The design of all buildings is required to meet with all relevant parts of the Building Regulations. The specific detail of which will be completed at detailed design stage. In terms of the building sound insulation, the glazed elements and any required ventilation paths to achieve compliance with Part F of the Building Regulations will be the weakest elements in the façade. For the purposes of this assessment it is assumed that the building with be ventilated by heat recovery units therefore removing the need to open windows to ventilate living spaces.

Consideration will therefore be given to the provision of sound insulation performance for glazing, where required to achieve suitable internal noise levels within the development. Achievement of acceptable internal ambient noise levels does not form part of building regulation requirements; however, this will be incorporated into the building design in line with best practice and compliance with the guidance set out in ProPG.

Impact of noise control measures on fire, health and safety etc.

The good acoustic design measures that have been implemented on site, e.g. locating properties away from the road are considered to be cost neutral and do not have any significant impact on other issues.

Assess Viability of Alternative Solutions

The main noise sources incident on the site are road and to a lesser extent Luas traffic. These sources are largely mitigated by the distance to the building, screening by the on-site building and orientation of building layouts to avoid overlooking of sensitive amenity spaces to the main noise sources. All the measures listed above aid in the control of noise intrusion to the residential and commercial buildings across the development site.

Assess External Amenity Area Noise

ProPG provides the following advice with regards to external noise levels for amenity areas in the development:

> *"The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB $L_{Aeq,16hr}$."*

Noise levels across external amenity areas is addressed in Section 9.12.6.2.

Summary

Considering the constraints of the site, insofar as possible and without limiting the extent of the development area, the principles of Good Acoustic Design have been applied to the development.

Element 2 – Internal Noise Levels

Internal Noise Criteria

Element 2 of the ProPG document sets out recommended internal noise targets derived from BS 8233 (2014). The recommended indoor ambient noise levels are set out in Table 10.2 and are based on annual average data.

In addition to these absolute internal noise levels ProPG provides guidance on flexibility of these internal noise level targets. For instance, in cases where the development is considered necessary or desirable, and noise levels exceed the external WHO guidelines, then a relaxation of the internal L_{Aeq} values by up to 5dB can still provide reasonable internal conditions.

Façade Noise Levels

Noise levels have been predicted across the development site during day and night-time periods. Table10.17 presents the predicted noise levels for the various facades of the buildings on site that have been assumed for this assessment.

Ref	Period	$L_{Aeq,T}$ dB
RED	Day	72
	Night	66
ORANGE	Day	55
	Night	50
GREEN	Day	45
	Night	40

Table 10.17 Summary of Predicted Façade Noise Levels

Figure 10.11 Façade Noise Levels (see Table 10.17)

Discussion on Open/Closed Windows

The level of sound reduction offered by a partially open window is typically applied as 15dB[2] to 18dB.

Considering the design goals outlined in Table 10.2 and sound reduction across an open window of 15dB, the free-field noise levels that would be required to ensure that internal noise levels do not exceed 'good' or 'reasonable' internal noise levels have been summarised in Table 10.18.

Level Desired	Day 07:00 to 23:00hrs	Night 23:00 to 07:00hrs
Good (i.e. at or below the internal noise levels)	50 – 55dB $L_{Aeq,16hr}$	45dB $L_{Aeq,8hr}$
Reasonable (i.e. 5 dB above the internal noise levels)	55 – 60dB $L_{Aeq,16hr}$	50dB $L_{Aeq,8hr}$

Table 10.18 External Noise Levels Required to Achieve Internal Noise Levels

For sensitive rooms that face on to the Naas Road a reasonable internal noise level will not be achieved with windows open. For those on orange and green highlight facades reasonable levels will be achieved with windows open.

2 Section 2.33 of ProPG, additional information can be found in the DEFRA NANR116: *'Open/Closed Window Research' Sound Insulation Through Ventilated Domestic Windows'*

A mechanical heat recovery ventilation (MHRV) system is proposed for the development therefore there is no requirement to have windows open to achieve background ventilation requirements. An appropriate acoustic specification for windows shall be provided in this instance to ensure the rooms achieve good internal noise levels.

this assessment we have assumed that there will be negligible noise intrusion via ducting associated with the MVHR system.

Recommend Façade Treatment

The British Standard BS EN 12354-3: 2000: *Building acoustics – Estimation of acoustic performance of buildings from the performance of elements – Part 3: Airborne sound insulation against outdoor sound* provides a calculation methodology for determining the sound insulation performance of the external envelope of a building. The method is based on an elemental analysis of the building envelope and can take into account both the direct and flanking transmission paths.

The Standard allows the acoustic performance of the building to be assessed taking into account the following:

- Construction type of each element (i.e. windows, walls, etc.);
- Area of each element;
- Shape of the façade, and;
- Characteristics of the receiving room.

The principals outlined in BS EN 12354-3 are also referred to in BS8233 and Annex G of BS8233 provide a calculation method to determine the internal noise level within a building using the composite sound insulation performance calculated using the methods outlined in BS EN 12354-3. The methodology outlined in Annex G of BS8233 has been adopted here to determine the required performance of the building facades. This approach corrects the noise levels to account for the frequency content of the source in question. In this instance, rail and road traffic noise, depending on the buildings in question.

Glazing

As is the case in most buildings, the glazed elements of the building envelope are typically the weakest element from a sound insulation perspective. In this instance the facades will be provided with glazing that achieves the minimum sound insulation performance as set out in Table 10.19.

Glazing Specification	Octave Band Centre Frequency (Hz)						R_w
	125	250	500	1k	2k	4k	
Red	24	30	36	45	45	45	40
Orange/Green	22	20	26	34	46	39	32

Table 10.19 Sound Insulation Performance Requirements for Glazing, SRI (dB)

The glazing performance requirement for the various facades can be confirmed by reviewing the mark up presented in Figure 10.9.

The overall R_w outlined above are provided for information purposes only. The over-riding requirement is the Octave Band sound insulation performance values which may also be achieved using alternative glazing configurations. Any selected system will be required to provide the same level of sound insulation performance set out in Table 10.19 or greater.

It is important to note that the acoustic performance specifications detailed herein are minimum requirements which apply to the overall glazing system. In the context of the acoustic performance specification the 'glazing system' is understood to include any and all of the component parts that form part of the glazing element of the façade, i.e. glass, frames, seals, openable elements etc.

It is advised that the window supplier provides laboratory tests confirming the sound insulation performance, (to British Standard 2750 Part 3:1980 and British Standard 5821, or British Standard EN ISO 140 Part 3 1995 and British Standard EN ISO 717, 1997). It is important to note that the acoustic

performance specifications detailed herein are minimum requirements which apply to the overall glazing system when installed on site.

Wall Construction

In general, all wall constructions (i.e. block work or concrete and spandrel elements) offer a high degree of sound insulation, much greater than that offered by the glazing systems. Therefore, noise intrusion via the wall construction will be minimal. The calculated internal noise levels across the building façade have assumed a minimum sound reduction index of 50 dB R_w for this construction.

Internal Noise Levels

Taking into account the external façade levels and the specified acoustic performance to the building envelope, the internal noise levels have been calculated.

All locations are predicted to achieve good internal noise levels with windows closed. For locations highlighted orange and green in Figure 10.9, the good to reasonable internal noise levels are achieved with both windows open and closed.

Element 3 – External Amenity Areas

External noise levels within the public open spaces and private gardens across the development site are within the recommended range of noise levels from ProPG of between 50 – 55 dB $L_{Aeq,16hr}$ as illustrated in Figure 10.10. It is considered that the objectives of achieving suitable external noise levels is achieved within the overall site.

Conclusion

An initial site noise risk assessment has been carried out on the proposed mixed use development at the Concorde industrial estate. The initial site assessment has classified the development site as having a medium to high noise risk in accordance with ProPG guidance. This was determined through a review of baseline noise measurements, noise modelling of the site for existing road and Luas noise.

The assessment concluded that overall environmental noise levels at the proposed residential buildings, are not significant on the southern façade of the building and on the three blocks that project south at a perpendicular angle to the main building with line of site to the Naas Road and hence would not require any specific noise mitigation measures in order to achieve suitable internal noise levels with windows open and closed.

Highest noise levels are calculated at units overlooking the northern site boundary with a direct line of sight to the Naas Road.

Boundary treatment is proposed along this boundary as part of proposed landscaping works. In addition to this physical screening, enhanced acoustic glazing are recommended along facades with a direct line of sight to the Naas Road. Specific details of boundary treatments and glazing requirements are set out in the relevant sections of this assessment.

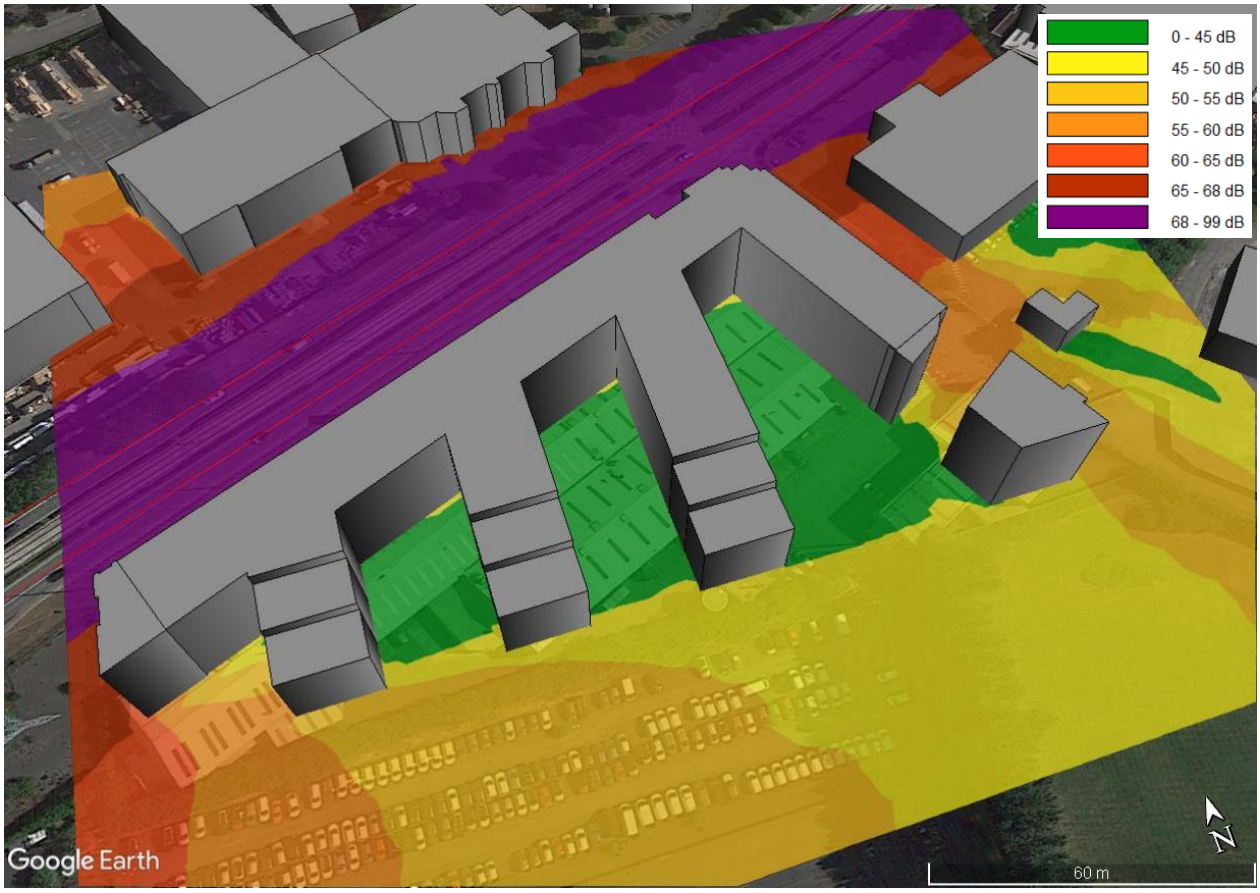


Figure 10.12 Predicted Daytime Noise Levels across External Amenity Spaces

10.15 REFERENCES

Dublin Agglomeration Noise Action Plan 2018 – 2023 (NAP)

BS 8233: 2014: Guidance on sound insulation and noise reduction for buildings.

British Standard BS 4142: 2014: Methods for Rating and Assessing Industrial and Commercial Sound

Design Manual for Roads & Bridges – Volume 11 Section 3

British Standard BS 5228 (2009 +A1 2014): Code of Practice for Control of Noise and Vibration on Construction and Open Sites *Part 1: Noise & Part 2: Vibration.*

British Standard BS 7385 (1993): *Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration*.

Calculation of Road Traffic Noise, Department of Transport Welsh Office, HMSO, 1988

EPA: *Guidance Note for Noise – Licence Applications, Surveys and Assessments in Relation to Scheduled Activities NG4* (2012).

ISO 1996: 2017: *Acoustics – Description, measurement and assessment of environmental noise.*

ISO 9613 (1996): *Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation.*

Chapter 11:

Material Assets Traffic and Transport / Utilities

11.1 MATERIAL ASSETS – TRAFFIC & TRANSPORT

11.1.1 Introduction

Author: John Considine, (B Eng MIEI MIStruct E C Eng FConsEI IEI Mem No. 022256)

Material assets are defined in the EPA "Guidelines on Information to be contained in Environmental Impacts Statements (EPA, 2002) as: "*Resources that are valued and that are intrinsic to specific places are called 'material assets'. They may be of either human or natural origin and the value may arise for either economic or cultural reasons. Examples of natural resources of economic value include assimilative capacity of air and water, non-renewable resources (e.g. minerals, soils, quarries and mines), renewable resources (hydraulic head, wind exposure).*"

This chapter of the EIAR assesses the impacts of the proposed residential development, at the Concorde Industrial Estate on the Naas Road, on the existing material assets in the vicinity of the site, as well as identifying proposed mitigation measures to minimize any impacts. This section should be read in conjunction with the architectural drawings for the development & the project description sections of this EIAR. The proposed residential development consists of one large building divided into 5no. blocks (A-E) and a second smaller building in the south-east corner of the site (block F) along with landscaping works carried out to the surrounding locale.

The material assets considered in this chapter of the EIAR include the surrounding transport network and utilities such as;

Transport Network:

- Road network and associated junction nodes
- Pedestrian
- Cyclist
- Public transport
  - *(i) Bus*
  - *(ii) Rail*
  - *(iii) Luas*

The information outlined within this chapter has been in part extracted from the proposed developments Traffic Assessment, the Parking and Mobility Study, drainage drawings, Infrastructure report, chapter 5.0 Land & soils, chapter 6.0 Water.

Existing:

The subject site is currently occupied by several small business focused towards automobile repair/sale, along with one unit being used as a gym. The overall site totals 1.88 hectares with the proposed building footprint 0.58 hectares, (31% of the overall site). The building at the south-east corner of the site and the last unit to the west end of the site are currently unoccupied.

The immediate vicinity of the site is shown in Figure 11.1.1 below. The site is bounded to the north by the Nass Road, to the east by an un-named public access road (cul de sac), to the west by an ESB high voltage mast and compound and to the south by a car yard and Drimnagh Castle playing fields. The main point of access to the site will be via the un-named road to the east which, in turn, is accessed from the Naas Road via a proposed new signalised junction. The site surface is generally flat, at approximately +39.65m. The surface levels drop in the south-east corner by 0.5 m to 39.15m. There is a low retaining wall along the south boundary. There is also a low-level retaining wall (circa 0.75m in height) along the full northern (Naas Road) boundary.

Proposed:

Planning permission is being sought for a mixed-use residential development at the Concorde Industrial Estate on the Naas Road.

The proposal is for a mixed-use residential development of 492 no. apartment units over 8 no. storeys, over the ground and first floor levels of retail / restaurant floor space and a single level basement.

The proposed apartment mix consists of 104 no. studio units, 136 no. 1 bed units, 21 no. 2 bed units (3 person) and 231 no. 2 bed units (4 person). Balconies are provided for the residential apartments on the north eastern, north western, south eastern and south western elevations of the respective buildings. Access to the residential units will be provided via a stair and lift core from basement and ground floor level. A total of 238 no. car parking spaces will be provided, with 200 no. provided in the basement car park allocated to the residential units and 38 no. surface car parking spaces provided for the commercial units, incorporating 10 no. car club spaces. The development includes 516 no. bicycle parking spaces for the apartments and commercial units, located at basement and ground floor level. The development also includes a bin store and plant area at ground floor level and plant enclosures at roof level.

It is envisaged that all structural loads will be carried via concrete foundations to either bedrock or the over-lying layers of stiff black boulder clay.

Surface water drainage (including Sustainable Drainage Systems - SuDS), foul water drainage, water supply and road network will be constructed to service the proposed development.

Figure 11.1.1 – Site Location

11.1.2 Study 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 Statement (EPA 2002 and 2017 (Draft)), EIA Directive 2014/EU/52, 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), Development Management Guidelines (DoEHLG, 2007) and Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessments August 2018.

11.1.2.1 Transport Network

This section of the EIAR assesses the impacts of the proposed mixed-use residential development at the Concorde Industrial Centre, on the surrounding transport network in the area. This section should be read in conjunction with the site layout plans for the site and the project description sections of this EIAR.

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.
- Dublin City Development Plan 2016-2022.
- Cycling Policy.
- Naas Road Lands – Local Area Plan.
- Guidelines for Traffic Impact Assessments' The Institution of Highways and Transportation;
- NTA Transport Strategy for GDA 2016

The methodology included a number of key inter related stages;

- Background Review: This important exercise incorporated three parallel tasks which included;

  (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 Naas Road Local 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 traffic counts in addition to 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.

Please see Appendix 11.1 for the full site Traffic Assessment.

11.1.3 The Existing Receiving Environment

11.1.3.1 Road Network

The site is located within an urban road network, with the links adjacent to the site carrying significant volumes of traffic into and out of the central business area within Dublin city. A traffic survey was carried out on Thursday October 18th 2018 over a 12-hour period between 0700 and 1900 at the 4 No. stated junctions, Figure 11.1.2. Junctions outside these 4 No. junctions are not considered of significant relevance as generated traffic will have significantly dissipated by the time it will have reached this wider network.

The surveys, combined with the trip generation estimates, indicate that the weekday morning peak occurs between 0800 and 0900 with the evening peak occurring between 1600 and 1700 - these were observed to be the timeframes during which the major links in the vicinity of the subject site will be assumed to be most heavily loaded.

The morning and evening peak hour flows incident at the 4 No. junctions were as follows:

Naas Road Kylemore Road / Walkinstown Avenue signalised junction

- AM peak hour - 3271 passenger car units
- PM peak hour - 3200 passenger car units

Naas Road / Concorde Industrial Estate signalised junction

- AM peak hour - 1833 passenger car units
- PM peak hour - 1816 passenger car units

Walkinstown Road / Long Mile Road signalised junction

- AM peak hour - 3407 passenger car units
- PM peak hour - 3071 passenger car units

Davitt Road / Tyrconnelll Road / Naas Road signalised junction

- AM peak hour - 2089 passenger car units
- PM peak hour - 1997 passenger car units

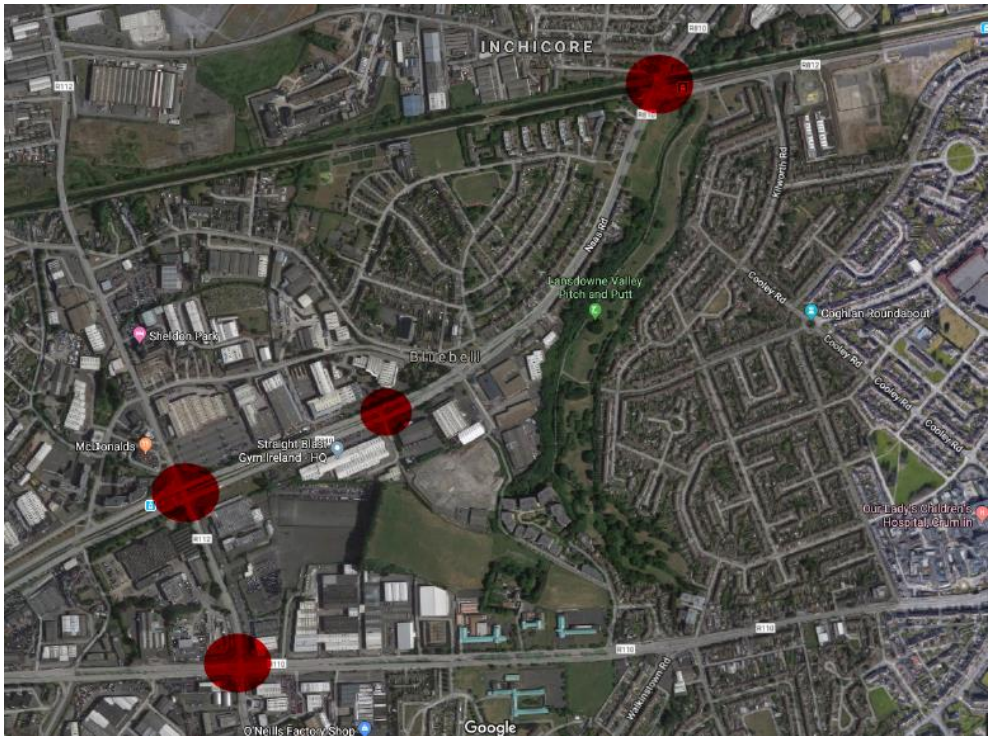


Figure 11.1.2 – Traffic Junction Locations

11.1.3.2 Pedestrians

Existing pedestrian movement through the site is non-existent due to the impermeable fencing which surrounds the site, Figure 11.1.3.This is a function of the current land usage, which is primarily an industrial estate and its lack of connectivity with the adjacent surrounding areas.

Most of the pedestrianised areas that surround the site are hostile to pedestrian users, Figure 11.1.4. The footpath has no barriers between the pedestrians and the traffic on the road, and the roads in the area such as the Naas Road and Kylemore Road, which are main routes out of the city, have high volumes of traffic including cars, buses and trucks; particularly at peak times. Crossing the Naas road at the site is potentially dangerous as there is no dedicated pedestrian crossing outside the site. Navigating from one side of the road to the other is challenging as there are multiple lanes of traffic and a Luas line to contend with when crossing. The quality of the pedestrian environment and connections for pedestrians at major junctions is poor.

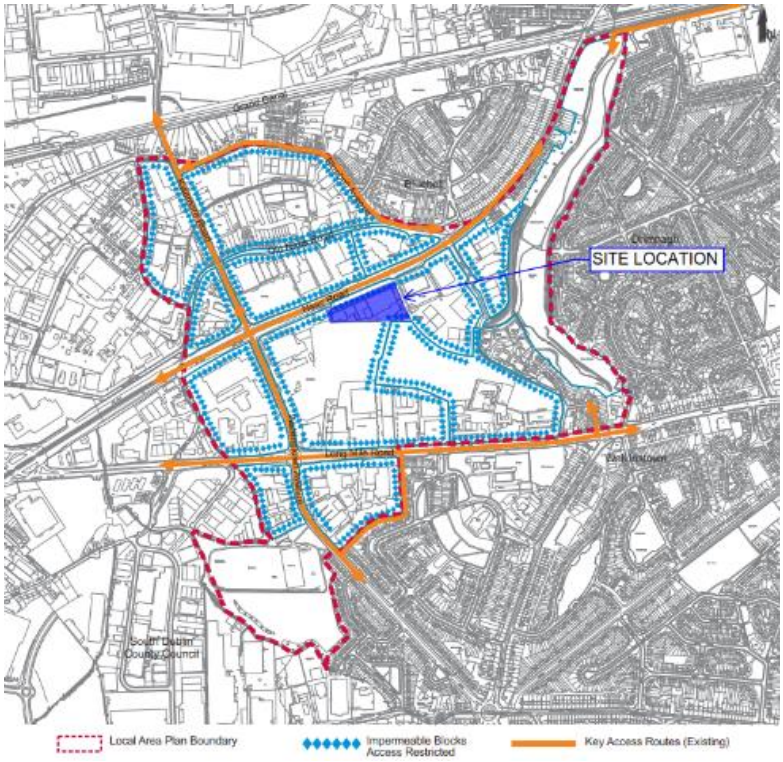


Figure 11.1.3 – Local Area Plan – Existing Accessibility

Figure 11.1.4 – Existing Naas Road Pedestrian/Cyclist Facilities

11.1.3.3 Cyclists

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. As previously stated, the majority of infrastructure for cyclists exists along major strategic roads where cyclists have to share their space with buses and large volumes of traffic.

Currently, the majority of infrastructure for cyclists exists along major strategic roads where cyclists have to share their space with buses and large volumes of traffic, which is the situation along the Naas Road at the proposed development site location. In Figure 11.1.4 it can be seen that there is no provision for

cyclists along the route. Cyclist who wish to use the route must share the road with the cars, buses and trucks that occupy the road.

11.1.3.4 Public Transport

11.1.3.4.1 Bus Services

The Naas Road area is currently connected by Dublin Bus in a predominantly radial nature, providing good links between the city centre and the west but not to other areas of the city. The full array of public transport can be seen in Table 11.1.3.1.

Currently Dublin Bus services in the area provide direct linkage to the city with Route 13 and 151. The frequency of each bus can be seen in Table 11.1.3.1, with an approximate 12-minute waiting time between buses. There is an inbound Route 13 stop situated directly outside the site, however accessing the inbound route is difficult as there is no dedicated pedestrian crossing across the Naas Road and Luas line which results in a 7 minute walk, indicated in the dashed blue line in Figure 11.1.5, to reach the stop. If residents choose to use the 151 bus service on the Long Mile Road, due to the lack of permeability through the site and lands between the stop, pedestrians need to walk down the Naas Road and Walkinstown Avenue which results in a 12 minute walk, indicated in a dashed orange line in Figure 11.1.5.

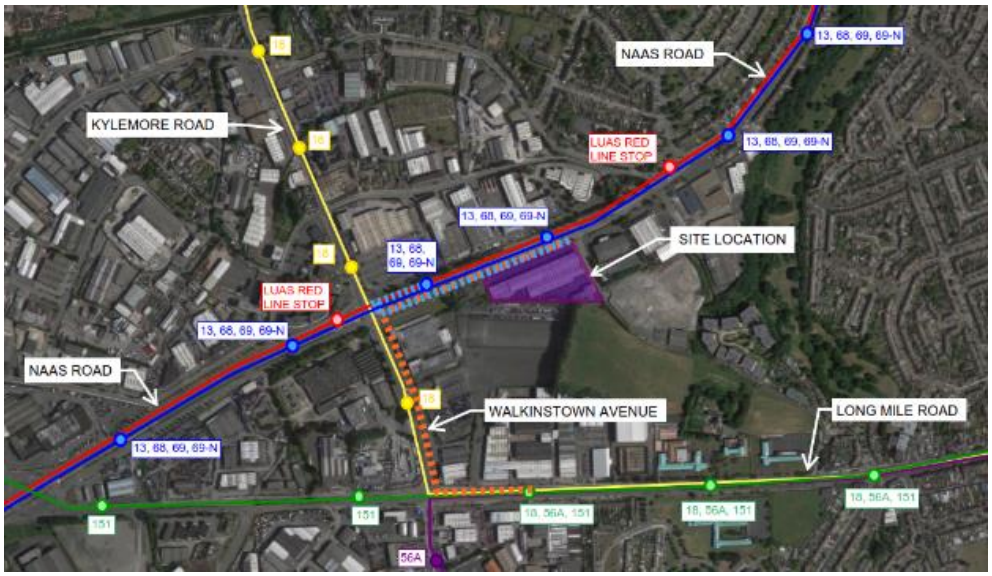


Figure 11.1.5 – Existing Bus & Luas Services

Table 11.1.3.1 – Dublin Bus Route Frequencies

Route	Origin	Destination	Frequency (07:00 – 08:00)
Route 13	Grange Castle	Harristown	5 per hour
Route 151	Foxborough Rd.	Docklands	5 per hour

11.1.3.4.2 Luas Services

The Luas service is a form of public transport which travels along the Naas Road and is a strong option for a reliable, sustainable transport option. The frequency of service is a train every 5/6 minutes, which is twice the regularity of the bus service in the area. There are two Luas stops in the Naas Local Area Plan, although the Bluebell Luas Stop, a 4-minute walk, would be the stop of choice for residents in the proposed development, Figure 11.1.6. Although the Luas service is well maintained, reliable and has a

higher frequency of service, according to the Naas Road Local Area Plan, "*there is a relatively low patronage of these stops comparative to other stops*".

Figure 11.1.6 – Existing Luas Stops

11.1.3.4.3 Rail Services

Mainline rail services are in the area but they are currently outside the walking distance of the site. The rail connection to the site area is located 2.5 km to the north east at the Cherry Orchard & Park West stop on the Kildare commuter service which can be seen in Figure 11.1.7. There is currently a dedicated shuttle service from the Kylemore Luas stop to Parkwest station. The "861 Express Bus" provides a limited amount of trips from the Luas stop in the morning and a limited amount in the evening, Figure 11.1.8.

Figure 11.1.7 – Existing Train Facilities

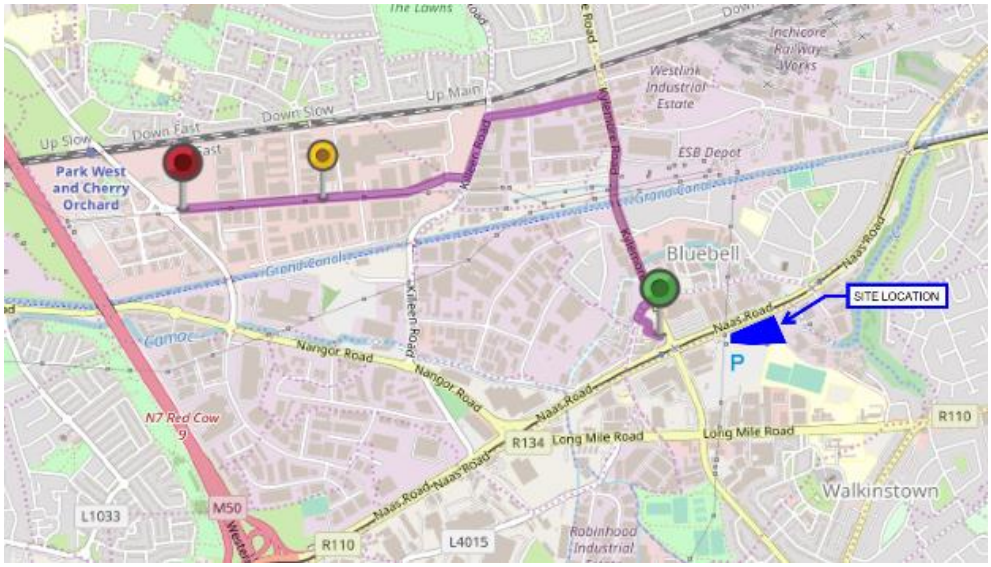


Figure 11.1.8 – 861 "Express Bus" Route

11.1.4 Characteristics of the Proposed Development

Consideration of the Characteristics of the Proposed Development allows for a projection of the 'level of impact' on any aspect of the proposed environment that could arise. For this chapter the potential impact on the Traffic and Transport network in the site is discussed.

The proposal is for a mixed-use residential development of 492 no. apartment units over 8 no. storeys, over the ground and first floor levels of retail / restaurant floor space and a single level basement.

The proposed apartment mix consists of 104 no. studio units, 136 no. 1 bed units, 21 no. 2 bed units (3 person) and 231 no. 2 bed units (4 person). Balconies are provided for the residential apartments on the north eastern, north western, south eastern and south western elevations of the respective buildings. Access to the residential units will be provided via a stair and lift core from basement and ground floor level. A total of 243 no. car parking spaces will be provided, with 200 no. provided in the basement car park allocated to the residential units incorporating 10 no. car club spaces with 43 no. surface car parking spaces provided for the commercial units. The development includes 512 no. bicycle parking spaces for the apartments and commercial units, located at basement and ground floor level. The development also includes a bin store and plant area at ground floor level and plant enclosures at roof level.

Surface water drainage (including Sustainable Drainage Systems - SuDS), foul water drainage, water supply and road network will be constructed to service the proposed development.

It is envisaged that all structural loads will be carried via concrete foundations to either bedrock or the over-lying layers of stiff black boulder clay.

11.1.4.1 Road Network

No additional capacity can, or will be, made available to private vehicles along the Naas Road. Therefore any additional private vehicles who use the road will have a negative effect on the road network. To avoid this, major steps have been taken to encourage as much movement as possible by public transport, cycling and walking in both the Naas Road Local Area Plan and the project Mobility Management Plan.

The Concorde Traffic Assessment report demonstrates that the existing road network near the proposed development is busy and congested at peak times. It is demonstrated that the volume of trips predicted to

be generated by the project will be at low levels and will not have a significant impact on major road junctions adjacent to the subject site.

The mixed use and commercial component of the proposed development will likely attract trips to these facilities, however, these are not new trips but already exist on the network. Entering and exiting trips in this case will thus be pass-by trips by commuters availing of these facilities before they complete their onward journey. In relation to the residential component of the proposed development, the low parking provision will result in high public transport and soft mode usage by residents at peak times on the network.

In overall terms, therefore, based on the analysis within this report, and given the mitigating facts listed immediately above, it is predicted that the proposal will have limited impact in transportation terms, and will constitute a wholly sustainable development.

The transport related elements of the development are listed below:

- 512 long- and short-term bicycle parking.
- New basement car park which will provide 200no. residential car parking spaces incorporating 10no. car club spaces.
- New surface car parking which will provide 43no. commercial car parking spaces.
- New pedestrian crossing across the unnamed side road.
- New pedestrian crossing across the Naas Road.

11.1.4.2 Pedestrians

The development will create a highly permeable site with easy access provided to the green routes that interact with the site to the south. The subject site will be accessible to pedestrians and cyclists via the 2 no. proposed new signal-controlled junctions parallel to the Naas Road across the cul-de-sac, directly across the Naas Road, Figure 11.1.9. The design of the junctions incorporates the proposed “City Wide Green Routes” in this area, per the Naas Road Local Area Plan. Furthermore, dedicated pedestrian and cycle facilities are proposed adjacent to and along the entire length of the Naas Road, as well as along the entire perimeter of the site thereby providing a permeable route through the subject site for pedestrians and cyclists.

By providing a pedestrian route across the Naas Road and the road adjacent to the site, a significantly improved and safer pedestrian facility is provided to both the Luas line and inbound public bus service. This new pedestrian route will also link in with “City Wide Green Route” shown in Figure 11.1.10 to promote permeability throughout the site and allow continuity through to the adjacent strategic development sites.

Figure 11.1.9 – Proposed Pedestrian Crossing Locations

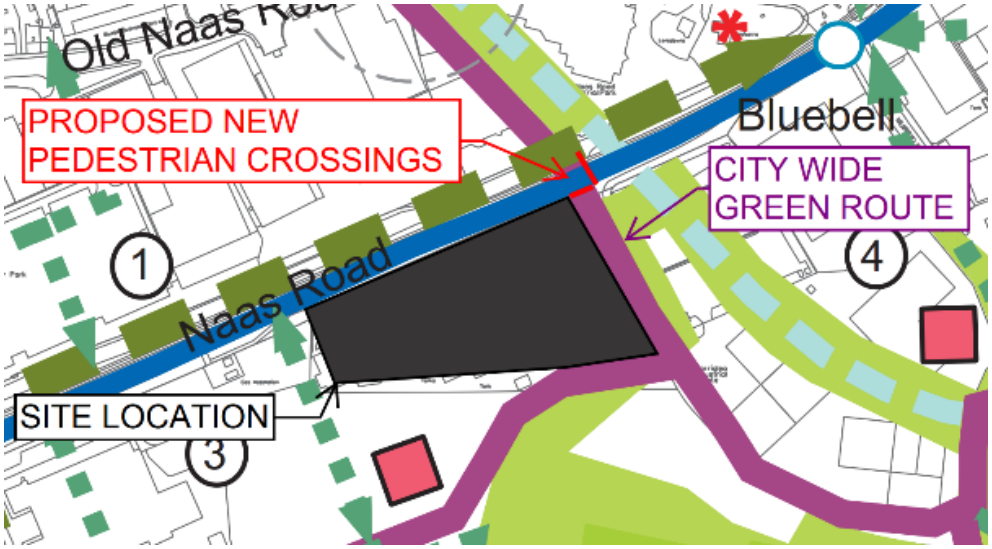


Figure 11.1.10 – Local Area Plan Extract – Pedestrian Crossing

11.1.4.3 Cyclists

To accommodate this proposed usage of bicycles to travel in and out of the city centre, 512no. bicycle parking locations have been provided at a variety of easily accessible locations throughout the site. This equates to 1 parking spot per apartment and 1 per 150m2 of commercial space per the Dublin City Guidelines.

As set out above regarding pedestrian access, the permeability of the proposed development will also be of benefit to cyclists. To the immediate north of the site location is the new cycleway along the Grand Canal connecting the city with Lucan and which on completion, will form part of the Canal Way Cycle route, connecting along the Grand Canal to the Royal Canal through the city and docklands and integrating with other strategic cycle routes planned for the city. The proximity of this route to the site presents an opportunity to deliver new connections to this strategic cycle route and integrate the site into this growing network.

Providing easy access to this main cycle route into the city will entice residents of the development to use the route and cycle along the canal where they will not have to share their space with other road users such as cars, buses or trucks. Residents of the proposed development can choose to gain access to this main cycle route via the "7D" route or alternatively along the "River Carmac Greenway" which they will able to access via the Local Area Plan City Wide Green Route, (Figure 11.1.11).

Figure 11.1.11 – Cycle Network Plan for the Greater Dublin Area Extract

11.1.4.4 Public Transport

As no additional capacity on the roads surrounding the site can be made available to private vehicles, the role of public transport in accommodating the movement requirements of the area now and into the future is crucial.

11.1.4.4.1 Bus Service

Buses have the greatest potential to increase public transport capacity and decrease the number of private vehicles on the road. Providing easy access to public transport services will ensure. The previously mentioned pedestrian crossings will allow residents from the proposed development to access the in-bound Dublin Bus service along the Naas Road.

Delays will be unlikely along these routes as the frequency of the buses should outweigh the amount of residents who will use the service.

There is proposals for a new bus service to be introduced to Dublin, "Bus Connects". This new bus service has proposals to alter the current route layout in favour of a more efficient global network, Figure 11.1.12. This new route travels along Drimnagh Road behind the proposed site. Currently, there is no direct access to this road from the site. However, with the site landscaping incorporating green routes, if this new bus system comes into effect, residents will be able to access it.

Figure 11.1.12 – Bus Connects Network

11.1.4.4.2 Luas Service

No additional provisions have been made to the already frequent Luas service. Easy access will be provided via the new pedestrian crossings.

Based on the Local Area Plan – Naas Road, patronage of these stops is quite low. Therefore the Luas service should have capacity for an increased usage. Delays will also not occur on the route, as the Luas already stops at every stop along the route.

11.1.4.4.3 Rail Service

No additional provisions have been made to access the Rail service. Based on the proximity of the Luas and Bus services to the site, usage of the rail service will be limited.

11.1.5 Potential Impact of the Proposed Development

11.1.5.1 Introduction

This section contains an assessment of the potential effects of the proposed development on the traffic and transport near the site. This is provided with reference to both the Characteristics of the Receiving Environment and Characteristics of the Proposed Development sections. The assessment takes both the construction and operational phases of development into account.

All construction activities will be governed by a Construction Traffic Management Plan (CTMP) which will form a key component of the development proposals overall Construction Management Plan. Furthermore, the applications accompanying Construction and Waste Management Plan also considers the impacts potentially generated during the construction stage. The details, scope and management initiatives detailed within the final CTMP will be agreed with the local authority's Roads Department prior to the commencement of construction activities on-site. The principal objective of the CTMP is to ensure that the impacts of all building activities generated during the construction of the proposed development upon both the public (off-site) and internal (on-site) workers environments, are fully considered and proactively managed / programmed respecting key stakeholders requirements thereby ensuring that both the public' and construction workers' safety is maintained at all times, disruptions are minimised and

undertaken within a controlled hazard free environment. It is noted that the impact of the construction works will be temporary in nature.

11.1.5.2 Road Network

11.1.5.2.1 Construction Phase

The works associated with the new development will result in additional traffic on the road network with the removal of excavated material, small amounts of demolition waste, and the delivery of new materials, concrete trucks etc. Construction traffic access to the site will be via the existing access onto the un-named road which connects onto the Naas Road, Figure 11.1.13.

The period (time of day and day of week) during which construction activities will be permitted on-site, and during which construction traffic will be travelling across the local road network will be set out in the construction management plan.

Construction staff traffic movements will generally occur before 08:00 and therefore avoid the morning road network peak. It is anticipated that all general construction traffic (deliveries) will occur outside of the peak commuting hours, 08:00 – 09:00.

Figure 11.1.13 – Existing Access to the Site

11.1.5.2.2 Operational Phase

There will be an increase of traffic during the operational phase of the site. However, based on the minimal on-site parking provided this increase will be minimal. The large emphasis and access provided to other transport options will also mean that the increase to the road network will be minimal.

The commercial aspect of the proposed development will also not generate a large increase of vehicles on the road network as per the Traffic Assessment report, the majority of patrons who utilize the commercial facilities will be current road users and therefore there will be no increase in traffic on the road network.

The un-named side road will provide vehicular access to the site. There is currently a signalled junction at the intersection of this road and the Naas Road. This will be sufficient for the proposed development.

11.1.5.3 Pedestrian

11.1.5.3.1 Construction Phase

The site is currently impermeable to pedestrians. The addition of hoarding around the site perimeter should not change the current permeability of the site and the pedestrian.

Due to the location of the site the number of additional pedestrians in the form of site staff will be almost non-existent as the majority will use private vehicles or public transport.

11.1.5.3.2 Operational Phase

The proposed permeability of the site will allow pedestrians to pass through the site and access the surrounding proposed green routes. Access to the green routes will also deter pedestrians from using the Naas Road as a means of travelling to and from town.

11.1.5.4 Cyclist

11.1.5.4.1 Construction Phase

The site is currently impermeable to cyclists. The addition of hoarding around the site perimeter should not change the current permeability of the site and the pedestrian.

Due to the location of the site the amount of additional cyclists in the form of site staff will be almost non-existent as the majority will use private vehicles or public transport.

11.1.5.4.2 Operational Phase

The proposed permeability of the site will allow cyclists to pass through the site and access the surrounding proposed green routes. Access to the green routes will also deter cyclists from using the the busy and more dangerous Naas Road as a means of travelling to and from town.

11.1.5.5 Public Transport

11.1.5.5.1 Construction Phase

There will be an increase of public transport usage during the construction phase. The proximity and frequency of the Luas and Dublin Bus services to the site means that this will be the primary method of reaching the site used by site staff. This should not negatively affect the public transport services within the area. The site staff will arrive before 08:00, before peak commuting hours, which should not negatively impact the public transport.

The frequency of each service, described in 11.1.3, alludes to the fact that there should be no negative effect felt by the public transport system based on site staff.

Using public transport will mean that there is no negative impact on the surrounding road network.

11.1.5.5.2 Operational Phase

There will be an increase of public transport usage during the operational phase. The proximity and frequency of the Luas and Dublin Bus services to the site means that this will be the primary method of transport used by residents. This should not negatively affect the public transport services within the area.

The frequency of each service, described in 11.1.3, alludes to the fact that there should be no negative effect felt by the public transport system based on site staff.

Using public transport will mean that there is no negative impact on the surrounding road network.

11.1.6 Potential Cumulative Impacts

11.1.6.1 Road Network

There is another large development proposed to the south east of the site, see Figure 11.1.14. This will not affect the un-named road into the site or the junction onto the Naas Road as all access to this development will be via Muirfield Drive, one junction to the east of the proposed development. There may

be a small increase in road traffic from private vehicles, however given both developments propose a low ratio of private car spaces to apartments, on the road network however compared to the volume of traffic which currently uses the Naas Road, the addition will be negligible.

11.1.6.2 Pedestrian

There should be no cumulative effect on pedestrians in the area.

11.1.6.3 Cyclists

There should be no cumulative effect on cyclists in the area.

11.1.6.4 Public Transport

The large development to the south east will also add to the public transport usage, however the public transport should have capacity for additional patronage. The increased usage of public transport will not have an effect on the road traffic and transport in the area.

Figure 11.1.14 – Adjacent Site

11.1.7 'Do Nothing' Impact

11.1.7.1 Road Network

If the proposed development were not constructed there would be no effect on the road network.

11.1.7.2 Pedestrian

If the proposed development were not constructed there would be no effect on the pedestrian usage of the site area.

11.1.7.3 Cyclist

If the proposed development were not constructed there would be no effect on the cyclist usage of the site area.

11.1.7.4 Public Transport

If the proposed development were not constructed there would be no effect on the public transport area.

11.1.8 Remedial and Mitigation Measures

Remedial and mitigation measures describe any corrective measures that are either practicable or reasonable, having regard to the potential impacts discussed above. This includes avoidance, reduction and remedy measures as per the guidance set out in Section 4.7 of the Development Management Guidelines 2007 to reduce or eliminate any significant adverse impacts identified.

The Construction Management Plan will incorporate a range of integrated control measures and associated management activities with the objective of mitigating the impact of the proposed developments on-site construction activities.

11.1.8.1 Road Network

11.1.8.1.1 Construction Phase

The following remedial or reductive measures to mitigate the impact of the construction phase on the existing environment are proposed with reference to the road network:

11.1.8.1.2 Road Network Construction Stage Measures to be Implemented:

- Any recommendations regarding 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.
- Efforts are to be made to promote the usage of public transport by site staff to prevent additional private cars on the road network.
- Provision of enough 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 be able to 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 if deemed necessary.

11.1.8.1.3 Operational Phase

The following mitigation measures are proposed for the operational phase of the proposed development with reference to the road network:

11.1.8.1.4 Road Network Operational Stage Measures to be Implemented:

- As part of the ‘Built-to-rent’ scheme implemented on-site, access to dedicated on-site parking will be controlled by the management team on-site as per the Mobility Management Plan report.

11.1.8.2 Pedestrian

11.1.8.2.1 Construction Phase

The following remedial or reductive measures to mitigate the impact of the construction phase on the existing environment are proposed with reference to the pedestrian network:

11.1.8.2.2 Pedestrian Construction Stage Measures to be Implemented:

- Hoarding to be set up around the perimeter to prevent pedestrian access.
- Signage to be implemented to clearly indicate navigation routes around the site.

11.1.8.2.3 Operational Phase

The following mitigation measures are proposed for the operational phase of the proposed development with reference to the pedestrian network:

11.1.8.2.4 Pedestrian Operational Stage Measures to be Implemented:

- Provide signage to indicate the green routes in the vicinity.
- Provide adequate lighting along pedestrian routes to promote usage in the evenings.
- Signage of local green routes should be on site to indicate trip time and route to various surrounding locations.

11.1.8.3 Cyclist

11.1.8.3.1 Construction Phase

The following remedial or reductive measures to mitigate the impact of the construction phase on the existing environment are proposed with reference to the cyclist network:

11.1.8.3.2 Cyclist Construction Stage Measures to be Implemented:

- Provide bike parking locations on site to promote the usage of cycling by site staff.

11.1.8.3.3 Operational Phase

The following mitigation measures are proposed for the operational phase of the proposed development with reference to the cyclist network:

11.1.8.3.4 Cyclist Operational Stage Measures to be Implemented:

- Provide adequate bike parking locations on the site for each resident.
- Provide adequate lighting along cycle routes to promote usage in the evenings
- Signage of local green routes should be on site to indicate trip time and route to various surrounding locations.

11.1.8.4 Public Transport

11.1.8.4.1 Construction Phase

The following remedial or reductive measures to mitigate the impact of the construction phase on the existing environment are proposed with reference to the public transport network:

11.1.8.4.2 Public Transport Construction Stage Measures to be Implemented:

- Promote usage of public transport by site staff by clearly displaying local bus, Luas and rail services with a map and timetable indicating routes and travel times.

11.1.8.4.3 Operational Phase

The following mitigation measures are proposed for the operational phase of the proposed development with reference to the public transport network:

11.1.8.4.4 Public Transport Operational Stage Measures to be Implemented:

- Provide access to the Luas stop and the bus stops travelling into town via a new pedestrian crossing system across both the un-named roads and the Naas Road.

11.1.9 Predicted Impacts of the Proposed Development

11.1.9.1 Road Network

11.1.9.1.1 Construction Phase

Provided that the proposed remedial or reductive measures are implemented, the impact of the proposed development during the construction stage will be of a temporary nature and will be minimised.

11.1.9.1.2 Operational Phase

There will be an increase in road network usage by private vehicles, although this addition will be minimal in comparison to the current usage.

11.1.9.2 Pedestrian

11.1.9.2.1 Construction Phase

Provided that the proposed remedial or reductive measures are implemented, the impact of the proposed development during the construction stage will be of a temporary nature and will be minimised.

11.1.9.2.2 Operational Phase

There will be an increase in pedestrians in the surrounding area, however these pedestrians will predominantly use the proposed green routes. These green routes are currently not in place so the impact the operational phase will have cannot be ascertained.

11.1.9.3 Cyclist

11.1.9.2.3 Construction Phase

Provided that the proposed remedial or reductive measures are implemented, the impact of the proposed development during the construction stage will be of a temporary nature and will be minimised.

11.1.9.2.4 Operational Phase

There will be an increase in cyclists in the surrounding area, however these pedestrians will predominantly use the proposed green routes. These green routes are currently not in place so the impact the operational phase will have cannot be ascertained.

11.1.9.3 Public Transport

11.1.9.3.1 Construction Phase

Provided that the proposed remedial or reductive measures are implemented, the impact of the proposed development during the construction stage will be of a temporary nature and will be minimised. There will be an increase in public transport usage by site staff. This should not negatively affect the public transport systems in the area and will have no effect on the road network.

11.1.9.3.2 Operational Phase

There will be an increase in public transport usage by residents of the development. This should not negatively affect the public transport systems in the area and will have no effect on the road network.

11.1.10 Monitoring

11.1.10.1.1 Construction Phase

During the construction stage the following monitoring exercises are likely to be required. The specific compliance exercises to be undertaken in regard to the range of measures detailed in the final construction management plan will be agreed with the planning authority.

- Compliance with construction vehicles routing practices.
- Compliance with construction vehicles parking practices.
- Internal and external road conditions
- Timing of construction activities.

11.1.10.1.2 Operational Phase

The mobility management plan for the residential elements of the development will be monitored and updated every two years over a period of ten years from the initial occupancy of the units. This will allow progress to be made towards achieving a working system. The information obtained from the monitoring surveys will be used to identify ways in which the MMP initiatives should be taken forward in order to maintain and further encourage sustainable travel characteristics.

11.1.11 Reinstatement

Reinstatement is not applicable to the Traffic and Transportation Section of this EIAR.

11.1.12 Interactions

11.1.12.1.1 Construction Phase

Temporary negative impacts to human health may be likely during the construction phase due to noise, dust, air quality and visual impacts which are discussed in other chapters within this EIAR. The traffic impacts, which would also be temporary in duration are not considered to be significant due to the implementation of the mitigation measures identified in section 11.1.8.

11.1.12.1.2 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.

11.1.13 Difficulties Encounter in Compiling

None.

11.1.14 References

- NRA Traffic & Transportation Assessment Guidelines; National Roads Authority (May 2014)
- TII Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections (PE-PAG-02017); TII (October 2016)
- 'Traffic Management Guidelines' Dublin Transportation Office & Department of the Environment and Local Government (May 2003)
- 'Guidelines for Traffic Impact Assessments' The Institution of Highways and Transportation (1994)
- Naas Road Local Area Plan 2013-2019
- Greater Dublin Area Cycle Network Plan; National Transport Authority (2013); www.nta.ie
- Dublin Bus Website; www.dublinbus.ie
- Irish Rail Website; www.irishrail.ie
- Luas Website; www.luas.ie/

11.2 MATERIAL ASSETS – UTILITIES

11.2.1 Introduction

Author: John Considine, (B Eng MIEI MIStruct E C Eng FConsEI IEI Mem No. 022256)

Material assets are defined in the EPA "Guidelines on Information to be contained in Environmental Impacts Statements (EPA, 2002) as: "*Resources that are valued and that are intrinsic to specific places are called 'material assets'. They may be of either human or natural origin and the value may arise for either economic or cultural reasons. Examples of natural resources of economic value include assimilative capacity of air and water, non-renewable resources (e.g. minerals, soils, quarries and mines), renewable resources (hydraulic head, wind exposure).*"

This chapter of the EIAR assesses the impacts of the proposed residential development, at the Concorde Industrial Estate on the Naas Road, on the existing material assets in the vicinity of the site, as well as identifying proposed mitigation measures to minimize any impacts. This section should be read in conjunction with the architectural drawings for the development & the project description sections of this EIAR. The proposed residential development consists of one large building divided into 5no. blocks (A-E) and a second smaller building in the south-east corner of the site (block F) along with landscaping works carried out to the surrounding locale.

The material assets considered in this chapter of the EIAR include the surrounding transport network and utilities such as;

11.2.1.1 Utilities

- Water Supply
- Surface Water Drainage
- Foul Water Drainage
- Natural Gas
- ESB Power
- Telecommunications

The information outlined within this chapter has been in part extracted from the proposed developments Traffic Assessment, the Parking and Mobility Study, drainage drawings, Infrastructure report, chapter 5.0 Land & soils, chapter 6.0 Water.

Existing:

The subject site is currently occupied by several small business focused towards automobile repair/sale, along with one unit being used as a gym. The overall site totals 1.88 hectares with the proposed building footprint 0.58 hectares, (31% of the overall site). The building at the south-east corner of the site and the last unit to the west end of the site are currently unoccupied.

The immediate vicinity of the site is shown in Figure 11.15 below. The site is bounded to the north by the Nass Road, to the east by an un-named public access road (cul de sac), to the west by an ESB high voltage mast and compound and to the south by a car yard and Drimnagh Castle playing fields. The main point of access to the site will be via the un-named road to the east which, in turn, is accessed from the Naas Road via a proposed new signalised junction. The site surface is generally flat, at approximately +39.65m. The surface levels drop in the south-east corner by 0.5 m to 39.15m. There is a low retaining wall along the south boundary. There is also a low level retaining wall (circa 0.75m in height) along the full northern (Naas Road) boundary.

Proposed:

Planning permission is being sought for a mixed-use residential development at the Concorde Industrial Estate on the Naas Road.

The proposal is for a mixed-use residential development of 492 no. apartment units over 8 no. storeys, over the ground and first floor levels of retail / restaurant floor space and a single level basement.

The proposed apartment mix consists of 104 no. studio units, 136 no. 1 bed units, 21 no. 2 bed units (3 person) and 231 no. 2 bed units (4 person). Balconies are provided for the residential apartments on the north eastern, north western, south eastern and south western elevations of the respective buildings. Access to the residential units will be provided via a stair and lift core from basement and ground floor level. A total of 238 no. car parking spaces will be provided, with 200 no. provided in the basement car park allocated to the residential units and 38 no. surface car parking spaces provided for the commercial units, incorporating 10 no. car club spaces. The development includes 516 no. bicycle parking spaces for the apartments and commercial units, located at basement and ground floor level. The development also includes a bin store and plant area at ground floor level and plant enclosures at roof level.

It is envisaged that all structural loads will be carried via concrete foundations to either bedrock or the over-lying layers of stiff black boulder clay.

Surface water drainage (including Sustainable Drainage Systems - SuDS), foul water drainage, water supply and road network will be constructed to service the proposed development.

Figure 11.2.1 – Site Location

11.2.2 Study 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 Statement (EPA 2002 and 2017 (Draft)), EIA Directive 2014/EU/52, 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), Development Management Guidelines (DoEHLG, 2007) and Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessments August 2018.

This section of the EIAR assesses the impacts of the proposed mixed-use residential development at the Concorde Industrial Centre, on the surrounding utility network in the area. This section should be read in conjunction with the site layout plans for the site and the project description sections of this EIAR.

The following sources of information were used in the completion of this assessment:

- Irish Water Utility Plans
- Gas Networks Ireland Utility Plans
- ESB Utility Plans
- Eir Utility Plans

11.2.3 The Existing Receiving Environment

11.2.3.1 Water Supply

There is an existing 9" watermain located in the Naas Road to the north of the site. There is 30" steel watermain running from the north east to the south west, this watermain extends through the south east corner of the site. There is also an existing 110mm MOPVC within the site.

The existing water supply network in the vicinity of the proposed development site is shown on the Irish Water - Water Main Map in Appendix 11.2 of this Chapter.

Irish water have provided confirmation that the public water supply infrastructure in the vicinity of the site has adequate capacity to serve the proposed development via a new metered connection to the existing 30" watermain to the east of the site.

11.2.3.2 Surface Water Drainage

The nearest surface water sewer is a 450mm diameter concrete sewer on the south side of the Naas Road, parallel to the northern boundary of the site, flowing north-east. At approximately 25m north east of the development site boundary, the surface water sewer discharges to a manhole and subsequently, to the culverted River Camac.

There is also a 300mm diameter surface water sewer on the north side of the Naas Road flowing north-east, which also discharges to the culverted River Camac.

Refer to Appendix 11.2 for existing records. It is unclear how the existing site drains into the adjacent sewer network. There are currently no SuDS measures in place on the site.

11.2.3.3 Foul Water Drainage

There is a 1350mm Concrete Combined Sewer in parallel to the Naas Road which runs west to east inside the site boundary and also north-south inside the eastern site boundary, parallel to the side road. There is a 225mm foul sewer from the north east, crossing the Naas Road and running parallel to the 1350mm combined sewer along the eastern boundary of the site.

11.2.3.4 Natural Gas

There is an existing high pressure natural gas transmission main located in the Naas Road to the north of the site.

A 125 PE-80, 4 Bar main also runs parallel to the high pressure transmission line located in the Nass Road which is currently extended into the existing site to service existing premises in two locations to the east and west of the site.

The existing natural gas network in the vicinity of the proposed development site is shown on the Gas Networks Ireland – Gas Transmission Network Information Map in Appendix 11.3 of this Chapter.

Gas Networks Ireland have provided confirmation that the natural gas infrastructure in the vicinity of the site has adequate capacity to serve the proposed development via a new metered connection.

11.2.3.5 ESB Power

2no distinct ESB supply lines traverse the proposed development site as shown on the ESB Utility Plans included as Appendix 11.4 to this document. One being high voltage lines, the second being MV / LV supply's.

High Voltage: To west of the site a high voltage mast exists which has overhead lines travelling from just outside the south west boundary of site which enters to the south east section of site approximately over the redundant south eastern building.

The existing ESB network in the vicinity of the proposed development site is shown on the ESB –Network Information Map in Appendix 11.4 of this Chapter.

The second ESB supply identified is the existence of an MV / LV supply incorporating an onsite substation located centrally in the southern area. Underground MV / LV supply's enter and exit the substation both in an east and west direction serving which is assumed supplied the existing on site buildings.

11.2.3.6 Eir

Existing main Eir lines travel on the Naas road outside the northern boundary. From the Naas road, the Eir braches into the site and an existing telecommunication line identified directly in front of the front façade of the building from where each building was serviced accordingly.

A second Eir feed enters via the un-named eastern road serving the south eastern building only (within the site) branched from the Carriglea Industrial Estate.

The existing EIR network in the vicinity of the proposed development site is shown on the EIR –Network Information Map in Appendix 11.5 of this Chapter.

11.2.4 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 proposed environment that could arise. For this chapter the potential impact on material assets is discussed.

The proposal is for a mixed-use residential development of 492 no. apartment units over 8 no. storeys, over the ground and first floor levels of retail / restaurant floor space and a single level basement.

The proposed apartment mix consists of 104 no. studio units, 136 no. 1 bed units, 21 no. 2 bed units (3 person) and 231 no. 2 bed units (4 person). Balconies are provided for the residential apartments on the north eastern, north western, south eastern and south western elevations of the respective buildings. Access to the residential units will be provided via a stair and lift core from basement and ground floor level. 200 no. car parking spaces within the basement car park will be allocated to the residential units with 43 no. car parking spaces provided for the commercial units at ground floor level. The development includes 512 no. Electric parking spaces for the apartments and commercial units, located at basement and ground floor level. The development also includes a bin store and plant area at ground floor level and plant enclosures at roof level.

The total car parking provision for the scheme will be 243 no. spaces, which comprises of 200 no. spaces for the proposed residential units and 43 no. spaces for the permitted retail and commercial floor space.

11.2.4.1 Water Supply

The watermain layout and connections, valves, hydrants, meters etc. are designed in accordance with Irish Water's Code of Practice / Standard Details and the Department of the Environment's Building Regulations "Technical Guidance Document Part B Fire Safety".

A new separate surface and foul water buried drainage system will need to be designed and implemented within the site as part of the proposed development. The new surface water drainage system is designed using the Micro Drainage Windes package.

It is proposed to connect to the existing line at the east of the site. The water demand for the proposed development has been calculated in Chapter 8, section **Error! Reference source not found.** as:

Average Flow = 3.26 l/s
Peak Flow = 16.3 l/s

Twenty-four-hour storage will be provided to cater for possible shut-downs in the system.

Hydrants will be provided on the loop main in accordance with Part B of the Building Regulations and the Fire Safety Certificate's Requirements. Sluice valves will be provided at appropriate locations to facilitate isolation and purging of the system.
The new site watermain network will also adequately serve the firefighting requirements of the development.

11.2.4.2 Surface Water Drainage

A pre-planning meeting with Dublin City Council Drainage engineer (Ms. Maria Treacy) took place on Friday 5th of October 2018 to discuss proposals for surface water drainage. The advice given at this meeting, to employ two stage treatment, has been accounted for in the planning proposals in as much as is practical.

A new separate surface and foul water buried drainage system will need to be designed and implemented within the site as part of the proposed development. The new surface water drainage system is designed using the Micro Drainage Windes package.

The principles of Sustainable Urban Drainage Systems (SUDS) are embodied in the recommendations of the Greater Dublin Strategic Drainage Study (GDSDS). The GDSDS addresses the issue of sustainability by requiring designs to comply with a set of drainage criteria which aim to minimize the impact of urbanisation by replicating the run-off characteristics of the greenfield site. The criteria provide a consistent approach to addressing the increase in both rate and volume of run-off as well as ensuring the environment is protected from pollution that is washed off roads and buildings.

The proposed development will be designed in accordance with the principles of Sustainable Drainage Systems (SuDS) as embodied in the recommendations of the Greater Dublin Strategic Drainage Study (GDSDS) and will significantly reduce run-off rates and improve storm water quality discharging to the public storm water system.

These drainage design criteria are as follows:

- Criterion 1 – River Water Quality Protection
- Criterion 2 – River Regime Protection
- Criterion 3 – Flood Risk Assessment
- Criterion 4 – River Flood Protection

Further details of each individual design criteria for the surface water drainage can be found in Chapter 6.0 – Water of this report.

11.2.4.3 Foul Water Drainage

A separate foul water drainage system exists within the site. This will be maintained and extended for the new development. The current foul water drainage system will have capacity for the proposed mixed-used residential development.

A full set of calculations can be found in Chapter 8.0 Water, below is a summary breakdown.

11.2.4.3.1 Sum of Foul Water Flow & BOD_5 Calculation

	Type		Foul Water Flow	BOD_5
1.	Apartment	=	219 m^3/day	80 kg/day
2.	Casual Dining / Café	=	3.12 m^3/day	1.68 kg/day
3.	Crèche	=	0.78 m^3/day	0.42 kg/day
4.	Car Showroom	=	0.48 m^3/day	0.27 kg/day
5.	Pharmacy	=	0.18 m^3/day	0.12 kg/day
6.	Convenience Store	=	0.27 m^3/day	0.18 kg/day
7.	Medical Centre	=	1.47 m^3/day	0.78 kg/day
8.	Shared Offices	=	1.8 m^3/day	1.2 kg/day
Total		=	225.3 m^3/day	84.65 kg/day
Average Daily Flow		=	3.26 L/s	1.22 g
Peak Daily Flow		=	16.3 L/s	6.1g

The proposed foul outfall pipe is 225mm diameter pipe at 1:100 minimum fall has a capacity = 47 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 1:100) respectively will be used for all other foul pipework within the site.

11.2.4.4 Natural Gas

It is proposed to decommission the existing 4 bar natural gas mains extended into the existing site.

It is also proposed to extend one new metered connection into the site to service the proposed development. The exact connection location for the proposed pressure reducing and meter station will be agreed with Gas Networks Ireland. An application shall be made to GNI to complete the proposed works in due course.

11.2.4.5 ESB

The high voltage line, overhead the south eastern building, will require a diversion and burial underground and the existing substation and feeds will need an application for decommission, removal and strip out. Discussion have begun with the ESB (Alan Brown – ESB Transmission) to determine acceptable diversion routes and burial options of the high Voltage lines. An application for the ESB removal will be applied for imminently.

The proposal is to provide 3no individual substation buildings across the site, 2no residential and 1 no commercial to serve the development. The exact connection locations will be agreed with ESB networks. Each block of apartments will be served from either the east or west substations. ESB meters for each block will be located within the ground floor LV switch room which will serve each apartment distribution boards accordingly. The commercial units will either have their meters located in the adjoining meter room of the substation or within the commercial units.

11.2.4.6 Telecommunications

The existing Eir infrastructure within the site boundary will require decommissioning and removal to facilitate demolition works.

The proposal will be to serve the development by branching off from the main Eir supply running parallel with the site on the Naas road. New roadway / footpath chambers will be used in conjunction with underground ducting intended to distribute throughout the development to provide telecom services to each block of residential units and commercial units. Termination boxes will be provided for each residential unit to Eir standards.

11.2.5 Potential Impact of the Proposed Development

This section contains an assessment of the potential effects of the proposed development on material assets. This is provided with reference to both the Characteristics of the Receiving Environment and Characteristics of the Proposed Development sections. The assessment takes both the construction and operational phases of development into account.

11.2.5.1 Water Supply

11.2.5.1.1 Construction Phase

The following are the potential impacts of the proposed scheme during the construction stage:

- Mobilisation of sediments and harmful substances during the construction phase, due to exposed soil and earth movement/excavation, which may be flushed into the culverted stream during rainfall events;

- 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 surface water system, causing blockages and pollution.

11.2.5.1.2 Operational Phase

There are currently no SUDS measures in place on site. There will be an impact on the surface water in the area due to the new development. However, the surface water system detailed in Chapter 6.0 - Water will ensure the impact from the operational phase on surface water will be minimal and constitute a significant improvement from existing conditions.

There will be a decrease in surface water run-off from the new development due to the SUDS measures proposed. Surface water run-off will also improve in quality due to these measures.

There is very little risk of accidental spillages resulting in water quality issues during the operational stage.

11.2.5.2 Surface Water

11.2.5.2.1 Construction Phase

The following are the potential impacts of the proposed scheme during the construction stage:

- Mobilisation of sediments and harmful substances during the construction phase, due to exposed soil and earth movement/excavation, which may be flushed into the culverted stream during rainfall events;
- 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 surface water system, causing blockages and pollution.

11.2.5.2.2 Operational Phase

There are currently no SUDS measures in place on site. There will be an impact on the surface water in the area due to the new development. However, the surface water system detailed in section **Error! Reference source not found.** will ensure the impact from the operational phase on surface water will be minimal and constitute a significant improvement from existing conditions.

There will be a decrease in the rate of surface water run-off from the new development due to the SUDS measures proposed. Surface water run-off will also improve in quality due to these measures.

There is very little risk of accidental spillages resulting in water quality issues during the operational stage.

11.2.5.3 Foul Water Drainage

The following are the potential impacts of the proposed scheme 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 culverted stream 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.

11.2.5.3.1 Operational Phase

The development will result in an increase in the waste water discharged from the site to the public sewer system.

There exists a minor risk associated with the possibility of leakage from damaged foul sewers and drains within the development site. Any foul water leakage could result in minor contamination of groundwater in the area. The current foul water drainage system that is on site will need to be replaced. Placing a new system on site reduces the overall risk of leakage from damaged sewers.

The basement car park discharges to the foul system via a petrol interceptor to prevent pollution from accidental oil spills.

As discussed previously, the current surrounding foul water system has the capacity for the proposed development. The potential impact from the operational phase of the development is therefore likely to be minimal.

11.2.5.4 Natural Gas

Risks associated with underground trenching for pipework have been highlighted elsewhere in the surface and foul water section, similarly the potential impact from the construction and operational phase of the development is likely to be minimal.

11.2.5.5 ESB

The current surrounding ESB network has the capacity for the proposed load. The potential impact from the operational phase of the development is likely to be minimal.

11.2.5.6 Telecommunications

The current surrounding Eir network has the capacity to cater for the proposed development. The potential impact from the operational phase of the development is likely to be minimal.

11.2.6 Potential Impact of the Proposed Development

11.2.6.1 Introduction

This section contains an assessment of the potential effects of the proposed development on the utilities near the site. This is provided with reference to both the Characteristics of the Receiving Environment and Characteristics of the Proposed Development sections. The assessment takes both the construction and operational phases of development into account.

11.2.6.2 Water Supply

11.2.6.2.1 Construction Phase

During the connection of new mains to existing mains on site there is a small risk that contamination of the existing supply may occur. The potential impact on the local public water supply network would be short term and imperceptible.

11.2.6.2.2 Operational Phase

The new development will have an increase in the water supply demand. The calculations for these figures are set out in summary in section 11.2.4.1 and fully in Chapter 6.0 – Water.

11.2.6.3 Surface Water

11.2.6.3.1 Construction Phase

The following are the potential impacts of the proposed scheme during the construction stage:

- Mobilisation of sediments and harmful substances during the construction phase, due to exposed soil and earth movement/excavation, which may be flushed into the culverted stream during rainfall events;
- 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 surface water system, causing blockages and pollution.

11.2.6.3.2 Operational Phase

There are currently no SUDS measures in place on site. There will be an impact on the surface water in the area due to the new development. However, the surface water system will ensure the impact from the operational phase on surface water will be minimal and constitute a significant improvement from existing conditions.

There will be a decrease in surface water run-off from the new development due to the SUDS measures proposed. Surface water run-off will also improve in quality due to these measures.

There is very little risk of accidental spillages resulting in water quality issues during the operational stage.

11.2.6.4 Foul Water Drainage

11.2.6.4.1 Construction Phase

The following are the potential impacts of the proposed scheme 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 culverted stream 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.

11.2.6.4.2 Operational Phase

The development will result in an increase in the waste water discharged from the site to the public sewer system.

There exists a minor risk associated with the possibility of leakage from damaged foul sewers and drains within the development site. Any foul water leakage could result in minor contamination of groundwater in the area. The current foul water drainage system that is on site will need to be replaced. Placing a new system on site reduces the overall risk of leakage from damaged sewers.

The basement car park discharges to the foul system via a petrol interceptor to prevent pollution from accidental oil spills.

As discussed in Chapter 6.0 – Water, the current surrounding foul water system has the capacity for the proposed development. The potential impact from the operational phase of the development is therefore likely to be minimal.

11.2.6.5 Gas

11.2.6.5.1 Construction Phase

Discussions with GNI have taken place with respect to the proposed development's proximity to the High-Pressure Transmission line routed east to west in the Naas Road and GNI associated wayleave requirements.

The proposed development does not impinge on these requirements, as such the potential impact from the operational phase of the development is likely to be minimal.

11.2.6.5.2 Operational Phase

The current surrounding GNI network has the capacity for the proposed load, as such the potential impact from the operational phase of the development is likely to be minimal.

11.2.6.6 ESB

11.2.6.6.1 Construction Phase

The potential impact from the construction phase of the development is likely to be minimal. Risks associated with underground trenching for ducting have been highlighted elsewhere in the surface and foul water sections.

11.2.6.6.2 Operational Phase

The potential impact from the operational phase of the development is likely to be minimal. Risks associated with underground trenching for ducting have been highlighted elsewhere in the surface and foul water sections.

11.2.6.7 Eir

11.2.6.7.1 Construction Phase

The potential impact from the construction phase of the development is likely to be minimal. Risks associated with underground trenching for ducting have been highlighted elsewhere in the surface and foul water sections.

11.2.6.7.2 Operational Phase

The potential impact from the operational phase of the development is likely to be minimal. Risks associated with underground trenching for ducting have been highlighted elsewhere in the surface and foul water sections.

11.2.7 Potential Cumulative Impacts

11.2.7.1 Surface Water

Given the scale of the proposed development, the best practice design methods adopted and the advice received from the various utility providers confirming capacity accommodate the proposed development, it is not likely to give rise to any significant effects cumulatively or, in combination with, other developments in the area.

11.2.8 'Do Nothing' Impact

11.2.8.1 Surface Water

If the proposed development were not constructed there would be no effect on the existing surface water network and storm water from the lands will continue to be discharged to the sewerage system without attenuation or SUDs measures in place.

11.2.8.2 Foul Water Drainage

If the proposed development were not constructed there would be no effect on the existing foul water network and foul water from the site would continue to be discharged to the existing system.

11.2.8.3 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.

11.2.8.4 Natural Gas

If the proposed development were not to go ahead there would be no diversion or removal of existing GNI infrastructure.

11.2.8.5 ESB

If the proposed development were not to go ahead there would be no diversion or removal of existing ESB infrastructure.

11.2.8.6 Eir

If the proposed development were not to go ahead there would be no diversion or removal of existing Eir infrastructure.

11.2.9 Remedial and Mitigation Measures

Remedial and mitigation measures describe any corrective measures that are either practicable or reasonable, having regard to the potential impacts discussed above. This includes avoidance, reduction and remedy measures as per the guidance set out in Section 4.7 of the Development Management Guidelines 2007 to reduce or eliminate any significant adverse impacts identified.

The Construction Management Plan will incorporate a range of integrated control measures and associated management activities with the objective of mitigating the impact of the proposed developments on-site construction activities.

11.2.9.1 Water Supply

11.2.9.1.1 Construction Phase

11.2.9.1.2 Water Supply Construction Stage Measures to be Implemented:

- Contact the local authority to adhere to the measures required for introducing a new watermain connection.
- Testing of the system may be required.

11.2.9.1.3 Operational Phase

11.2.9.1.4 Water Supply Operational Stage Measures to be Implemented:

- 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.

11.2.9.2 Surface Water

11.2.9.2.1 Construction Phase

The following remedial or reductive measures to mitigate the impact of the construction phase on the existing environment are proposed with reference to the Surface Water:

11.2.9.2.2 Surface Water Construction Stage Measures to be Implemented:

- A method statement for all works to be carried out will be prepared by the contractor and agreed with Dublin City County Council prior to commencement of works to outline what measures are to be taken to ensure there is no loss of service during the works;
- Dewatering measures should only be employed where necessary;
- If concrete mixing is carried out on site, the mixing plant should be sited in a designated area with an impervious surface;
- Existing surface drainage channels within the lands that serve adjacent lands should be retained where possible to prevent causing increased flooding impacts;
- Construction methods used should be tailored to reduce, as much as possible, dust and noise pollution;
- Comprehensive traffic management procedures, including the provision of access to all roads, and access/egress points should be prepared and agreed with the Local Authority. These traffic management measures should be implemented at times when traffic disruption may be experienced;
- Road sweeping and/or wheel wash facilities should be provided, as required;
- All oils/diesel stored on site for construction equipment are to be located in appropriately bunded areas;
- Filters and silt traps will be used to prevent rain washing silts and other materials into the surface water network and creating blockages.

- Adjacent watercourses/groundwater need to be protected from sedimentation and erosion due to direct surface water runoff generated onsite during the construction phase. To prevent this from occurring surface water discharge from the site will be managed and controlled for the duration of the construction works until the permanently attenuated surface water drainage system of the proposed site is complete. A temporary positive drainage system shall be installed prior to the commencement of the construction works to collect surface water runoff from the site during construction. A series of geotextile lined cascading, high level outfall, settling basins will be installed upstream of the agreed discharge point. This temporary surface water management facility will throttle runoff and allow suspended solids to be settled out and removed before being discharged in a control manner to the agreed outfall. Inlet to the cascading settling basins will be riprapped to prevent scour and erosion in the vicinity of the inlet.

11.2.9.2.3 Operational Phase

The following mitigation measures are proposed for the operational phase of the proposed development with reference to the Surface Water:

11.2.9.2.4 Surface Water Operational Stage Measures to be Implemented:

- Water Quality: The green roof for the apartments on the podium and the car park permeable paving will improve the quality of surface water run from the site.

11.2.9.3 Foul Water Drainage

11.2.9.3.1 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 DCC Drainage Division.

The following remedial or reductive measures to mitigate the impact of the construction phase on the existing environment are proposed:-

11.2.9.3.2 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.

11.2.9.3.3 Operational Phase

11.2.9.3.4 Foul Water Drainage Operational Stage Measures to be Implemented:

- Dual & low flush toilets and water economy outlets will be used to reduce flows from the development.

11.2.9.4 Gas

11.2.9.4.1 Construction Phase

Any GNI works are to be undertaken by GNI approved personal only.

11.2.9.4.2 Operational Phase

Any GNI concerns during the operational phase are to be advised immediately to the GNI by contacting there emergency number and adherence accordingly to GNI's advice on dealing with the matter.

11.2.9.5 ESB

11.2.9.5.1 Construction Phase

Any ESB works are to be undertaken by ESB personal only.

11.2.9.5.2 Operational Phase

Any ESB concerns during the operational phase are to be advised immediately to the ESB by contacting their emergency number and adherence accordingly to the ESB's advice on dealing with the matter.

11.2.9.6 Eir

11.2.9.6.1 Construction Phase

Any Eir works are to be undertake by Eir personal only.

11.2.9.6.2 Operational Phase

Eir disruptions during the operational phase should be minimal but any interruptions in the Eir supply should be dealt directly by Eir personal only.

11.2.10 Predicted Impacts of the Proposed Development

11.2.10.1 Water Supply

11.2.10.1.1 Construction Phase

Provided that the proposed remedial or reductive measures are implemented, there will be no appreciable impact of the proposed development during the construction stage on the water supply in the area.

11.2.10.1.2 Operational Phase

The increase in water consumption is a function of the usage of the development.

The installation of water saving devices will further reduce the impact of the re-development on the existing water supply network.

11.2.10.1.3 'Worst-case' scenario

The '*worst case'* scenario would be the pollution of the water supply by an accidental spillage or contamination during the connection process. However, the mitigation measures proposed should ensure that this will not occur. Prior to connection to the public watermain, all watermains in the development will be tested and cleaned to the requirements of Irish Water.

11.2.10.2 Surface Water

11.2.10.2.1 Construction Phase

Provided that the proposed remedial or reductive measures are implemented, the impact of the proposed development during the construction stage will be of a temporary nature and will be minimised.

11.2.10.2.2 Operational Phase

There will be a decrease in surface water run-off from the new development due to the SUDS measures proposed. Surface water run-off will also improve in quality due to these measures.

11.2.10.2.3 'Worst-case' scenario

The worst-case scenario is that flooding occurs on-site and in the surrounding area due to this development. The design of the new drainage system ensures that the pipe sizes, gradients etc. will be more than adequate for the anticipated stormwater flows. The depth, size, gradient of the receiving culverted watercourse means that blockage downstream of the site is not conceived to be a risk.

11.2.10.3 Foul Water Drainage

11.2.10.3.1 Construction Phase

Provided that the proposed remedial or reductive measures are implemented, the impact of the proposed development during the construction stage will be of a temporary nature and will be minimised. There will be a temporary increase in traffic due to the delivery of materials and other construction related traffic.

The contractor's operations will result in the generation of effluent and sanitary waste from facilities provided for the workforce on site.

11.2.10.3.2 Operational Phase

The increase in water consumption and resulting foul water flow is a function of the usage of the development.

11.2.10.3.3 'Worst-case' scenario

A '*worst-case'* scenario resulting from the construction of the development would result in the contamination of groundwater and the local streams by foul effluent from the development. However the mitigation measures outlined will ensure that this should not occur.

11.2.10.4 Gas

11.2.10.4.1 Construction Phase

Any construction damage to GNI installations, contact the GNI emergency number and advice will be given accordingly.

11.2.10.5 ESB

11.2.10.5.1 Construction Phase

Any construction damage or arson to ESB equipment, contact the ESB emergency number and advice will be given accordingly.

11.2.10.5.2 Operational Phase

Any damage or arson to ESB equipment, contact the ESB emergency number and advice will be given accordingly.

11.2.10.6 EIR

11.2.10.6.1 Construction Phase

Any construction damage or arson to Eir equipment, contact Eir and advice will be given accordingly.

11.2.10.6.2 Operational Phase

Any damage or arson to Eir equipment, contact Eir and advice will be given accordingly.

11.2.11 Monitoring

All surface water drainage works will be approved by Dublin City County Council, Drainage Division, and will be carried out in accordance with the GDRCOP (Greater Dublin Regional Code of Practice for Drainage Works). Foul and water works will be carried out in accordance with Irish Water Codes of Practice.

11.2.12 Reinstatement

11.2.12.1 Water Supply

All excavations will be fully reinstated to the requirements of Irish Water.

11.2.12.2 Surface Water

11.2.12.2.1 Construction Phase

Reinstatement at completion of the works will involve:

- The cleaning of the existing sewers in the vicinity of the development as required.
- All excavations will be fully reinstated to the requirements of DCC.
- Leaving the area in a neat and clean condition, removing all deleterious materials that may have been deposited during construction works.

11.2.12.2.2 Operational Phase

Following completion of the development no reinstatement works are envisaged.

11.2.12.3 Foul Water Drainage

11.2.12.3.1 Construction Phase

Reinstatement at completion of the works will involve:

- The cleaning and sterilisation of the existing sewers near the development as required;
- All excavations will be fully reinstated to the requirements of DCC.
- Leaving the area in a neat and clean condition, removing all deleterious materials that may have been deposited during the construction works.

11.2.12.3.2 Operational Phase

No reinstatement works are envisaged upon completion of the development.

11.2.13 Interactions

11.2.13.1 Surface Water

None anticipated.

11.2.13.2 Foul Water Drainage

None anticipated.

11.2.13.3 Water Supply

None anticipated.

11.2.14 Difficulties Encounter in Compiling

11.2.14.1 Surface Water

None.

11.2.14.2 Foul Water Drainage

None.

11.2.14.3 Water Supply

None.

11.2.15 References

- Guidelines on the information to be contained in Environmental Impact Statements (EPA 2002) and Advice Notes on Current Practice in the preparations of Environmental Impact Statements (EPA 2003)
- 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 Statements (EPA 2002) and Advice Notes on Current Practice in the preparations of Environmental Impact Statements (EPA 2003)
- 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 Statements (EPA 2002) and Advice Notes on Current Practice in the preparations of Environmental Impact Statements (EPA 2003).
- Dun Laoghaire Rathdown County Council Water Main Map.

Chapter 12:

MATERIAL ASSETS – WASTE

12.0 MATERIAL ASSETS – WASTE MANAGEMENT

12.1 INTRODUCTION

This chapter of the EIAR comprises an assessment of the likely impact of the proposed development on the waste generated from the development as well as identifying proposed mitigation measures to minimise any impacts.

A site-specific Construction and Demolition Waste Management Plan (C&D WMP) has been prepared by Barrett Mahony Consulting Engineers to deal with waste generation during the construction and demolition phases of the project. The C&D WMP was prepared in accordance with the *'Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects'* document produced by the National Construction and Demolition Waste Council (NCDWC) in conjunction with the Department of the Environment, Heritage and Local Government in July 2006.

A separate Operational Waste Management Plan (OWMP) has also been prepared for the operational phase of the development and is included as Appendix 12.1.

These documents will ensure the sustainable management of wastes arising at the development in accordance with legislative requirements and best practice standards.

12.2 STUDY METHODOLOGY

The assessment of the impacts of the proposed development arising from the consumption of resources and the generation of waste materials, was carried out taking into account the methodology specified in relevant guidance documents, along with an extensive document review to assist in identifying current and future requirements for waste management including national and regional waste policy, waste strategies, management plans, legislative requirements and relevant reports. A summary of the documents reviewed, and the relevant legislation is provided in the C&D WMP and in the OWMP provided as Appendix 12.1.

This Chapter is based on the proposed development, as described in Chapter 2.0 and considers the following aspects:

- Legislative context;
- Demolition phase;
- Construction phase (including site preparation, excavation and levelling); and,
- Operational phase.

A desk study was carried out which included the following:

- Review of applicable policy and legislation which creates the legal framework for resource and waste management in Ireland;
- Description of the typical waste materials that will be generated during the demolition, construction and operational phases; and
- Identification of mitigation measures to prevent waste generation and promote management of waste in accordance with the waste hierarchy.

Estimates of waste generation during the demolition, construction and operational phases of the proposed development have been calculated. The waste types and estimated quantities are based on published data by the EPA in the *National Waste Reports* and *National Waste Statistics*, data recorded from similar previous developments, Irish and US EPA waste generation research, other available research sources and waste collection data from the existing neighbouring development.

Mitigation measures are proposed to minimise the effect of the proposed development on the environment during the construction and operational phases, to promote efficient waste segregation and to reduce the quantity of waste requiring disposal. This information is presented in Section 12.8.

A detailed review of the existing ground conditions on a regional, local and site-specific scale are presented in Chapter 5 Land and Soil. Chapter 5 of the EIAR also discusses the environmental quality of any soils which will have to be excavated to facilitate construction of the proposed development.

12.2.1 Legislation and Guidance

Waste management in Ireland is subject to EU, national and regional waste legislation which defines how waste materials must be managed, transported and treated. The overarching EU legislation is the Waste Framework Directive (2008/98/EC) which is transposed into national legislation in Ireland. The cornerstone of Irish waste legislation is the Waste Management Act 1996 (as amended).

In addition, the Irish government issues policy documents which outline measures aimed to improve waste management practices in Ireland and help the country to achieve EU targets in respect of recycling and disposal of waste. The most recent policy document *A Resource Opportunity – Waste Management Policy in Ireland* was published in 2012 and stresses the environmental and economic benefits of better waste management, particularly in relation to waste prevention.

The strategy for the management of waste from the construction phase is in line with the requirements of the *Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects* published in 2006. The guidance document *Construction and Demolition Waste Management: A handbook for Contractors and Site Managers* was also consulted in the preparation of this assessment.

There are currently no Irish guidelines on the assessment of operational waste generation and guidance is taken from industry guidelines, plans and reports including the EMR Waste Management Plan 2015 – 2021, BS 5906:2005 Waste Management in Buildings – Code of Practice, Dublin City Council (DCC) *Bye-Laws for the Storage, Presentation and Collection of Household and Commercial Waste 2013*, DCC *Dublin City Council (Storage, Presentation and Segregation of Household and Commercial Waste) Bye-Laws 2018,* the EPA National Waste Database Reports 1998 – 2016 and the EPA National Waste Statistics Web Resource

12.3 THE EXISTING RECEIVING ENVIRONMENT (BASELINE SITUATION)

The subject site is1.8 hectares and is located on the southern side of the Naas Road, Dublin 12. The site is brownfield site formerly used as a car sales showroom.

In terms of waste management, the receiving environment is largely defined by Dublin City Council (DCC) as the local authority responsible for setting and administering waste management activities in the area. This is governed by the requirements set out in the Eastern-Midlands Region (EMR) Waste Management Plan 2015 – 2021.

The waste management plan sets the following targets for waste management in the region:

- A 1% reduction per annum in the quantity of household waste generated per capita over the period of the plan;
- Achieve a recycling rate of 50% of managed municipal waste by 2020; and
- Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill (from 2016 onwards) in favour of higher value pre-treatment processes and indigenous recovery practices.

The Regional Plan sets out the strategic targets for waste management in the region and sets a specific target for C&D waste of *"70% preparing for reuse, recycling and other recovery of construction and demolition waste"* (excluding natural soils and stones and hazardous wastes) to be achieved by 2020.
The National Waste Statistics update published by the EPA in October 2018 identifies that Ireland's current progress against this C&D waste target is at 68% and our progress against 'Preparing for reuse and recycling of 50% by weight of household derived paper, metal, plastic & glass (includes metal and plastic estimates from household WEEE)' is at 45%. Both of these targets are required to be met by December 2020 in accordance with the requirements of the Waste Framework Directive.

The Dublin City Development Plan 2016 – 2022 also sets policies and objectives for the DCC area which reflect those set out in the regional waste management plan.

In terms of physical waste infrastructure, DCC no longer operates any municipal waste landfill in the area. There are a number of waste permitted and licensed facilities located in the Eastern-Midlands Waste Region for management of waste from the construction industry as well as municipal sources. These include soil recovery facilities, inert C&D waste facilities, hazardous waste treatment facilities, municipal waste landfills, material recovery facilities, waste transfer stations and two waste-to-energy facilities.

12.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

A Full description of the development can be found in Chapter 2. The characteristics of the development that are relevant in terms of waste management are summarised below.

The proposed development comprises of 492 no. residential units comprising of 104 no. studios, 136 no. 1 beds and 252 no. 2 beds. The proposed development includes the provision of communal residential facilities such as concierge, resident lounge, shared winter gardens, shared work space, meeting rooms, events spaces and external residential courtyards and all associated resident support facilities to accompany the "Build to Rent" development. The development also includes the provision of space for commercial uses comprising of retail, café, restaurant, medical centre, car showroom, and creche. The proposed development also accommodates 200 no. car parking spaces at basement level and 43 no. at surface level, 276 no. cycle parking spaces at basement level and 264 no. cycle spaces at surface level, plant rooms, refuse storage, public open space, landscaping, SUDS drainage, and all associated site development works necessary to facilitate the development.

12.4.1 Demolition Phase

There will be waste materials generated from the demolition of the existing building and hardstanding areas on site, as well as from the excavation of the basement and building foundations. The volume of waste generated from demolition will be more difficult to segregate than waste generated from the construction phase, as many of the building materials will be bonded together or integrated i.e. plasterboard on timber ceiling joists, steel embedded in concrete etc.

Further detail on the waste materials likely to be generated during the demolition works are presented in the project-specific C&D WMP. The C&D WMP provides an estimate of the main waste types likely to be generated during the C&D phase of the proposed development, while AWN has estimated the reuse, recycling/recovery and disposal rates using the EPA *National Waste Reports* and these are summarised in Table 12.1.

Table 12.1 Estimated quantum of C&D waste (Source: C&D WMP prepared by Barret Mahony Consulting Engineers). Estimated Reuse, Recycling/Recovery and disposal by AWN.

Waste Type	Tonnes	Reuse		Recycle/Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Steel and Cladding	7593.0	15	1139.0	80	6074.4	5	379.7
Masonry	2018.4	30	605.5	65	1312.0	5	100.9
Concrete	1427.4	30	428.2	65	927.8	5	71.4
Bitumen	84.0	0	0.0	25	21.0	75	63.0
Total	**9695.4**		**2172.7**		**8335.2**		**615.0**

It should be noted that until a detailed survey of the areas to be demolished is carried out, it is difficult to predict with a high level of accuracy the demolition waste that will be generated from the proposed works.

A site-specific C&D WMP has been prepared by the project engineers (Barret Mahony Consulting Engineers) for the proposed development and is included with the planning submission. The plan will be updated, or a demolition plan will be prepared and submitted prior to commencement of the demolition phase which may refine the demolition waste figures detailed in Table 12.1.

12.4.2 Construction Phase

During the construction phase, waste will be produced from surplus materials such as broken or off-cuts of timber, plasterboard, concrete, tiles, bricks, etc. Waste from packaging (cardboard, plastic, timber) and oversupply of materials may also be generated. The 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.

In addition, stone, gravel, clay and made ground will require excavation for the construction of the basement, building foundations and installation of underground services. The project engineers (Barrett Mahony) have estimated that c. 17,747m^3 of material will require excavation. These estimates will be refined prior to commencement of construction. It is anticipated that there will be no opportunities for reuse of the excavated material on site and so it will require removal from site for offsite reuse, recovery and/or disposal. If the surplus material that requires removal from site is deemed to be a waste, removal and reuse/recycling/recovery/disposal of the material will be carried out in accordance with the *Waste Management Act 1996* (as amended), the *Waste Management (Collection Permit) Regulations 2007* (as amended) and the *Waste Management (Facility Permit & Registration) Regulations 2007* (as amended). The volume of waste requiring recovery/disposal will dictate whether a Certificate of Registration (COR), permit or license is required by the receiving facility.

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.

Waste will also be generated from construction workers e.g. organic/food waste, dry mixed recyclables (waste paper, newspaper, plastic bottles, packaging, aluminium cans, tins and Tetra Pak cartons), mixed non-recyclables and potentially sewage sludge from temporary welfare facilities provided 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.

Further detail on the waste materials likely to be generated during the excavation and construction works are presented in the project-specific C&D WMP. AWN have estimated the main waste types using EPA *National Waste Reports* and the GMIT *research report 146*, along with further research reports. The estimated likely waste to be generated during the construction phase of the proposed development and it's likely reuse, recycle/recovery and disposal rates are summarised in Table 12.2.

Table 12.2 Reuse, Recycle/Recovery and Disposal Rates for Construction Waste

Waste Type	Tonnes	Reuse		Recycle/Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	905.2	10	90.5	80	724.2	10	90.5
Timber	768.1	40	307.2	55	422.4	5	38.4
Plasterboard	274.3	30	82.3	60	164.6	10	27.4
Metals	219.4	5	11.0	90	197.5	5	11.0
Concrete	164.6	30	49.4	65	107.0	5	8.2
Other	411.5	20	82.3	60	246.9	20	82.3
Total	**2743.1**		**622.7**		**1862.6**		**257.9**

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 construction waste that will be generated from the construction of the proposed development as the exact materials and quantities may be subject to some degree of change and variation during the construction process. However, the above estimates are considered to be the worst-case scenario

12.4.3 Operational Phase

As noted in Section 12.1, an OWMP has been prepared for the development and is included as Appendix 12.1. The OWMP provides a strategy for segregation (at source), storage and collection of all wastes generated within the building during the operational phase including dry mixed recyclables, organic waste and mixed non-recyclable waste as well as providing a strategy for management of waste glass, batteries, WEEE, printer/toner cartridges, chemicals, textiles, waste cooking oil and furniture.

The total estimated waste generation for the development for the main waste types is presented in Table 12.3 & 12.4 below and is based on the uses and areas as advised by the project architects (Reddy Architecture) April 2019.

Table 12.3 Estimated waste generation for the proposed development for the main waste types

Waste type	Waste Volume (m^3/week)		
	Residential (Combined)	Retail/Café/ Restaurant Units (Combined)	Crèche Unit
Organic Waste	7.02	0.77	0.03
DMR	51.44	7.34	1.37
Glass	1.36	0.30	0.01
MNR	28.51	4.32	0.61
Total	**88.32**	**12.73**	**2.02**

Table 12.4 Estimated waste generation for the proposed development for the main waste types

Waste type	Waste Volume (m^3/week)	
	Offices (Combined)	Medical Unit
Organic Waste	0.04	0.06
Paper (Confidential)	0.71	0.53
Healthcare Risk Waste	-	0.15
DMR	1.63	1.29
Glass	0.01	0.01
MNR	0.88	0.56
Total	**3.31**	**2.59**

The BS5906:2005 Waste Management in Buildings – Code of Practice was considered in the estimations of the waste arising. It has been assumed that the retail, café, restaurant, and residential units will generate similar waste volumes over a seven-day period, while the office, medical and crèche units will operate over a five-day period. It is anticipated that the conservative estimation of waste quantities from the residents will be sufficient to cover the small quantities likely to be generated in the community facilities on a weekly basis.

AWN's modelling methodology is based on data from recent published data and data from numerous other similar developments in Ireland and based on AWN's experience it is a more representative estimate of the likely waste arisings from the development.

Residential waste will be conveyed by occupants to one of two dedicated communal Waste Storage Areas (WSAs) on basement level. The bins of segregated waste/recyclables will be conveyed by the facilities management or the waste contractor via the internal roads and ramps to the temporary waste collection area, located to the south of the carpark entrance for collection/emptying by the nominated waste contractor(s). Once emptied, bins should be promptly returned to the WSAs.

Commercial tenants waste will be conveyed by the tenants to one of the three designated WSAs on ground floor level. Bins will be conveyed from the WSAs by facilities management or the waste contractor via the internal roads and ramps to the temporary waste collection area, located to the south of the carpark entrance for collection/emptying by the nominated waste contractor(s). Once emptied, bins should be promptly returned to the WSAs.

The designated collection point located to the south of the carpark entrance will be readily accessible by the waste contractor during the designated collection days/times. Both the waste collection point and the WSAs can be viewed on the drawings submitted with the planning application.

The OWMP seeks to ensure the development contributes to the targets outlined in the EMR Waste Management Plan 2015 – 2021, the DCC Bye-Laws for the Storage, Presentation and Collection of Household and Commercial Waste and the DCC Dublin City Council (Storage, Presentation and Segregation of Household and Commercial Waste) Bye-Laws.
Mitigation measures proposed to manage impacts arising from wastes generated during the operation of the proposed development are summarised below

12.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

This section details the potential waste effects associated with the proposed development.

12.5.1 Construction Phase

The proposed development will generate a range of non-hazardous and hazardous waste materials during demolition, excavation and construction. General housekeeping and packaging will also generate waste materials as well as typical municipal wastes generated by construction employees including food waste.

Waste materials will be required to be temporarily stored on site pending collection by a waste contractor. Dedicated areas for waste skips and bins will be identified across the site. These areas will need to be easily accessible to waste collection vehicles.

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.

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. 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.

Wastes arising will need to be taken to suitably registered/permitted/licenced waste facilities for processing and segregation, reuse, recycling, recovery and/or disposal as appropriate. There are numerous licensed waste facilities in the Eastern Midlands region which can accept hazardous and non-hazardous waste materials and acceptance of waste from the proposed development would be in line with daily activities at these facilities. At present, there is sufficient capacity for the acceptance of the likely C&D waste arisings at facilities in the region. Where possible, waste will be segregated into reusable, recyclable and recoverable materials. The majority of demolition and construction materials are either recyclable or recoverable.

Recovery and recycling of C&D waste has a positive impact on sustainable resource consumption, for example where waste timber is mulched into a landscaping product or waste asphalt is recycled for use in new pavements. The use of recycled materials, where suitable, reduces the consumption of natural resources.

There is a quantity of soil and stone which will need to be excavated to facilitate the proposed development. It is anticipated that there will be limited or no opportunities for reuse of the excavated material on site and so it will require removal from site for offsite reuse, recovery and/or disposal. Correct classification and segregation of the excavated material is required to ensure that any potentially contaminated materials are identified and handled in a way that will not impact negatively on workers as well as on water and soil environments, both on and off-site.

The potential effect of construction waste generated from the proposed development is considered to be ***short-term, not significant*** *and* ***neutral.***

12.5.2 Operational Phase

The potential impacts on the environment of improper, or a lack of, waste management during the operational phase would be a diversion from the priorities of the waste hierarchy which would lead to small volumes of waste being sent unnecessarily to landfill.

The nature of the development means the generation of waste materials during the operational phase is unavoidable. Networks of waste collection, treatment, recovery and disposal infrastructure are in place in the region to manage waste efficiently from this type of development. Waste which is not suitable for

recycling is typically sent for energy recovery. There are also facilities in the region for segregation of municipal recyclables which is typically exported for conversion in recycled products (e.g. paper mills and glass recycling).

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

Waste contractors will be required to service the development on a regular basis to remove waste. The use of non-permitted waste contractors or unauthorised facilities could give rise to inappropriate management of waste and result in negative environmental impacts or pollution. It is essential that all waste materials are dealt with in accordance with regional and national legislation, as outlined previously, and that time and resources are dedicated to ensuring efficient waste management practices.

The potential impact of operational waste generation from the development is considered to be **long-term, not significant** and **negative.**

12.6 POTENTIAL CUMULATIVE IMPACTS

Multiple permission remain in place for both residential and commercial developments within the local area. In a worst-case scenario, multiple developments in the area could be developed concurrently or overlap in the construction phase. Due to the high number of waste contractors in the Dublin region there would be sufficient contractors available to handle waste generated from a large number of these sites simultaneously, if required. Similar waste materials would be generated by all the developments.

There is a mix of existing residential and commercial developments, both neighbouring and in close proximity, these developments will generate similar waste types during their operational phases. Authorised waste contractors will be required to collect waste materials segregated, at a minimum, into recyclables, organic waste and non-recyclables. An increased density of development in the area is likely improve the efficiencies of waste collections in the area.

Other developments in the area will be required to manage waste in compliance with national and local legislation, policies and plans which will minimise/mitigate any potential cumulative impacts associated with waste generation and waste management. As such the effect will be a ***long-term*****,** ***imperceptible*** and ***neutral***.

12.7 'DO NOTHING' IMPACT

If the proposed development was not to go ahead there would be no demolition, excavation or construction or operational waste generated at this site. There will would be a neutral effect on the environment.

12.8 AVOIDANCE, REMEDIAL & MITIGATION MEASURES

This section outlines the measures that will be employed in order to reduce the amount of waste produced, manage the wastes generated responsibly and handle the waste in such a manner as to minimise the effects on the environment.

12.8.1 Construction Phase

As previously stated, a project specific C&D WMP has been prepared in line with the requirements of the guidance document issued by the DoEHLG and is included with the application. Adherence to the high-level strategy presented in this C&D WMP will ensure effective waste management and minimisation, reuse, recycling, recovery and disposal of waste material generated during the demolition, excavation and construction phases of the proposed development. Prior to commencement of demolition, the contractor(s) will be required to refine/update the C&D WMP or submit an addendum to C&D WMP to

DCC to detail specific measures to minimise waste generation and resource consumption and provide details of the proposed waste contractors and destinations of each waste stream.

The project engineers have estimated that c. 17,747m^3 of material will be generated from the excavations required to facilitate the construction of the basement, building foundations and the installation of underground services. It is anticipated that this material will require removal from site for offsite reuse, recovery, recycling and/or disposal. The contractor(s) will endeavor to ensure that material is reused or recovered off-site insofar as is reasonably practicable or disposed of at authorized facility.

In addition, the following mitigation measures will be implemented:

- Building materials will be chosen with an aim to 'design out waste';
- On-site segregation of waste materials will be carried out to increase opportunities for off-site reuse, recycling and recovery – it is anticipated that the following waste types, at a minimum, will be segregated:
    - Concrete rubble (including ceramics, tiles and bricks);
    - Plasterboard;
    - Metals;
    - Glass; and
    - Timber.
- Left over materials (e.g. timber off-cuts, broken concrete blocks/bricks) and any suitable construction materials shall be re-used on-site, where possible;
- All waste materials will be stored in skips or other suitable receptacles in designated areas of the site;
- Any hazardous wastes generated (such as chemicals, solvents, glues, fuels, oils) will also be segregated and will be stored in appropriate receptacles (in suitably bunded areas, where required);
- A waste manager will be appointed by the main contractor(s) to ensure effective management of waste during the excavation and construction works;
- All construction staff will be provided with training regarding the waste management procedures;
- All waste leaving site will be reused, recycled or recovered where possible to avoid material designated for disposal;
- All waste leaving the site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licensed facilities; and
- All waste leaving the site will be recorded and copies of relevant documentation maintained.

Nearby sites requiring clean fill material will be contacted to investigate reuse opportunities for clean and inert material, if required. If any of the material is to be reused on another site as by-product (and not as a waste), this will be done in accordance with Article 27 of the *EC (Waste Directive) Regulations (2011)*. EPA approval will be obtained prior to moving material as a by-product. However, it is not currently anticipated that article 27 will be used.

These mitigation measures will ensure that the waste arising from the construction phase of the development is dealt with in compliance with the provisions of the Waste Management Act 1996, as amended, associated Regulations, the Litter Pollution Act 1997, the EMR Waste Management Plan (2015 - 2021) and the and the DCC Bye-Laws for the Storage, Presentation and Collection of Household and Commercial Waste and the DCC waste and draft waste bye-laws. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved and will encourage sustainable consumption of resources

12.8.2 Operational Phase

As previously stated, a project specific OWMP has been prepared and is included as Appendix 12.1. Implementation of this OWMP will ensure a high level of recycling, reuse and recovery at the development. All recyclable materials will be segregated at source to reduce waste contractor costs and

ensure maximum diversion of materials from landfill, thus achieving the targets set out in the EMR Waste Management Plan 2015 – 2021 and the DCC waste and draft waste bye-laws.

In addition, the following mitigation measures will be implemented:

- On-site segregation of all waste materials into appropriate categories including (but not limited to):
  - Organic waste;
  - Dry Mixed Recyclables;
  - Mixed Non-Recyclable Waste;
  - Glass;
  - Waste electrical and electronic equipment (WEEE);
  - Batteries (non-hazardous and hazardous);
  - Cooking oil;
  - Light bulbs;
  - Cleaning chemicals (pesticides, paints, adhesives, resins, detergents, etc.);
  - Furniture (and from time to time other bulky waste); and
  - Abandoned bicycles.
- All waste materials will be stored in colour coded bins or other suitable receptacles in designated, easily accessible locations. Bins will be clearly identified with the approved waste type to ensure there is no cross contamination of waste materials;
- All waste collected from the development will be reused, recycled or recovered where possible, with the exception of those waste streams where appropriate facilities are currently not available; and
- All waste leaving the site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licensed facilities.

These mitigation measures will ensure the waste arising from the development is dealt with in compliance with the provisions of the *Waste Management Act 1996*, as amended, associated Regulations, the *Litter Pollution Act 1997*, the *EMR Waste Management Plan (2015 - 2021)* and the DCC waste and draft waste bye-laws. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved

12.9 PREDICTED IMPACTS OF THE PROPOSED DEVELOPMENT

The implementation of the mitigation measures outlined in Section 12.8 will ensure that a high rate of reuse, recovery and recycling is achieved at the development during the demolition, excavation and construction phases as well as during the operational phase. It will also ensure that European, National and Regional legislative waste requirements with regard to waste are met and that associated targets for the management of waste are achieved

12.10 MONITORING

The management of waste during the construction phase should be monitored to ensure compliance with relevant local authority requirements, and effective implementation of the C&D WMP including maintenance of waste documentation.

The management of waste during the operational phase should be monitored to ensure effective implementation of the OWMP by the building management company and the nominated waste.

12.10.1 Construction Phase

The objective of setting targets for waste management is only achieved if the actual waste generation volumes are calculated and compared. This is particularly important during the demolition, excavation and

construction phases where there is a potential for waste management to become secondary to progress and meeting construction schedule targets. The C&D WMP specifies the need for a waste manager to be appointed who will have responsibility to monitor the actual waste volumes being generated and to ensure that contractors and sub-contractors are segregating waste as required. Where targets are not being met, the waste manager should identify the reasons for targets not being achieved and work to resolve any issues. Recording of waste generation during the project will enable better management of waste contractor requirements and identify trends. The data should be maintained to advise on future projects.

12.10.2 Operational Phase

During the operational phase, waste generation volumes should be monitored against the predicted waste volumes outlined in the OWMP. There may be opportunities to reduce the number of bins and equipment required in the WSAs where estimates have been too conservative. Reductions in bin and equipment requirements will improve efficiency and reduce waste contractor costs.

Waste legislation should also be consulted on a regular basis in case of any changes which may impact on waste management procedures

12.11 INTERACTIONS

Adherence to the mitigation measures outlined in Section 12.8.1 and 12.8.2 will ensure that there are no significant impacts on resource or waste management from the proposed development. The management of waste during the construction phase in accordance with the C&D WMP and during the operational phase in accordance with the OWMP will meet the requirements of regional and national waste legislation and promote the management of waste in line with the priorities of the waste hierarchy.

12.11.1 Land and Soils

During the construction phase excavated soil and stone (c. 17,747m^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 all excavated material will be taken offsite it will be taken for reuse or recovery, where practical, with disposal as last resort. Adherence to the mitigation measures in Chapter 12 and the requirements of the C&D Waste Management Plan will ensure the effect is ***long-term, imperceptible*** and ***neutral.***

12.11.2 Traffic and Transportation

Local traffic and transportation will be impacted by the additional vehicle movements generated by removal of waste from the site during the construction and operational phases of the development. The increase in vehicle movements as a result of waste generated during the construction phase will be temporary in duration. There will be an increase in vehicle movements in the area as a result of waste collections during the operational phase but these movement will be imperceptible in the context of the overall traffic and transportation increase and has been addressed in Chapter 11 Material Assets – Traffic. Provided the mitigation measures detailed in Chapter 12 and 11 and the requirements of the OWMP (included as Appendix 12.1) are adhered to, the effects should be **short** to ***long-term, imperceptible*** and **neutral.**

12.11.3 Population and Human Health

The potential impacts on human beings in relation to the generation of waste during the construction and operational phases are that incorrect management of waste could result in littering which could cause a nuisance to the public and attract vermin. A carefully planned approach to waste management and adherence to the project specific C&DWMP and OWMP, will ensure appropriate management of waste

and avoid any negative impacts on the local population. The effects will be ***long-term, imperceptible*** and ***neutral***

12.12 DIFFICULTIES ENCOUNTERED IN COMPILING

There were no difficulties encountered during the production of this chapter of the EIAR.

12.13 REFERENCES

- Waste Management Act 1996 (No. 10 of 1996) as amended. Sub-ordinate and associated legislation include:
  - European Communities (Waste Directive) Regulations 2011 (S.I. No. 126 of 2011) as amended.
  - Waste Management (Collection Permit) Regulations 2007 (S.I. No. 820 of 2007) as amended.
  - Waste Management (Facility Permit and Registration) Regulations 2007 (S.I No. 821 of 2007) as amended.
  - Waste Management (Licensing) Regulations 2000 (S.I No. 185 of 2000) as amended.
  - European Union (Packaging) Regulations 2014 (S.I. No. 282 of 2014) as amended.
  - Waste Management (Planning) Regulations 1997 (S.I. No. 137 of 1997) as amended.
  - Waste Management (Landfill Levy) Regulations 2015 (S.I. No. 189 of 2015)
  - European Union (Waste Electrical and Electronic Equipment) Regulations 2014 (S.I. No. 149 of 2014)
  - European Union (Batteries and Accumulators) Regulations 2014 (S.I. No. 283 of 2014) as amended.
  - Waste Management (Food Waste) Regulations 2009 (S.I. No. 508 of 2009) as amended.
  - European Union (Household Food Waste and Bio-waste) Regulations 2015 (S.I. No. 191 of 2015)
  - Waste Management (Hazardous Waste) Regulations 1998 (S.I. No. 163 of 1998) as amended.
  - Waste Management (Shipments of Waste) Regulations 2007 (S.I. No. 419 of 2007) as amended.
  - The European Communities (Transfrontier Shipment of Hazardous Waste) Regulations 1988 (S.I. No. 248 of 1988)
  - European Communities (Shipments of Hazardous Waste exclusively within Ireland) Regulations 2011 (S.I. No. 324 of 2011)
  - European Union (Properties of Waste which Render it Hazardous) Regulations 2015 (S.I. No. 233 of 2015)
- Protection of the Environment Act 2003, (No. 27 of 2003) as amended.
- Litter Pollution Act 1997 (S.I. No. 12 of 1997) as amended
- Eastern-Midlands Region Waste Management Plan 2015 – 2021 (2015).
- Department of Environment and Local Government (DoELG) *Waste Management – Changing Our Ways, A Policy Statement* (1998).
- Forum for the Construction Industry – *Recycling of Construction and Demolition Waste.*
- Department of Environment, Communities and Local Government (DoECLG), *A Resource Opportunity - Waste Management Policy in Ireland* (2012).
- Department of Environment, Heritage and Local Government, *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects* (2006).
- FÁS and the Construction Industry Federation (CIF), *Construction and Demolition Waste Management – a handbook for Contractors and Site Managers* (2002).
- Dublin City Council (DCC)*, Dublin City Develoment plan 2016-2022 (2015)*
- Planning and Development Act 2000 (S.I. No. 30 of 2000) as amended

- EPA, *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* (2015)
- Council Decision 2003/33/EC, establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC.
- Environmental Protection Agency (EPA), *National Waste Database Reports 1998 – 2012*.
- EPA and Galway-Mayo Institute of Technology (GMIT), *EPA Research Report 146 – A Review of Design and Construction Waste Management Practices in Selected Case Studies – Lessons Learned* (2015).
- BS 5906:2005 Waste Management in Buildings – Code of Practice.
- DoEHLG, Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities (2018).
- Dublin City Council (DCC) *Bye-Laws for the Storage, Presentation and Collection of Household and Commercial Waste (2013)*
  DCC Draft *Dublin City Council (Storage, Presentation and Segregation of Household and Commercial Waste) Bye-Laws (2018*).

Chapter 13:

Interactions Between Environmental Factors

13.0 INTERACTIONS BETWEEN ENVIRONMENTAL FACTORS

13.1 INTRODUCTION

All environmental factors are interlinked to a degree such that interrelationships exist on numerous levels. Interactions within the study area can be one-way interactions, two-way interactions and multiple-phase interactions which can be influenced by the proposed development. As this EIAR document has been prepared by a number of specialist consultants an important aspect of the EIA process is to ensure that interactions between the various disciplines have been taken into consideration. This chapter of the EIAR was prepared by Stephanie Byrne , BA, MRUP, MIPI, Associate Director with John Spain Associates.

The purpose of this requirement of an EIAR is to draw attention to significant interaction and interrelationships in the existing environment. ***John Spain Associates, Planning & Development Consultants*****,** in preparing and co-ordinating this EIAR ensured that each of the specialist consultants liaised with each other on an ongoing and regular basis and dealt with the likely interactions between effects predicted as a result of the proposed development during the preparation of the proposals for the proposed development and ensuring that appropriate mitigation measures are incorporated into the design process.

Having regard to the above, JSA required from the outset that 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.

The primary interactions can be summarised as follows:

- Architectural design, landscape design, and road and services design with visual impact and material assets;
- Landscape design and engineering services with biodiversity and archaeology;
- Stormwater attenuation design with biodiversity and land and soils ;
- Visual impact with biodiversity and architectural heritage and archaeology;
- Biodiversity with water and soils;
- Architectural and landscape design with noise;
- Noise and vibration and population and human health;
- Air quality and climate and Population and Human Health;
- Material Assets with Population and Human Health, Water, Noise and Vibration, Air Quality and Climate

The relevant consultants liaised with each other and the project architects, engineers and landscape architects where necessary to review the proposed scheme and incorporate suitable mitigation measures where necessary. As demonstrated throughout this EIAR, most inter-relationships are neutral in impact when the mitigation measures proposed are incorporated into the design, construction or operation of the proposed development.

In addition to the above a series of standalone reports have been prepared to accompany the application and which have helped inform the final scheme design and the relevant chapters of the EIAR. Barrett Mahony Consulting Engineers have prepared a Traffic and Transport Assessment Report. BM Consulting Engineers have prepared a Site Specific Flood Risk Assessment for the site. BM Consulting Engineers have undertaken site investigations and

soil testing, which have informed the stormwater drainage proposals and design. AWN Consulting and BM Consulting Engineers have produced a Construction and Operational Waste Management Plan. In addition, Openfield has prepared an Appropriate Assessment Screening Report which concludes that the scheme will not have any likely significant impact either alone or in combination with other plans of projects on any European Site.

Table 13.1 – Summary of Interactions

Interaction	Population & Human Health		Biodiversity		Land & Soils		Air & Climate		Noise & Vibration		Water		Archaeology, Architecture & Cultural Heritage		Landscape and Visual Impact		Material Assets: Traffic, Waste, & Utilities	
	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																		

✓ Interaction
✖ No Interaction

Chapter 14:

Risk Management

14.0 RISK MANAGEMENT

14.1 INTRODUCTION

The 2014 EIA Directive (2014/52/EU) has updated the list of topics to be addressed in an EIAR and has included 'Risk Management' as a new chapter to be addressed. Article 3 of the new 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".

The chapter identifies and assesses the likelihood and potential significant 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. This chapter of the EIAR was prepared by Mary Mac Mahon, Executive Director at John Spain Associates, Planning & Development Consultants. This chapter was also reviewed by the project engineers, John Considine of Barrett Mahony, who prepared the Construction Management Plan and AWN Consulting who prepared the Land Use Planning Report.

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 will identify the types 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 the likely adverse impact of such events on the environment.

14.2 STUDY METHODOLOGY

The starting point for the scope and methodology of this assessment is that the proposed development has been designed and 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 was carried out. Measures to control risks associated with Construction Phase activities are incorporated into the Construction Environmental Management Plan.

The following sections set out the requirements as stated in the new EIA Directive and in the EPA draft Guidelines on the information to be contained in an Environmental Impact Assessment Report (EIAR). The scope and methodology presented is based on the new EIA Directive, the draft EPA guidelines, on other published risk assessment 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 an urban regeneration project which when completed, will not give rise to ongoing significant risks in its operating environment.

The *2017 EPA Draft Guidelines* on the information to be contained in an EIAR refer to major accidents and/or disasters in a number of sections:

Characteristics of the Project – the draft guidelines state that the project characteristics should "a description of the Risk of Accidents – having regard to substances or technologies used."

Impact assessment - the draft 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 draft 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 a number of mechanisms which currently manage accidents outside of the EIA process. These would include through the Construction Management Plan, which would deal with pollution risks during construction (See Chapters 7 and 9 on Land, Soils, Air and Water) and risk of accidents during construction, including traffic accidents. The risk of flooding is dealt with in Chapter 8; Water. There is no risk of flooding. 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.

14.3 SITE SPECIFIC 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 risk, taken from the Guide to Risk Assessment in Major Emergency Management (Department of the Environment, Heritage & Local Government, 2010).

Figure 14.1 Classification of Likelihood Extract (Department of the Environment, Heritage & Local Government, 2010).

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.

Hazard identification

The site is not in an area prone to natural disasters. Risks were reviewed through the identification of plausible risks in consultation with relevant specialists. Therefore the risks set out below are considered the most relevant potential risks.

Table 14.1 : Identification of Risks

Category	Risk Factor Type	Likelihood
Weather	Storms, snow	5
Hydrological	Risk from flooding	1
Geological	Made ground	3
Road	Traffic accident	3
Industrial accident	Seveso site	3
Explosion	Natural gas	1
Fire	Construction and operation	3
Building Collapse	Structural failure	2
Hazardous substance escape	Construction	3
Pollution	Construction	3

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, Dublin City Council have in place a 'Major Emergency Plan' which, if implemented as intended, will work to reduce the effect 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.

Figure 14.2 Risk Matrix Extract (Department of the Environment, Heritage & Local Government, 2010).

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				

14.4 THE PROPOSED DEVELOPMENT

14.4.1 LIKELY SIGNIFICANT EFFECTS

14.4.1.1 Do Nothing Scenario

In the do-nothing scenario, the potential risk of the proposed development would be low due to the existing buildings on the site and the vacant nature of these buildings.

14.4.1.2 CONSTRUCTION PHASE

The proposed development will involve the excavation of a basement, traffic management, scaffolding.

Hazardous materials used during construction will be appropriately stored so as not to give rise to a risk of pollution.

In the event of storms or snow, construction activity can be halted and the site secured. The construction activity will involve a number of potential risks as set out in the construction management plan. The risks identified include traffic management, working at height, and fire strategy.

14.4.2 OPERATION PHASE

The proposed development is a mixed use development. The residential component shall be a "Build to Rent" scheme of 492 no. residential units with associated resident support facilities and resident services and amenities and 3,347 sq.m. of other uses including shop, car show room, creche, café/ restaurant , co -working space, medical centre.

The main risk identified during operation is the risk of fire, and the potential impact of the SEVESO sites nearby.

With regard to fire 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.

The fire risk mitigation for the project will comprise all fire safety measures necessary to comply with the requirements of Part B (Fire) of the Second Schedule to the Building Regulations 1997-2017. It is noted that these measures will be validated under the Building Control Act 1990-2007 through the obtaining, in due course, of statutory Fire Safety Certificates under Part III of the Building Control Regulations 1997-2018 from Dublin City Council/Dublin Fire Brigade.

The risk of the SEVESO sites in the vicinity have also been assessed as part of this application. The Land Use Planning Report prepared by AWN notes that the proposed development is located outside of any zone of influence airing from the SEVESO sites. However the risk to human being has been assessed with regard to the location of the site in proximity to SEVESO sites.

The cleaning of windows in the buildings will be undertaken by specialist contractor. Window cleaning infrastructure has been designed into the scheme.

A risk arises from the provision of communal roof gardens. There is the potential for falls. The parapet height has been designed to ensure that all users of this space are safely secured. Signage will be provided to warn residents and their visitors.

14.5 PREDICTED IMPACTS - RISK OF MAJOR ACCIDENTS AND/OR DISASTERS

A Risk Register has been developed which contains the main risks identified with the construction and operation of the Proposed Project. These have been identified as follows:

Table 14.2 Risk Impacts

Risk No.	Risk Event	Possible Cause
1	Accidents during construction	- Traffic accident - Working at height - Risk of fire - Groundwater pollution
2	Fire following occupation	- Inappropriate use of electrical devices / cooking etc.
3	Falls	- Falling from communal gardens - Window cleaning
4	SEVESO Sites	- Major Accident Hazard

14.6 RISK ANALYSIS

Following identification of risks, the next stage is to analyse how likely this is to occur and the consequences, should the risk arise. This will provide a risk score, i.e. the consequences versus the likelihood of the event taking place.

Table 14.3: Risk Analysis

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score
1a	Accidents during construction	Movement of vehicles	Injury or loss of life	3	Construction accident statistics	3	Could result in loss of life	9
1b		Manual handling	Injury or loss of life	3	Construction accident statistics	3	Could result in loss of life	9
1c		Slips or falls	Injury or loss of life	3	Construction accident statistics	3	Could result in loss of life	9
1d		Ground water pollution	Impact on aquatic life, illness	1	Lack of direct pathways, controls of run-off during construction	3	Could result in environmental pollution	3
2	Fire following occupation	Electrical equipment / cooking	Injury or loss of life	1	Causes of fire statistics	3	Could result in loss of life	3
3	Falls	Loss of balance	Injury or loss of life	1	CSO statistics	3	Could result in loss of life	3
4	SEVESO Sites	Major Accident	Injury or loss of life	1	AWN Land Use Planning Report	2	Could result in loss of life	2

14.7 RISK EVALUATION

Taking the above table, and applying it below, the red zone represents 'high risk' scenarios', the amber zone represents 'medium risk scenarios' and the green zone represents 'low risk scenarios.'

Table 14.4 : Risk Evaluation

Likelihood Rating							
	Very Likely	5					
	Likely	4					
	Unlikely	3			1a – 9, 1b – 9 1c – 9, 1d - 3		
	Very Unlikely	2				3 - 3	
	Extremely Unlikely	1		4-2		2 - 3	
			Minor	Limited	Serious	Very Serious	Catastrophic
			1	2	3	4	5
			Consequence Rating				

14.8 MAIN RISKS

The man risks arise during the construction period. Consequences may be limited but severe for the individuals concerned. Geographical widespread environmental consequences are not anticipated, however due to the location of the site, the potential risk from the SEVESO site is unlikely however could potentially result i

14.9 MITIGATION MEASURES

The Construction Management Plan as well as good housekeeping practices will limit the risk of accidents during construction.

14.10 INTERACTIONS

There are interactions with Population and Human Health, Land, Soils, Geology and Hydrogeology, Surface Water, Noise, Climate and Air, Material Assets, Traffic and Transport, Landscape and Visual, and Cultural Heritage.

14.11 CONCLUSION

Through the implementation of mitigation measures, there are no identified incidents or examples of major accidents and or natural disasters that present a sufficient combination of risk and consequence that would lead to significant residual impacts or environmental effects.

References:

ARUP: *Luas Cross City EIAR Risk of Major Accident And Or Disaster*, 2017

DD *A National Risk Assessment for Ireland* 2017

DHPLG: Causes of Fire Attended by Brigades 2015

DHPLG: *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment* 2018

DOELG: *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: *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* 2017

EPA: *Guidance on Assessing and Costing Environmental Liabilities* 2014

Irish Water Safety: Analysis of Drowning 2014

Jacobs Tobin *Greater Dublin Drainage Project for Irish Water* 2018

https://www.hsa.ie/eng/Topics/Statistics/Infographics/2013_Injury_Fatality_Statistics_Infographic.gif

Chapter 15:

Summary of EIA Mitigation and Monitoring Measures

15.0 SUMMARY OF EIA MITIGATION & MONITORING MEASURES

15.1 INTRODUCTION

The central purpose of EIA is to identify potentially significant adverse impacts at the pre-consent stage and to propose measures to mitigate or ameliorate such impacts. This chapter of the EIAR document has been prepared by *John Spain Associates* and sets out a summary of the range of methods described within the individual chapters of this EIAR document which are proposed as mitigation and for monitoring during the construction and operational phases of the proposed development. It is intended that this chapter of the EIAR document will provide a useful and convenient summary to the competent/consent authority of the range of mitigation and monitoring measures proposed.

EIA related conditions are normally imposed by the competent/consent authority as part of conditions of planning consent and form a key part of the Impact Anticipation and Avoidance strategy. Conditions are principally used to ensure that undertakings to mitigate are secured by explicitly stating the location, quality, character, duration and timing of the measures to be implemented. A secondary role of EIA related conditions is to ensure that resources e.g. bonds / insurances will be available and properly directed for mitigation, monitoring or remedial action, in the event that the impacts exceed the predicted levels.

Monitoring of the effectiveness of mitigation measures put forward in the EIAR document, both by the competent authorities and the developer, is also an integral part of the process. Monitoring of environmental media and indicators arise either from undertakings or from conditions.

In the case of mitigation and monitoring measures it is important for all parties to be aware of the administrative, technical, legal and financial burdens that can accompany the measures proposed. It is also important to ensure that, where monitoring is provided for, it is clearly related to thresholds, which if exceeded cause a clearly defined set of actions to be implemented.

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

“While not a mandatory requirement an EIAR can very usefully include a summary table of features and/or measures envisaged to avoid, prevent or reduce and, if possible, offset likely significant adverse effects of the proposed development, and a timescale for the implementation of proposed mitigation measures.”

Given the complexity of the scheme in question, and the detail provided within this EIAR, this chapter seeks to provide a complete overview of mitigation and monitoring measures proposed, in the spirit of the above statement within the EIA Guidelines albeit not formatted as a table.

15.2 MITIGATION STRATEGIES

15.2.1 Introduction

There are three established strategies for impact mitigation - avoidance, reduction and remedy. The efficacy of each is directly dependent on the stage in the design process at which environmental considerations are taken into account (i.e. impact avoidance can only be considered at the earliest stage, while remedy may be the only option available to fully designed projects).

15.2.2 Mitigation by Avoidance

Avoidance is generally the fastest, cheapest and most effective form of impact mitigation. Environmental effects and consideration of alternatives have been taken into account at the earliest stage in the project design processes. The consideration of alternatives with respect to the development of the subject lands has been described in Chapter 2.

15.2.3 Mitigation by Reduction

This is a common strategy for dealing with effects which cannot be avoided. It concentrates on the emissions and effects and seeks to limit the exposure of the receptor. It is generally regarded as the "*end of pipe*" approach because it does not seek to affect the source of the problems (as do avoidance strategies above). As such this is regarded as a less sustainable, though still effective, approach.

15.2.4 Reducing the Effect

This strategy seeks to intercept emissions, effects and wastes before they enter the environment. It monitors and controls them so that acceptable standards are not exceeded. Examples include wastewater treatment, filtration of air emissions and noise attenuation measures.

15.2.5 Reducing Exposure to the Impact

This strategy is used for impacts which occur over an extensive and undefined area. Such impacts may include noise, visual impacts or exposure to hazard. The mitigation is effected by installing barriers between the location(s) of likely receptors and source of the impact (e.g. sound barriers, tree screens or security fences).

15.2.6 Mitigation by Remedy

This is a strategy used for dealing with residual impacts which cannot be prevented from entering the environment and causing adverse effects. Remedy serves to improve adverse conditions which exist by carrying out further works which seek to restore the environment to an approximation of its previous condition or a new equilibrium.

15.3 MITIGATION AND MONITORING MEASURES

The following provides a list, for ease of reference, of the mitigation and monitoring measures recommended in each chapter of the EIAR.

15.3.1 Project Description & Alternatives Examined

Construction Phase

PD&AE CONST 1: It will be necessary for the appointed contractor to prepare and implement a construction management plan (including traffic management) to reduce the impacts of the construction phase on local residents and ensure the local road network is not adversely affected during the course of the construction project.

PD&AE CONST 2: The appointed contractor should prepare a Construction and Operational Waste Management Plan for the proposed development as part of their contractual responsibilities. The Waste Management Plan should meet the requirements of the Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects.

Operational Phase

Not applicable.

Monitoring

Not applicable.

15.3.2 Population and Human Health

Construction Phase

POP & HH CONST 1: In order to protect the amenities enjoyed by nearby residents, premises and employees a Construction Management Plan (including traffic management) should be prepared by the contractor and implemented during the construction phase.

Operational Phase

Not applicable.

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. sufficiently address monitoring requirements.

15.3.3 Archaeological, Architectural and Cultural Heritage

No mitigation measures will be required with regards to the archaeological, architectural and cultural heritage resource.

Monitoring

Post development monitoring is not applicable in terms of the archaeological, architectural or cultural heritage

15.3.5 Biodiversity (Flora & Fauna)

Construction Phase

FF CONST 1: Disturbance of birds' nests

It must first be determined whether birds are nesting on the roof of this building. A survey by a suitably qualified ecologist should therefore be undertaken during the bird nesting season to ascertain whether this is the case. Deliberate disturbance of a bird's nest is prohibited unless under licence from the National Parks and Wildlife Service. If nesting is confirmed demolition works should proceed outside the nesting season, i.e. from September to February inclusive. If a nest is encountered then works must stop, until such time as nesting has ceased. Otherwise, a derogation licence must be sought from the NPWS to allow the destruction of the nest. Alternatively, roof netting can be installed outside the breeding season to prevent nesting occurring.

Operational Phase

There are no mitigation measures for the operational phase of the development.

Monitoring

Monitoring is required where the success of mitigation measures is uncertain or where residual impacts may in themselves be significant.

No further monitoring is required.

15.3.6 Landscape and Visual Impact

Construction and Operational Phase

The proposed development takes account of the physical context and the policy for development of the area. The potential impacts on the townscape and visual amenity are all positive. Therefore no measures to avoid, reduce or mitigate negative impacts have been identified.

Monitoring

There is no monitoring required as part of the landscape and visual impact assessment of the development.

15.3.7 Land and Soils

Construction Phase

L&S CONST 1:

- In order to prevent the accidental release of hazardous materials (fuels, paints, cleaning agents, etc.) during construction site activity all hazardous materials should be stored within secondary containment designed to retain at least 110% of the storage contents. Temporary bunds for oil/diesel storage tanks should be used on the site during the construction phase of the project. Safe materials handling of all potentially hazardous materials should be emphasised to all construction personnel employed during this phase of the project.
- Sediment runoff will be minimised by standard engineering measures including sediment skirts around soil stockpiles, sediment retention barriers in surface water drains and the use of adequate construction roads.
- Construction access to the site will be from the Naas Road. The provision of wheel wash areas at the construction entrances to the development will minimise the amount of soil deposited on the surrounding road network.
- Measures will be implemented throughout the construction stage to minimise the risk of contamination of the soil from accidental oil and petrol leakage from site plant. Bunding of storage areas and refueling areas will be incorporated into the site compound. The bund walls will be designed to the appropriate level to ensure no over-spilling occurs in the event of an accidental spillage. All lock up/storage areas will have a metal or concrete leak proof floor. Any accidental chemical spillages should be cleaned up and disposed of in an approved landfill site in accordance with the chemical manufacturer's recommendations.
- Refuelling of construction machinery shall be undertaken in designated areas located away from surface water drainage. Spill kits shall be kept in these areas in the event of spillages.
- Hazardous waste shall be dealt with in accordance with the Waste Management (Hazardous Waste) Regulations, 1998.
- All potentially hazardous materials shall be securely stored on site.

Operational

- **L&S OPERAT 1:**
- The surface water run-off from the development should be collected by an appropriately designed system. This system should ensure that contaminants are removed prior to discharge e.g. via a light liquids separator or by an appropriate treatment train of Sustainable Urban Drainage Systems as outlined in the Greater Dublin Strategic Drainage Study (GDSDS). Any separators and drainage systems should be maintained and operated by the facilities management company (prior to taking in charge by the Local Authority) in accordance with the manufacturers recommendations.
- All waste generated by the everyday operation of the development should be securely stored within designated collection areas. These should have positive drainage collection systems to collect potential run off. Operational waste should be removed from site using licensed waste management contractors.
- Foul effluent should be collected and discharged from the site via properly constructed sewers to the Public Foul Sewer.
- Fuel Storage areas, if required, should be within secured, bunded, designated areas.

Monitoring

Monitoring during the construction phase is recommended, in particular in relation to the following:-

- Adequate protection of any topsoil stockpiled for re-use.
- Adequate protection from contamination of soils for removal.
- Monitoring of surface water discharged to the existing culverted watercourses in the vicinity.
- Monitoring cleanliness of the adjoining road network.
- Monitoring measures for prevention of oil and petrol spillages.
- Dust control by dampening down measures as & when required by unusually dry weather conditions.

The Construction Management Plan (CMP) prepared by the contractor will cover these mitigation measures in more detail.

15.3.8 Water

15.3.8.1 Surface Water

Construction Phase

Surface Water Construction Stage Measures to be Implemented:

- A method statement for all works to be carried out will be prepared by the contractor and agreed with Dublin City County Council prior to commencement of works to outline what measures are to be taken to ensure there is no loss of service during the works;
- Dewatering measures should only be employed where necessary;
- If concrete mixing is carried out on site, the mixing plant should be sited in a designated area with an impervious surface;
- Existing surface drainage channels within the lands that serve adjacent lands should be retained where possible to prevent causing increased flooding impacts;
- Construction methods used should be tailored to reduce, as much as possible, dust and noise pollution;
- Comprehensive traffic management procedures, including the provision of access to all roads, and access/egress points should be prepared and agreed with the Local Authority. These traffic management measures should be implemented at times when traffic disruption may be experienced;
- Road sweeping and/or wheel wash facilities should be provided, as required;
- All oils/diesel stored on site for construction equipment are to be located in appropriately bunded areas;

- Filters and silt traps will be used to prevent rain washing silts and other materials into the surface water network and creating blockages.
- Adjacent watercourses/groundwater need to be protected from sedimentation and erosion due to direct surface water runoff generated onsite during the construction phase. To prevent this from occurring surface water discharge from the site will be managed and controlled for the duration of the construction works until the permanently attenuated surface water drainage system of the proposed site is complete. A temporary positive drainage system shall be installed prior to the commencement of the construction works to collect surface water runoff from the site during construction. A series of geotextile lined cascading, high level outfall, settling basins will be installed upstream of the agreed discharge point. This temporary surface water management facility will throttle runoff and allow suspended solids to be settled out and removed before being discharged in a control manner to the agreed outfall. Inlet to the cascading settling basins will be riprapped to prevent scour and erosion in the vicinity of the inlet.

Operational

Surface Water Operational Stage Measures to be Implemented:

- Water Quality: The green roof for the apartments on the podium and the car park permeable paving will improve the quality of surface water run from the site.

Foul Water Drainage

Construction Phase

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

Foul Water Drainage Operational Stage Measures to be Implemented:

- Dual & low flush toilets and water economy outlets will be used to reduce flows from the development.

Water Supply

Construction Phase

Water Supply Construction Stage Measures to be Implemented:

- Contact the local authority to adhere to the measures required for introducing a new watermain connection.
- Testing of the system meter & telemetry system is required.

Operational

Water Supply Operational Stage Measures to be Implemented:

- 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.

Monitoring

All surface water drainage works will be approved by Dublin City County Council, Drainage Division, and will be carried out in accordance with the GDRCOP (Greater Dublin Regional Code of Practice for Drainage Works). Foul and water works will be carried out in accordance with Irish Water Codes of Practice.

15.3.9 Air Quality & Climate

Construction Phase

Air Quality

The pro-active control of fugitive dust will ensure the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released. The main contractor will be responsible for the coordination, implementation and ongoing monitoring of the dust management plan. The key aspects of controlling dust are listed below. Full details of the dust management plan can be found in Appendix 9.3.

AQ CONST 1: Air Quality Mitigation Measures

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

Climate

Construction traffic and embodied energy of construction materials are expected to be the dominant source of greenhouse gas emissions as a result of the construction phase of the development. Construction vehicles, generators etc., may give rise to some CO_2 and N_2O emissions. However, due to short-term and temporary nature of these works, the impact on climate will not be significant.

Nevertheless, some site-specific mitigation measures can be implemented during the construction phase of the proposed development to ensure emissions are reduced further. In particular the prevention of on-site or delivery vehicles from leaving engines idling, even over short periods. Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site.

Operational

The results of the air dispersion modelling study indicate that the impact of the proposed development on air quality and climate is predicted to be imperceptible with respect to the operational phase in the long term.

Monitoring

Monitoring of construction dust deposition at nearby sensitive receptors during the construction phase of the proposed development is recommended to ensure mitigation measures are working satisfactorily. This can be carried out 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.

15.3.10 Noise & Vibration

Construction Phase

Best practice noise and vibration control measures will be employed by the contractor during the construction phase in order to avoid significant impacts at the nearest sensitive buildings. The best practice measures set out in BS 5228 (2009 +A1 2014) Parts 1 and 2 will be complied with. This includes guidance on several aspects of construction site mitigation measures, including, but not limited to:

- selection of quiet plant;
- noise control at source;
- screening, and;
- liaison with the public.

Further comment is offered on these items in the following paragraphs. 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, where required.

Selection of Quiet Plant

This practice is recommended in relation to static plant such as compressors and generators. It is recommended that these units be supplied with manufacturers' proprietary acoustic enclosures. The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. The least noisy item should be selected wherever possible. Should a particular item of plant already on the site be found to generate high noise levels, the first action should be to identify whether or not said item can be replaced with a quieter alternative.

Noise Control at Source

If replacing a noisy item of plant is not a viable or practical option, consideration will be given to noise control "at source". This refers to the modification of an item of plant or the application of improved sound reduction methods in consultation with the supplier. For example, resonance effects in panel work or cover plates can be reduced through stiffening or application of damping compounds; rattling and grinding noises can often be controlled by fixing resilient materials in between the surfaces in contact.

The following best practice migration measures should be considered:

N&V CONST:

- Site compounds should be located away from noise sensitive boundaries within the site constraints. The use lifting bulky items, dropping and loading of materials within these areas should be restricted to normal working hours.

- For mobile plant items such as cranes, dump trucks, excavators and loaders, maintaining enclosure panels closed during operation can reduce noise levels over normal operation. Mobile plant should be switched off when not in use and not left idling.
- For steady continuous noise, such as that generated by diesel engines, it may be possible to reduce the noise emitted by fitting a more effective exhaust silencer system.
- For percussive tools such as pneumatic breakers, a number of noise control measures include fitting muffler or sound reducing equipment to the breaker 'tool' and ensure any leaks in the air lines are sealed. Erect localised screens around breaker or drill bit when in operation in close proximity to noise sensitive boundaries.
- For concrete mixers, control measures should be employed during cleaning to ensure no impulsive hammering is undertaken at the mixer drum.
- For all materials handling ensure that materials are not dropped from excessive heights, lining drops chutes and dump trucks with resilient materials.
- For compressors, generators and pumps, these can be surrounded by acoustic lagging or enclosed within acoustic enclosures providing air ventilation.
- All items of plant should be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.

Screening

Screening is an effective method of reducing the noise level at a receiver location and can be used successfully as an additional measure to all other forms of noise control. Standard construction site hoarding (2.4m in height) with a mass per unit of surface area greater than 7 kg/m^2 can provide adequate sound insulation. This is recommended, as a minimum around the south, south-east and south-west perimeters.

Liaison with the Public

A designated noise liaison officer will appointed to site during construction works. Any noise complaints should be logged and followed up in a prompt fashion by the liaison officer. In addition, prior to particularly noisy construction activity, e.g. piling, the liaison officer will inform the nearest noise sensitive locations of the time and expected duration of the noisy works.

Project Programme

The phasing programme will be arranged so as to control the amount of disturbance in noise and vibration sensitive areas at times that are considered of greatest sensitivity. If piling works are in progress on a site at the same time as other works of construction that themselves may generate significant noise and vibration, the working programme will be phased so as to ensure noise limits are not exceeded due to cumulative activities. This will be reviewed in relation to other potential cumulative works occurring on adjacent construction site in close proximity to noise sensitive properties which have the potential to lead to significant construction noise impacts.

Operational

During the operational phase of the development, noise mitigation measures with respect to the outward impact of the development are not deemed necessary.

Additional Traffic on Adjacent Roads

During the operational phase of the development, noise mitigation measures with respect to the outward impact of traffic from the development are not deemed necessary.

Building Services Plant

Taking into account that sensitive receivers within the development are much closer than off-site sensitive receivers, once the relevant noise criteria included in Section 8.5 (i.e. 40dB $L_{Aeq,15min}$ at noise sensitive locations within the proposed development itself). is achieved within the development it is expected that there will be no negative impact at sensitive receivers off site, and therefore no further mitigation required.

Monitoring

Construction Phase

The contractor will be required to ensure construction activities operate within the noise limits set out within this assessment. The contractor will be required to undertake regular noise monitoring at locations representative of the closest sensitive locations to ensure the relevant criteria are not exceeded.

Noise monitoring should be conducted in accordance with the International Standard ISO 1996: 2017: *Acoustics – Description, measurement and assessment of environmental noise*.

Operational Phase

Noise or vibration monitoring is not required once the development is operational.

15.3.12 Material Assets Traffic and Transport & Utilities

Water Supply

Construction Phase

Water Supply Construction Stage Measures to be Implemented:

- Contact the local authority to adhere to the measures required for introducing a new watermain connection.
- Testing of the system may be required.
- Operational Phase
- Water Supply Operational Stage Measures to be Implemented:
- 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.

Surface Water

Construction Phase

- The following remedial or reductive measures to mitigate the impact of the construction phase on the existing environment are proposed with reference to the Surface Water:
- Surface Water Construction Stage Measures to be Implemented:
- A method statement for all works to be carried out will be prepared by the contractor and agreed with Dublin City County Council prior to commencement of works to outline what measures are to be taken to ensure there is no loss of service during the works;
- Dewatering measures should only be employed where necessary;
- If concrete mixing is carried out on site, the mixing plant should be sited in a designated area with an impervious surface;
- Existing surface drainage channels within the lands that serve adjacent lands should be retained where possible to prevent causing increased flooding impacts;
- Construction methods used should be tailored to reduce, as much as possible, dust and noise pollution;
- Comprehensive traffic management procedures, including the provision of access to all roads, and access/egress points should be prepared and agreed with the Local Authority. These traffic management measures should be implemented at times when traffic disruption may be experienced;
- Road sweeping and/or wheel wash facilities should be provided, as required;
- All oils/diesel stored on site for construction equipment are to be located in appropriately bunded areas;

- Filters and silt traps will be used to prevent rain washing silts and other materials into the surface water network and creating blockages.
- Adjacent watercourses/groundwater need to be protected from sedimentation and erosion due to direct surface water runoff generated onsite during the construction phase. To prevent this from occurring surface water discharge from the site will be managed and controlled for the duration of the construction works until the permanently attenuated surface water drainage system of the proposed site is complete. A temporary positive drainage system shall be installed prior to the commencement of the construction works to collect surface water runoff from the site during construction. A series of geotextile lined cascading, high level outfall, settling basins will be installed upstream of the agreed discharge point. This temporary surface water management facility will throttle runoff and allow suspended solids to be settled out and removed before being discharged in a control manner to the agreed outfall. Inlet to the cascading settling basins will be riprapped to prevent scour and erosion in the vicinity of the inlet.

Operational Phase

- The following mitigation measures are proposed for the operational phase of the proposed development with reference to the Surface Water:
- Surface Water Operational Stage Measures to be Implemented:
- Water Quality: The green roof for the apartments on the podium and the car park permeable paving will improve the quality of surface water run from the site.

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 DCC Drainage Division.

- The following remedial or reductive measures to mitigate the impact of the construction phase on the existing environment are proposed:-
- 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

- Foul Water Drainage Operational Stage Measures to be Implemented:
- Dual & low flush toilets and water economy outlets will be used to reduce flows from the development.

Gas

Construction Phase

- Any GNI works are to be undertaken by GNI approved personal only.
- Operational Phase
- Any GNI concerns during the operational phase are to be advised immediately to the GNI by contacting there emergency number and adherence accordingly to GNI's advice on dealing with the matter.

ESB

Construction Phase

- Any ESB works are to be undertaken by ESB personal only.
- Operational Phase
- Any ESB concerns during the operational phase are to be advised immediately to the ESB by contacting their emergency number and adherence accordingly to the ESB's advice on dealing with the matter.

Eir

Construction Phase

- Any Eir works are to be undertake by Eir personal only.
- Operational Phase
- Eir disruptions during the operational phase should be minimal but any interruptions in the Eir supply should be dealt directly by Eir personal only.

Monitoring

All surface water drainage works will be approved by Dublin City County Council, Drainage Division, and will be carried out in accordance with the GDRCOP (Greater Dublin Regional Code of Practice for Drainage Works). Foul and water works will be carried out in accordance with Irish Water Codes of Practice.

15.3.12 Material Assets Waste

Construction Phase

As previously stated, a project specific C&D WMP has been prepared in line with the requirements of the guidance document issued by the DoEHLG and is included with the application. Adherence to the high-level strategy presented in this C&D WMP will ensure effective waste management and minimisation, reuse, recycling, recovery and disposal of waste material generated during the demolition, excavation and construction phases of the proposed development. Prior to commencement of demolition, the contractor(s) will be required to refine/update the C&D WMP or submit an addendum to C&D WMP to DCC to detail specific measures to minimise waste generation and resource consumption and provide details of the proposed waste contractors and destinations of each waste stream.

The project engineers have estimated that c. 17,747m^3 of material will be generated from the excavations required to facilitate the construction of the basement, building foundations and the installation of underground services. It is anticipated that this material will require removal from site for offsite reuse, recovery, recycling and/or disposal. The contractor(s) will endeavor to ensure that material is reused or recovered off-site insofar as is reasonably practicable or disposed of at authorized facility.

In addition, the following mitigation measures will be implemented:

- Building materials will be chosen with an aim to 'design out waste';
- On-site segregation of waste materials will be carried out to increase opportunities for off-site reuse, recycling and recovery – it is anticipated that the following waste types, at a minimum, will be segregated:
  - Concrete rubble (including ceramics, tiles and bricks);
  - Plasterboard;
  - Metals;
  - Glass; and
  - Timber.
- Left over materials (e.g. timber off-cuts, broken concrete blocks/bricks) and any suitable construction materials shall be re-used on-site, where possible;
- All waste materials will be stored in skips or other suitable receptacles in designated areas of the site;
- Any hazardous wastes generated (such as chemicals, solvents, glues, fuels, oils) will also be segregated and will be stored in appropriate receptacles (in suitably bunded areas, where required);
- A waste manager will be appointed by the main contractor(s) to ensure effective management of waste during the excavation and construction works;
- All construction staff will be provided with training regarding the waste management procedures;
- All waste leaving site will be reused, recycled or recovered where possible to avoid material designated for disposal;
- All waste leaving the site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licensed facilities; and
- All waste leaving the site will be recorded and copies of relevant documentation maintained.

Nearby sites requiring clean fill material will be contacted to investigate reuse opportunities for clean and inert material, if required. If any of the material is to be reused on another site as by-product (and not as a waste), this will be done in accordance with Article 27 of the *EC (Waste Directive) Regulations (2011)*. EPA approval will be obtained prior to moving material as a by-product. However, it is not currently anticipated that article 27 will be used.

These mitigation measures will ensure that the waste arising from the construction phase of the development is dealt with in compliance with the provisions of the Waste Management Act 1996, as amended, associated Regulations, the Litter Pollution Act 1997, the EMR Waste Management Plan (2015 - 2021) and the and the DCC Bye-Laws for the Storage, Presentation and Collection of Household and Commercial Waste and the DCC waste and draft waste bye-laws. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved and will encourage sustainable consumption of resources

Operational Phase

As previously stated, a project specific OWMP has been prepared and is included as Appendix 12.1. Implementation of this OWMP will ensure a high level of recycling, reuse and recovery at the development. All recyclable materials will be segregated at source to reduce waste contractor costs and ensure maximum diversion of materials from landfill, thus achieving the targets set out in the EMR Waste Management Plan 2015 – 2021 and the DCC waste and draft waste bye-laws.

In addition, the following mitigation measures will be implemented:

- On-site segregation of all waste materials into appropriate categories including (but not limited to):
  - Organic waste;
  - Dry Mixed Recyclables;
  - Mixed Non-Recyclable Waste;
  - Glass;
  - Waste electrical and electronic equipment (WEEE);
  - Batteries (non-hazardous and hazardous);
  - Cooking oil;
  - Light bulbs;

- Cleaning chemicals (pesticides, paints, adhesives, resins, detergents, etc.);
- Furniture (and from time to time other bulky waste); and
- Abandoned bicycles.

- All waste materials will be stored in colour coded bins or other suitable receptacles in designated, easily accessible locations. Bins will be clearly identified with the approved waste type to ensure there is no cross contamination of waste materials;
- All waste collected from the development will be reused, recycled or recovered where possible, with the exception of those waste streams where appropriate facilities are currently not available; and
- All waste leaving the site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licensed facilities.

These mitigation measures will ensure the waste arising from the development is dealt with in compliance with the provisions of the *Waste Management Act 1996*, as amended, associated Regulations, the *Litter Pollution Act 1997*, the *EMR Waste Management Plan (2015 - 2021)* and the DCC waste and draft waste bye-laws. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved