ENVIRONMENTAL IMPACT ASSESSMENT REPORT

VOLUME II MAIN REPORT

PROPOSED RESIDENTIAL DEVELOPMENT

AT

Phase 1A Clonburris SDZ

Prepared by

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LIST OF ABBREVIATIONS

AA Appropriate Assessment

ABP An Bord Pleanála

CDP County Development Plan

CMP Construction Management Plan

CA Competent Authority (South Dublin County Council)

CSO Central Statistics Office

DAHG Department of Arts, Heritage and the Gealtacht

DCENR Department of Communications, Energy and Natural Resources

DEHLG Department of Housing, Planning and Local Government

EIA Environmental Impact Assessment

EIAR Environmental Impact Assessment Report

EMP Environmental Management Plan

EPA Environmental Protection Agency

ESRI Economic and Social Research Institute

GDP Gross Domestic Product

GSI Geology Survey Ireland

IAA Irish Aviation Association

IEEM Institute of Ecology and Environmental Management

IFI Inland Fisheries Ireland

LAP Local Area Plan

NHA/pNHA Natural Heritage Area / proposed Natural Heritage Area

NIAH National Archive of Architectural Heritage

NPWS National Parks and Wildlife Service

NRA National Roads Authority

NPF National Planning Framework

OPW Office of Public Works

PBSA Purpose-Built Student Accommodation

RMP Record of Monuments and Places

RPG Regional Planning Guidelines

RPS Record of Protected Structures

SAC Special Area of Conservation

SMR Sites and Monuments Record

SPA Special Protection Area

SUDS Sustainable Drainage System

TMP Traffic Management Plan

WFD Water Framework Directive

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1.0 INTRODUCTION AND METHODOLOGY

John Spain Associates, Planning & Development Consultants, have been commissioned by Cairn Homes Properties Ltd., to prepare an Environmental Impact Assessment Report (EIAR) for a proposed development on a site of c. 17.02 hectares. This chapter of the EIAR was prepared by Rory Kunz, BA (MOD), MScERM, MAT&CP, Dip EIA Mgmt., Executive Director with John Spain Associates who has a Masters in Environmental Resource Management and a Diploma in EIA Management (both from UCD) as well as a Masters in Town and Country Planning. In addition, Rory is a corporate member of the of the Irish Planning Institute and has 18 years of experience of Environmental Impact Assessment and urban development.

The subject lands are located within Development Area 3 (Clonburris South West) and comprise subsector CSW-S4 (located to the south of the permitted link street) and a portion of subsector CSW-S3, (located to the north of the permitted link street. Access to the subject lands will be via the Fonthill Road, along the eastern boundary.

The central purpose of the Environmental Impact Assessment Report (EIAR) is to undertake an appraisal of the likely and significant impacts on the environment of the proposed development in parallel with the project design process, and to document this process in the EIAR. This is then submitted to the competent/ consent authority to enable it assess the likely significant effects of the project on the environment. This assessment will then inform the 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.

The proposal comprises the development of 569 no. dwellings as well as a creche, shared offices, open space and associated ancillary development.

This EIAR document has been prepared in accordance with the European Union EIA Directive 85/337/EC as amended by directives 97/11/EC, 2003/4/EC, 2011/92/EU and 2014/52/EU, as well as implementing legislation, i.e. Part X of the Planning and Development Act 2000, as amended ('***the 2000 Act***'), and Parts 10 and 23 of the Planning and Development Regulations 2001, as amended, in particular as amended by the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 ("***the 2001 Regulations***"). A description of the methodological approach to the preparation of this EIAR is provided in the following sections of this chapter.

1.1 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) of Directive 2011/92/EU, as amended by the 2014 Directive states that "*environmental impact assessment*" means a process consisting of:

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

A definition of "*environmental impact assessment*" is also contained under Section 171A of the 2000 Act, as amended as follows:

'environmental impact assessment' means a process—

(a) consisting of—

(i) the preparation of an environmental impact assessment report by the applicant in accordance with this Act and regulations made thereunder,
(ii) the carrying out of consultations in accordance with this Act and regulations made thereunder,
(iii) the examination by the planning authority or the Board, as the case may be, of—
(I) the information contained in the environmental impact assessment report,
(II) any supplementary information provided, where necessary, by the applicant in accordance with section 172(1D) and (1E), and
(III) any relevant information received through the consultations carried out pursuant to subparagraph (ii),
(iv) the reasoned conclusion by the planning authority or the Board, as the case may be, on the significant effects on the environment of the proposed development, taking into account the results of the examination carried out pursuant to subparagraph (iii) and, where appropriate, its own supplementary examination, and
(v) the integration of the reasoned conclusion of the planning authority or the Board, as the case may be, into the decision on the proposed development, and

(b) which includes—
(i) an examination, analysis and evaluation, carried out by the planning authority or the Board, as the case may be, in accordance with this Part and regulations made thereunder, that identifies, describes and assesses, in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of the proposed development on the following:

(I) population and human health;
(II) biodiversity, with particular attention to species and habitats protected under the Habitats Directive and the Birds Directive;
(III) land, soil, water, air and climate;
(IV) material assets, cultural heritage and the landscape;
(V) the interaction between the factors mentioned in clauses (I) to (IV),

and
(ii) as regards the factors mentioned in subparagraph (i)(I) to (V), such examination, analysis and evaluation of the expected direct and indirect significant effects on the environment derived from the vulnerability of the proposed development to risks of major accidents or disasters, or both major accidents and disasters, that are relevant to that development;

The amended Directive (Directive 2014/52/EU) uses the term environmental impact assessment report (EIAR) rather than environmental impact statement (EIS). Where current national guidelines and regulations refer to an environmental impact statement or an EIS, this can be taken to be the same as an environmental impact assessment report (EIAR).

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 Competent Authority (CA) 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 inform its decision as to whether 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.

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

The EIAR provides a systematic analysis and evaluation of the potentially significant 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.

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 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.

1.2 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 EIARs 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.

We would also note that the pre-application discussions with the Planning Authority informed the content of the EIAR.

Table 1.1 – EIA Guidelines Consulted as Part of the Preparation of this EIAR

Irish
• Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, EPA, August 2017
• Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment August 2018
• Transposition of 2014 EIA Directive (2014/52/EU) in the Land Use Planning and EPA Licensing Systems - Key Issues Consultation Paper, Department of Housing, Planning, Community and Local Government, 2017.
• Circular letter PL 1/2017 - Advice on Administrative Provisions in Advance of Transposition (2017).
• Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (DoECLG, March 2013).
• 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)
• Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report, European Commission, 2017
• EU Guidance on EIA Screening (DG Environment 2001).
• Guidance on EIA Scoping (DG Environment 2001).
• EIA Review Checklist (DG Environment 2001).
• Study on the Assessment of Indirect & Cumulative Impacts as well as Impact Interaction (DG Environment 2002).

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 and Article 94 and Schedule 6 the 2001 Regulations as amended, in particular by European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018.

1.3 EIA PROCESS OVERVIEW

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

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

- Screening;
- Scoping;
- Assessing Alternatives; and
- Assessing and Evaluating.

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

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

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

Assessing and Evaluating: The central steps of the EIA process include baseline assessment (desk study and field surveys) to determine the status of the existing environment, impact prediction and evaluation, and determining appropriate mitigation measures where necessary. This stage of the EIAR is presented in Chapters 3 to 17.

1.4 SCREENING – REQUIREMENT FOR EIA

Screening is the term used to describe the process for determining whether a proposed development requires an EIA by reference to mandatory legislative threshold requirements or 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.

The proposed development falls within categories 10(b)(i) and 10(b)(iv) of Part 2 of Schedule 5 of the Planning and Development Regulations 2001-2015. Category 10(b)(i) refers to 'Construction of more than 500 dwellings'. Category 10(b)(iv) refers to '*Urban development which would involve an area greater than 2 hectares in the case of business district, 10 hectares in the case of other parts of a built up area and 20 hectares elsewhere.'*

For both categories, the proposed development is above the mandatory threshold for EIA at 569 no. dwellings and 17.02 hectares in area, respectively and therefore an EIAR to enable the Competent Authority to carry out an Environmental Impact Assessment in respect of the proposed development is required.

The EIAR provides information on the receiving environment and assesses the likely significant effects of the project and proposes mitigation measures to avoid or reduce these effects. The function of the EIAR is to provide information to allow the competent authority to conduct the Environmental Impact Assessment (EIA) of the proposed development.

1.5 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 development projects 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.

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 (as amended) 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,
- Biodiversity,
- Land and Soils,
- Water,
- Air Quality and Climate,
- Noise and Vibration,
- Landscape and Visual Impact,
- Material Assets Traffic, Waste and utilities,
- Archaeology, Architectural and Cultural Heritage,
- Risk Management,
- Interactions of the Foregoing,
- Principal Mitigation and Monitoring Measures,
- Non-Technical Summary.

In addition to the above a series of standalone reports have been prepared to accompany the application and which have helped inform the above chapters of the EIAR where relevant. Chapter 2 provides details of the envisaged phased delivery of development on the lands.

A series of meetings have taken place with the technical staff of South Dublin County Council which assisted in the preparation of this EIAR and the planning application.

1.6 INFORMATION TO BE CONTAINED IN AN EIAR

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;

[2] Guidance on EIA Scoping, EC, 2001

(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. W here 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."

Article 94 and Schedule 6 of the Planning and Development Regulations 2001, as amended, transpose into Irish law the EIA Directive requirements in relation to information to be contained in an EIAR.

Schedule 6 provides for the following information to be furnished:

1. (a) A description of the proposed development comprising information on the site, design, size and other relevant features of the proposed development.
(b) A description of the likely significant effects on the environment of the proposed development.
(c) A description of the features, if any, of the proposed development and the measures, if any, envisaged to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment of the development.
(d) A description of the reasonable alternatives studied by the person or persons who prepared the EIAR, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the proposed development on the environment.

2. Additional information, relevant to the specific characteristics of the development or type of development concerned and to the environmental features likely to be affected, on the following matters, by way of explanation or amplification of the information referred to in paragraph 1:

(a) a description of the proposed development, including, in particular—
(i) a description of the location of the proposed development,
(ii) a description of the physical characteristics of the whole proposed development, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases,
(iii) a description of the main characteristics of the operational phase of the proposed development (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, and
(iv) 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;

(b) a description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the person or persons who prepared the EIAR, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects;

(c) a description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without the development 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;

(d) a description of the factors specified in paragraph (b)(i)(I) to (V) of the definition of 'environmental impact assessment' in section 171A of the Act likely to be significantly affected by the proposed development: 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;

(e) (i) a description of the likely significant effects on the environment of the proposed development resulting from, among other things—
(I) the construction and existence of the proposed development, including, where relevant, demolition works,
(II) the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources,
(III) the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste,
(IV) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters),
(V) the cumulation of effects with other existing or approved developments, or both, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources,
(VI) the impact of the proposed development on climate (for example
the nature and magnitude of greenhouse gas emissions) and the vulnerability of the proposed development to climate change, and
(VII) the technologies and the substances used, and
(ii) the description of the likely significant effects on the factors specified in paragraph (b)(i)(I) to (V) of the definition of 'environmental impact assessment' in section 171A of the Act 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 proposed development, taking into account the environmental protection objectives established at European Union level or by a Member State of the European Union which are relevant to the proposed development;

(f) 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;

(g) 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 an analysis after completion of the development), explaining the extent to which significant adverse effects on the environment are avoided, prevented, reduced or offset during both the construction and operational phases of the development;

(h) a description of the expected significant adverse effects on the environment of the proposed development deriving from its vulnerability to risks of major accidents and/or disasters which are relevant to it. Relevant information available and obtained through risk assessments pursuant to European Union legislation such as the Seveso III Directive or the Nuclear Safety Directive or relevant assessments carried out pursuant to national legislation may be used for this purpose, provided that the requirements of the Environmental Impact Assessment Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for, and proposed response to, emergencies arising from such events.

Article 5(1) of the EIA Directive and Article 94 of the 2001 regulations, also require that the EIAR shall, with a view to avoiding duplication of assessments, take into account the available results of other relevant assessments under Union or national legislation. The available result of other such assessments, where relevant, have been considered in each of the chapters.

The likely significant effects in this EIAR are, unless otherwise indicated in a particular Chapter, described using the terminology in Table 3.3 in the Draft Guidelines on the Information to be Contained in Environmental Impact

Assessment Reports, EPA, August 2017 (the EPA Guidelines 2017), which are presented in the Table below. The use of these terms for the classification of impacts ensures that the EIA employs a systematic approach, which can be replicated across all disciplines covered in the EIAR. The consistent application of terminology throughout the EIAR facilitates the assessment of the proposed development on the receiving environment.

Table 1.2 – Description of Effects

Quality of Effects	**Definition**
Negative	A change which reduces the quality of the environment
Neutral	No effects or effects that are imperceptible, within the normal bounds of variation or within the margin of forecasting error.
Positive	A change that improves the quality of the environment
Significance of Effects on the Receiving Environment	**Description of Potential Effects**
Imperceptible	An effect capable of measurement but without significant consequences.
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters a sensitive aspect of the environment.
Profound	An effect which obliterates sensitive characteristics.
Extent and Context of Effects	**Describing the Extent and Context of Effects**
Extent	Describe the size of the area, the number of sites, and the proportion of a population affected by an effect.
Context	Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)
Probability of Effects	**Describing the Probability of Effects**
Likely Effects	The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
Unlikely Effects	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
Duration of Impact	**Definition**
Momentary	Effects lasting from seconds to minutes
Brief	Effects lasting less than a day
Temporary	Effects lasting one year or less
Short-term	Effects lasting one to seven years
Medium-term	Effects lasting seven to fifteen years
Long-term	Effects lasting fifteen to sixty years
Permanent	Effects lasting over sixty years
Reversible	Effects that can be undone, for example through remediation or restoration
Frequency of Effects	Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)
Types of Effect	**Describing the Types of Effects**

Indirect Effects	(a.k.a. Secondary Effects) Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
Cumulative Effects	The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.
'Do-Nothing Effects'	The environment as it would be in the future should the subject project not be carried out.
`Worst case' Effects	The effects arising from a project in the case where mitigation measures substantially fail.
Indeterminable Effects	When the full consequences of a change in the environment cannot be described.
Irreversible Effects	When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
Residual Effects	The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
Synergistic Effects	Where the resultant effect is of greater significance than the sum of its constituents, (e.g. combination of SOx and NOx to produce smog).

Source: Table 3.3 EPA Draft Guidelines EPA

1.7 PURPOSE OF THIS EIAR

The EPA Guidelines state that the main purpose of an EIAR '*is to identify, describe and present an assessment of the likely significant impacts of a project on the environment'*. This informs the competent authority's assessment process, its decision on whether to grant consent for a project and, if granting consent, what conditions to attach. The EIAR focuses on:

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

In addition to identifying and predicting the likely predicted significant environmental impacts resulting from the proposed development, the EIAR should 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 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 South Dublin County Council (as the Competent Authority), 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; and
- Facilitating better consultation.

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 housing development at Clonburris SDZ Phase 1A.

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

The EIAR document enables South Dublin County Council, as competent authority, 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.

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 are an integral part of the planning process as outlined in the Planning and Development Regulations 2001 (as amended).

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.

1.9 FORMAT AND STRUCTURE OF THIS EIAR

1.9.1 EIAR Structure

The structure of the EIAR is laid out in the preface of each volume for clarity. It consists of three volumes as follows:

- **Volume I: Non-Technical Summary**

This is a non-technical summary of the information contained within Volume II.

- **Volume II: Environmental Impact Assessment Report.**

This is the main volume of the EIAR. It provides information on the location and scale of the proposed development, details on design and impacts on the environment (both positive and negative) as a result of the proposed development.

Each of the environmental aspects as listed below are examined in terms of the existing or baseline environment, identification of potential construction and operational stage impacts and where necessary proposed mitigation measures are identified. The interaction of the environmental aspects with each other is also examined. Each chapter includes an assessment of potential cumulative impacts with other existing and planned developments, where relevant. Environmental aspects considered include:

Chapter 3 Population and Human Health;
Chapter 4 Biodiversity;
Chapter 5 Land and Soils;

Chapter 6 Water;
Chapter 7 Climate (Air Quality);
Chapter 8 Noise and Vibration;
Chapter 9 Landscape & Visual;
Chapter 10 Material Assets – Traffic;
Chapter 11 Material Assets - Waste Management;
Chapter 12 Material Assets – Utilities;
Chapter 13 Cultural Heritage (Local History, Archaeology & Architectural Heritage);
Chapter 14 Risk Management;
Chapter 15 Interactions of the Foregoing and Cumulative Impacts;
Chapter 16 Summary of Mitigation and Monitoring Measures;
Chapter 17 References.

- **Volume III: Technical Appendices**

Volume III contains specialists' technical data and other related reports.

1.9.2 EIAR Volume II Structure

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 1.3 below.

Table 1.3 – 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	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.
5	Land and Soils	Provides an overview of the baseline position, the potential impact of the proposed development on the site's soil and

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

Chapter	Title	Content
		geology and impacts in relation to land take and recommends mitigation measures.
6	Water	Provides an overview of the baseline position, the potential impact of the proposed development on water quality and quantity and recommends mitigation measures.
7	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.
8	Noise and Vibration	Provides an overview of the baseline noise environment, the potential impact of the proposed development and recommends mitigation measures.
9	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.
10-12	Material Assets	Describes the existing traffic, waste management and services and infrastructural requirements of the proposed development and the likely impact of the proposed development on material assets and recommends mitigation measures.
13	Archaeology and Architectural and Cultural Heritage	Provides an assessment of the site and considers the potential impact of the proposed development on the local archaeology, architectural and cultural heritage; and recommends mitigation measures.
14	Risk Management	Provides a review of the potential vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned
15	Interactions of the Foregoing and Cumulative Impacts	Describes the potential interactions and interrelationships between the various environmental factors. A description of the potential cumulative impacts is included in each of the relevant chapters and is referenced in this Chapter.
16	Summary of Mitigation and Monitoring Measures	Sets out the key mitigation and monitoring measures included in the EIAR Document for ease of reference.
17	Reference List	List of references within the chapters of the EIAR

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 1.4 – Methodology Employed to Evaluate Environmental Topic

- **Introduction:**
- **Study Methodology:**
- **The Existing Receiving Environment (Baseline Situation):**

- **Characteristics of the Proposed Development:**
- **Potential Impact of the Proposed Development:**
- **Do Nothing Scenario:**
- **Avoidance, Remedial and Mitigation Measures:**
- **Predicted Impacts of the Proposed Development:**
- **Monitoring:**
- **Reinstatement:**
- **Interactions:**
- **Difficulties Encountered in Compiling:**

1.10 EIAR PROJECT TEAM

1.10.1 EIAR Project Management

The preparation of this EIAR was project managed, co-ordinated and produced by Rory Kunz of John Spain Associates who has a Masters in Environmental Resource Management and a Diploma in EIA Management (both from UCD) as well as a Masters in Town and Country Planning. In addition, Rory is a corporate member of the of the Irish Planning Institute and has 18 years of experience of Environmental Impact Assessment and urban development.

John Spain Associates role was 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 the competent specialist consultants or the design team.

1.10.2 EIAR Competent Experts/Environmental Specialists

Environmental specialist consultants were also commissioned for the various technical chapters of the EIAR. 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. 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 1.5 below.

Table 1.5 – EIAR List of Competent Experts

Organisation	EIAR Specialist Topics / Inputs
John Spain Associates, Planning & Development Consultants, 39 Fitzwilliam Place, Dublin 2, D02 ND61 T: 01 662 5803 Rory Kunz, BA (MOD), MScERM, MAT&CP, Dip EIA Mgmt	Introduction and Methodology Project Description and Alternatives Examined Population and Human Health Interactions of the Foregoing Principal Mitigation and Monitoring Measures Non-Technical Summary
Bryan Deegan (MCIEEM) Managing Director Altemar Ltd. Marine and Environmental Consultants	Biodiversity
Dr Tina Aughney Bat Eco Services Licensed Bat Specialist - Honours degree in Environmental Science from NUI Galway and Ph.D.	Biodiversity (Bats)
Thomas Carrigg, Civil Engineer, DBFL Consulting Engineers & John Carr, Chartered Civil Engineer [B.Eng MSc CEng], DBFL Consulting Engineers.	Land and Soils/ Population and Human Health
Thomas Carrigg, Civil Engineer, DBFL Consulting Engineers & John Carr, Chartered Civil Engineer [B.Eng MSc CEng], DBFL Consulting Engineers	Water and Hydrogeology Population and Human Health
Danny Pio Murphy, Senior Engineer Transportation DBFL Consulting Engineers	Material Assets-Traffic
Byrne Environmental Ian Byrne Managing Director, MSc, MIOA, Diploma in Environmental & Planning Law	Material Assets (Waste Management)
Margaret Dolan, Tech Cert, BSc (Hons), CEng, MIEI, Chartered Engineer of Waterman Moylan Consulting Engineers	Material Assets (Utilities)
Byrne Environmental Ian Byrne Managing Director, MSc, MIOA, Diploma in Environmental & Planning Law	Air Quality and Climate (Population and Human Health)
Byrne Environmental Ian Byrne Managing Director, MSc, MIOA, Diploma in Environmental & Planning Law	Noise and Vibration (Population and Human Health)
Jim Bloxam Senior Associate MLA MILI, Murray & Associates landscape architecture	Landscape and Visual Impacts
Thomas Carrigg, Civil Engineer, DBFL Consulting Engineers	Risk Management
Faith Bailey MA, BA (Hons), MCIfA Associate Director.	Archaeology, Architectural and Cultural Heritage

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 in Volume I.

1.12 LINKS BETWEEN EIA AND APPROPRIATE ASSESSMENT/NIS

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

In January 2010 the DoEHLG 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.

The Department of the Environment, Heritage and Local Government are introducing further legislation on this issue of Appropriate Assessment. The Department advises that all projects are screened for Appropriate Assessment.

An Appropriate Assessment screening was undertaken by Altemar in accordance with "Assessment of plans and projects in relation to Natura 2000 sites - Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC Brussels, 28.9.2021 C(2021) 6913 final." The AA Screening document is submitted with the planning application.

1.13 AVAILABILITY OF EIAR DOC

A copy of this EIAR document and Non-Technical Summary of the EIAR document is available for purchase at the offices of South Dublin County Council (Planning Authority) at a fee not exceeding the reasonable cost of reproducing the document.

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 to ensure the EIAR document produced is robust, impartial and objective.

1.15 STATEMENT OF DIFFICULTIES ENCOUNTERED

No particular difficulties, such as technical deficiencies or lack of knowledge, were encountered in compiling any of the specified information contained in this statement, such that that the prediction of impacts has not been possible. Where any specific difficulties were encountered these are outlined in the relevant chapter of the EIAR.

1.16 EIA QUALITY CONTROL AND 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 EPA published draft guidelines on information to be contained in Environmental Impact Assessment Report[4] and the Department of Housing, Planning, Community and

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

Local Government have published a consultation paper[5], which have been consulted in the preparation of this EIAR. This document includes a detailed EIAR Review Checklist which has been used to undertake a review of this EIAR document.

1.17 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.

5 *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.*

2.0 DESCRIPTION OF THE PROPOSED DEVELOPMENT 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 Rory Kunz, BA (MOD), MScERM, MAT&CP, Dip EIA Mgmt., Executive Director with John Spain Associates who has a Masters in Environmental Resource Management and a Diploma in EIA Management (both from UCD) as well as a Masters in Town and Country Planning. In addition, Rory is a corporate member of the of the Irish Planning Institute and has 18 years of experience of Environmental Impact Assessment and urban development. .

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.

2.2 DESCRIPTION OF THE LOCATION OF THE PROPOSED DEVELOPMENT

The development will consist of the construction of 569 dwellings, a creche, innovation hub and open space in the Clonburris South West Development Area of the Clonburris SDZ Planning Scheme 2019 as follows:

A) 173 no. houses comprising 8 no. 2 bedroom houses, 153 no. 3 bedroom houses and 12 no. 4 bedroom houses (147 no. dwellings in CSW-S4 consisting of 8 no. 2 bedroom houses, 127 no. 3 bedroom houses & 12 no. 4 bedroom houses & 26 no. 3 bedroom dwellings in CSW-S3); all 2 no. storey comprising semi-detached, terraced, end terrace units (with parking and private open space);
B) 148 no. duplex apartments/apartments (88 no. in CSW-S4 & 60 no. in CSW-S3) comprising 74 no. 2 bedroom units and 74 no. 3 bedroom units, in 16 no. 3 no. storey buildings. In CSW-S4 Duplex Blocks A,B,C,D,E,F,G,J,K, comprise 8 no. units (4 no. 2 bed & 4 no. 3 bed units), Duplex Block H comprises 16 no. units (8 no. 2 bed & 8 no. 3 bed units); In CSW-S3 Blocks L, N & O comprise 8 no. units (4 no. 2 bed & 4 no. 3 bed units), Block M comprises 14 no. units (7 no. 2 bed & 7 no. 3 bed units), Block P comprises 10 no. units (5 no. 2 bed & 5 no. 3 bed units), Block Q comprises 12 no. units (6 no. 2 bed & 6 no. 3 bed units), all to have terraces/pitched roof;
C) 396 no. apartments as follows: within CSW-S4, Block 1 consists of 172 no. apartments (76 no. 1 bedroom, 91 no. 2 bedroom and 5 no. 3 bedroom apartments), in a 2-building arrangement both 6 no. storeys in height. Within CSW-S3, Block 2 (4 storeys) comprises 16 no. 1 bedroom apartments and 22 no. 2 bedroom apartments, Block 3 (4 storeys) comprises 16 no. 1 bedroom apartments and 22 no. 2 bedroom apartments (all apartments to have terrace or balcony).
D) Provision of an innovation hub (626 sq. m) and creche (c. 547 sq. m) in a part 3/4 storey *'local node'* building in CSW-S4;
E) Vehicular access will be from the permitted Clonburris Southern Link Street and R113 to the east (along with provision of internal haul routes (for construction) to connect to the R136 to the west);
F) Public Open Space/landscaping of c. 4.1 hectares (to include Local Park and MUGA in CSW-S3, Grand Canal Park, along the southern and eastern boundaries of the site to connect to existing Grand Canal towpath) as well as a series of communal open spaces to serve apartments and duplex units (c. 0.39 ha).
G) All ancillary development works including footpaths, landscaping boundary treatments, public, private open space areas, car parking (656 no. spaces) and bicycle parking (672 no. spaces), single storey ESB substations/bike/bin stores, 'Gateway' entrance signage (2 no.), solar panels at roof level of apartments, and all ancillary site development/construction works;
H) Permission is also sought for revisions to attenuation permitted under SDZ20A/0021 as well as connection to water supply, and provision of foul drainage infrastructure.

The subject site is located in the south-eastern section of Clonburris SDZ (Strategic Development Zone) and forms a section of the Clonburris Character Area within the Clonburris SDZ. The Clonburris SDZ Planning Scheme comprises 280 hectares and is located to the west of Dublin City Centre and the M50 - within the triangle between Lucan, Clondalkin and Liffey Valley.

The subject site is located in the south-western section of the SDZ lands, within development areas CSW-S3 and CSW-S4 as defined within the Clonburris SDZ Planning Scheme.

Figure 2.1 – Planning Scheme Development Areas

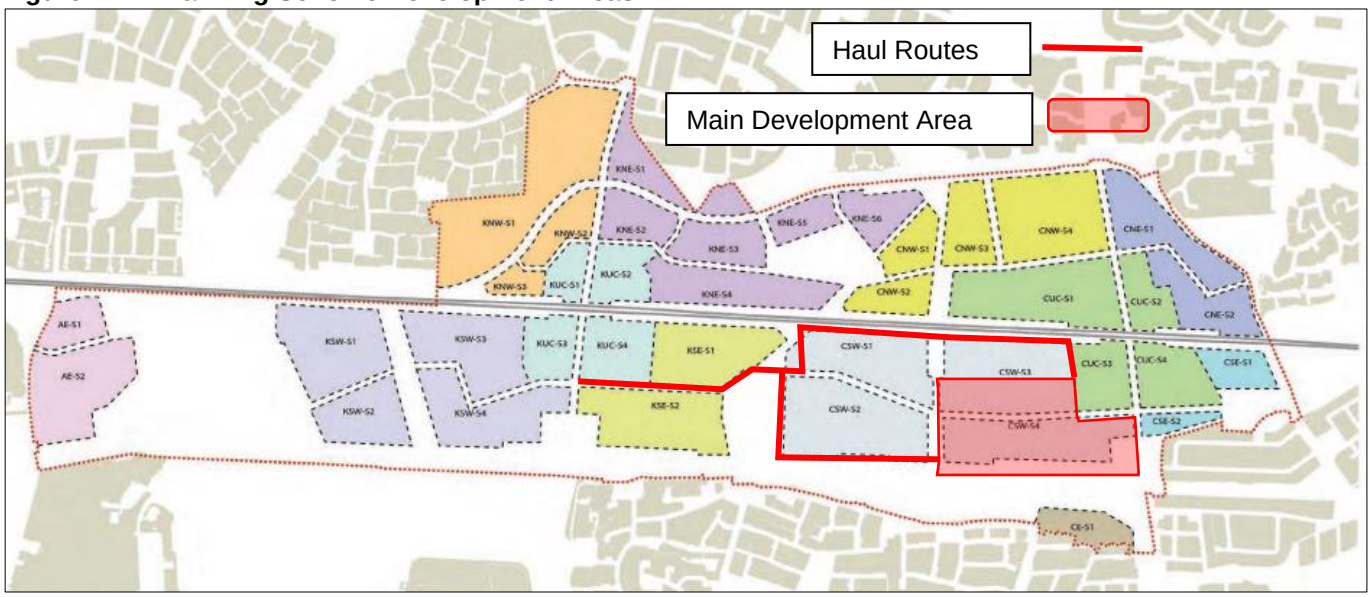


Figure 2.2 – Site Location Map

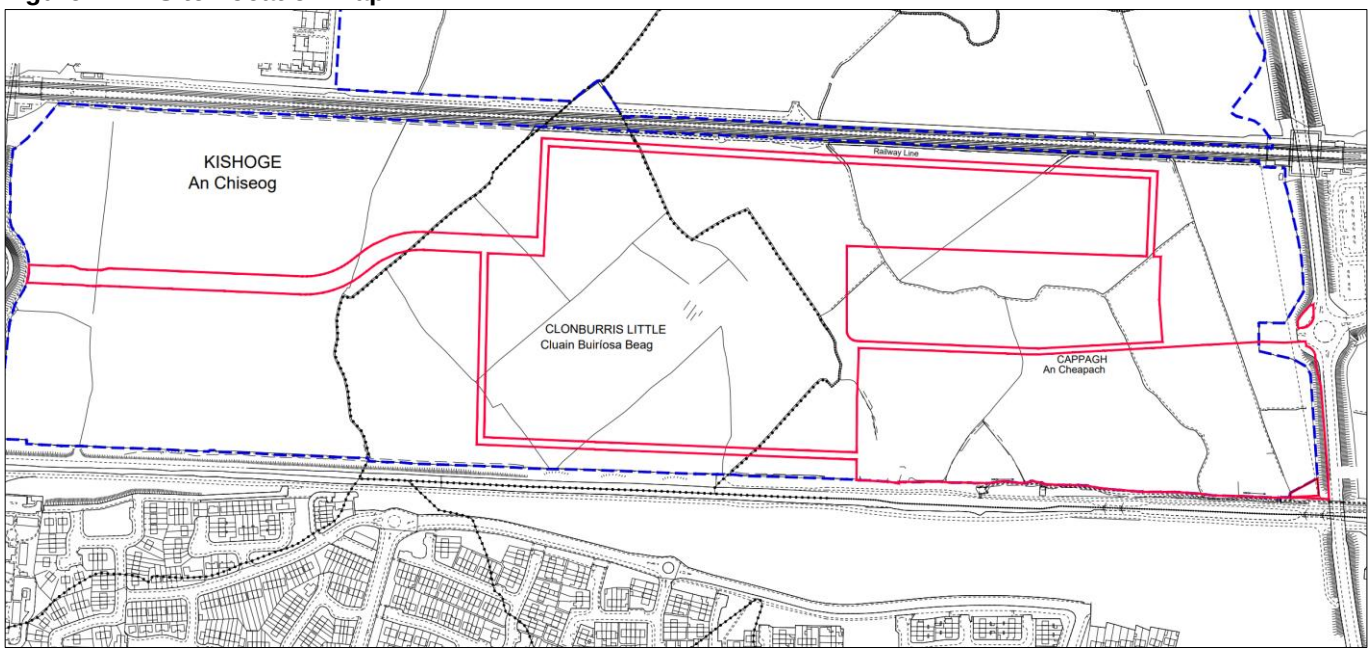


Figure 2.3 – Overall Layout (including Haul Routes)

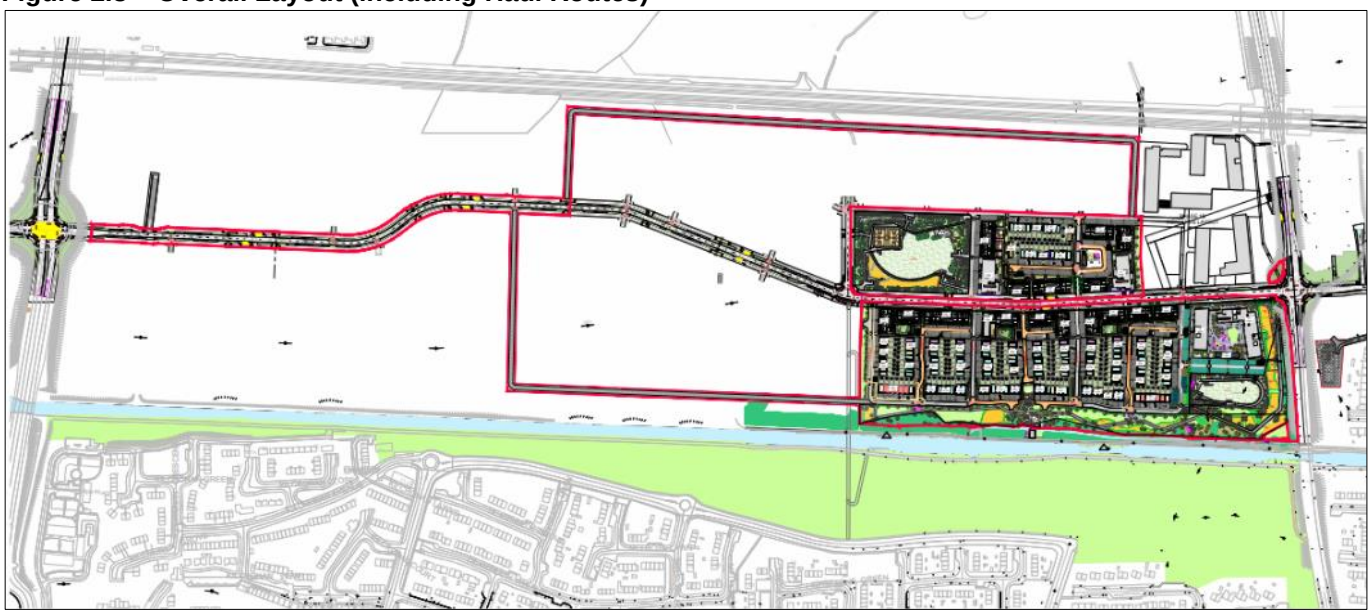
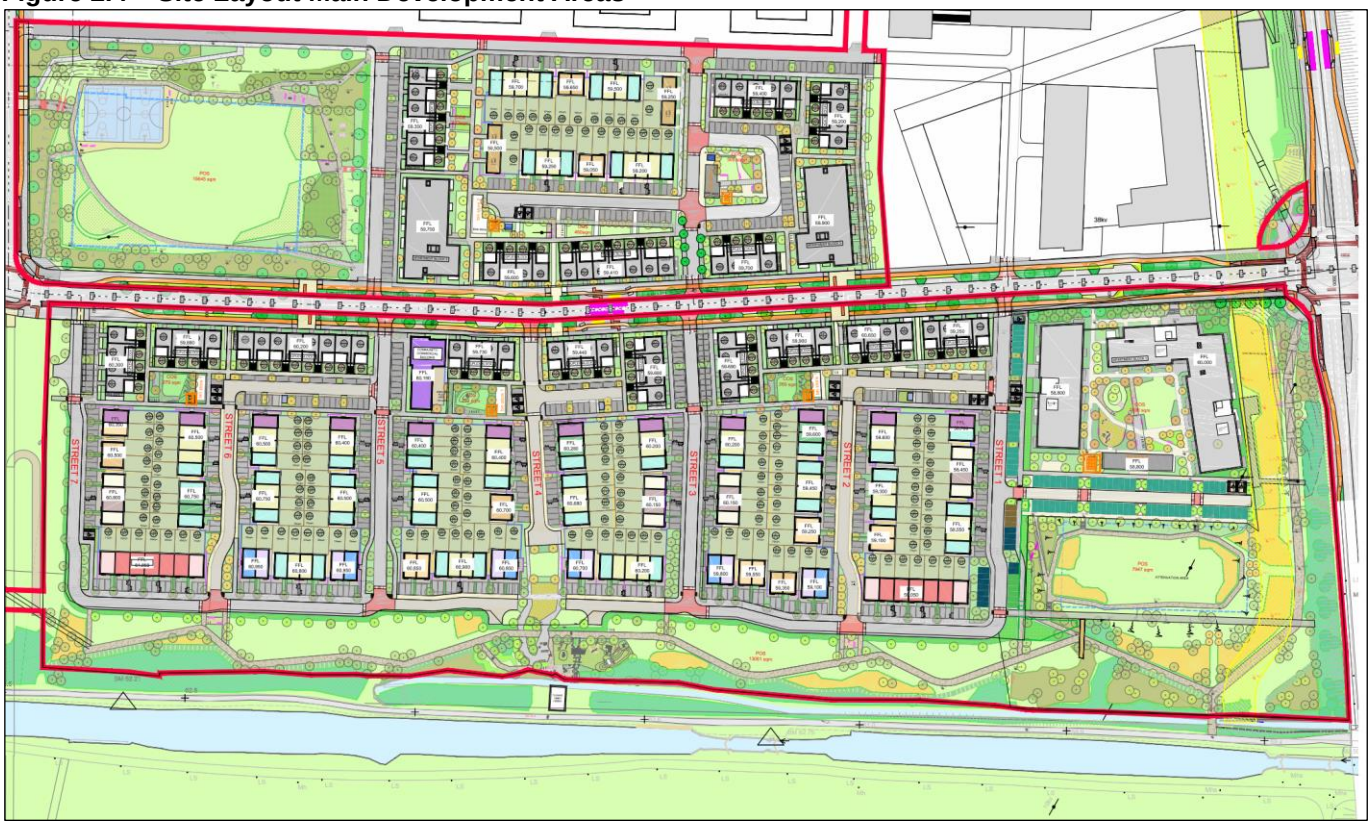


Figure 2.4 – Site Layout Main Development Areas



2.3 DESCRIPTION OF THE PHYSICAL CHARACTERISTICS OF THE WHOLE PROPOSED DEVELOPMENT

The Site Layout Plan (figure 2.3) prepared by MCORM Architects shows the Main Development Area layout in context. The Haul Routes are also shown on the associated site layout plans.

2.3.1 Demolition

There is no demolition of habitable or any other structures relating to the proposed development.

2.3.2 Summary

The overall mix across the 2 no. Development Areas is as follows:

Table 2.1 – Overall Dwelling Mix

	1 bedroom	2 bedroom	3 bedroom	4 bedroom	Overall
Houses		8	153	12	173
Duplex Apartments/Apartments		74	74		148
Apartments	108	135	5		248
Overall Mix	108	217	232	12	569
	18.9%	38.1%	40.7%	2.1%	

Source: MCORM Architects Schedule of Areas

A wide variety of dwelling typologies are included in the proposal, including 2 storey houses, duplex apartments and apartments.

In addition to the above it is proposed to provide a creche of c. 547 sq. m along with an innovation hub of c. 626 sq. m., located centrally within Development Area CSW-S4.

Across the 2 no. Development Areas, it is proposed to provide some 4.12 hectares of public open space in a series of well-distributed large-scale parks. It is also proposed to provide communal open spaces of some 0.39 hectares.

2.3.3 Development Area CSW-S4

Within DA CSW-S4 it is proposed to provide 407 no. dwellings, comprising 172 no. apartments, 88 no. duplex units, and 147 no. houses all within a site of c. 9.75 hectares.

Table 2.2 – Overall Dwelling Mix – Development Area CSW-S4

	1 bedroom	2 bedroom	3 bedroom	4 bedroom	Overall
Houses		8	127	12	147
Duplex Apartments/Apartments		44	44		88
Apartments	76	91	5		172
Overall Mix	76	143	176	12	407
	53.1%	35.1%	43.2%	2.9%	

Source: MCORM Architects Schedule of Areas

2.3.3.1 Houses

The houses are designed as two storey family dwellings, in semi-detached and terrace configurations. Individual plot layouts provide good separation to ensure privacy and minimise overlooking. The end-row and end terrace house types have been used to turn corners, with front doors and windows giving activity and passive supervision to the sides and avoiding large blank gables.

The house types are as follows:

Table 2.3 – House Types – Development Area CSW-S4

House Type		Height	No.
House Type F1	3 Bed - Mid Terrace	2 Storey	37
House Type F2	3 Bed - End Terrace	2 Storey	31
House Type F2s	3 Bed - Terrace Side Entry	2 Storey	11
House Type F3	3 Bed - Semi D	2 Storey	11
House Type F3s	3 Bed - Semi D Side Entry	2 Storey	1
House Type G1	3 Bed - Mid Terrace	2 Storey	8
House Type G2	3 Bed - End Terrace	2 Storey	8
House Type G3	3 Bed - Semi D	2 Storey	6
House Type H1	3 Bed - Mid Terrace	2 Storey	10
House Type H2	3 Bed - End Terrace	2 Storey	4
House Type J3	4 Bed - Semi D	2 Storey	6
House Type J3S	4 Bed - Side entry	2 Storey	6
House Type K1	2 Bed - Mid Terrace	2 Storey	8
Total			147

Source: MCORM Architects Schedule of Areas

The variety of house types provides for a wide choice to suit all potential occupiers and many household types, as well as permitting a very efficient site layout. The mix of house type in any one row creates visual interest and contribute to the specific character of the development, both overall and in each street.

Figure 2.5 – Open Space and Frontage along Southern Edge of Houses

Source: 3D Design Bureau

2.3.3.2 Apartments CSWS4

It is proposed to provide 172 no. apartments in Block 1 which is located in the eastern part of the Development Area; addressing the internal east-west street and the Fonthill Road to the east. The high pressure Gas Networks Ireland gas wayleave is located between the Fonthill Road and the proposed apartments.

Figure 2.6 – Apartments Entrance to Scheme

Source: 3D Design Bureau

Table 2.4 – Apartments – Development Area CSW-S4

Apartment Type		No.	Apartment Size
Type AP _1B	1 Bed (2 Person)	76	49.80
Type AP_2A	2 Bed (3 Person)	5	70.75
Type AP_2B	2 Bed (3 Person)	5	73.00
Type AP_2C	2 Bed (3 Person)	6	74.80
Type AP_ 2D	2 Bed (3 Person)	6	78.40
Type AP_ 2E	2 Bed (4 Person)	24	78.64
Type AP_ 2F	2 Bed (4 Person)	23	79.40
Type AP_2G	2 Bed (3 Person)	6	74.80
Type AP_ 2H	2 Bed (4 Person)	5	81.45
Type AP_ 2J	2 Bed (4 Person)	6	82.15
Type AP_ 2L	2 Bed (4 Person)	5	86.40
Type AP_ 3A	3 Bed (5 Person)	5	105.20
		172	

Source: MCORM Architects Schedule of Areas

The apartment blocks are set out in 2 no. buildings of 6 storeys in height with communal open space, with a southerly aspect of c. 1,698 sq. m located centrally, framed to the north east and west by the apartments. Surface car parking is provided to the south and to the west along with a bike/bin store along the southern part of the communal open space. In addition there are extensive areas of open space located to the east, and further to the south which will link to the wider east-west Grand Canal Park. The open space along the eastern boundary will link ultimately to the north to a future landscaped area (as part of Phase 1B).

Figure 2.7 – Apartment Block 1 – CSWS4

2.3.3.3 Duplex Apartment Buildings

Within Development Area CSW-S4, it is proposed to provide 88 no. duplex units (44 no. 2 bedroom units and 44 no. 3 bedroom units) in 10 no. 3 storey buildings, which will front ono the permitted Clonburris Southern Link Street.

Figure 2.8 –Duplex Elevation fronting onto Internal East West Street

Source: 3D Design Bureau

2.3.3.4 Communal Open Space

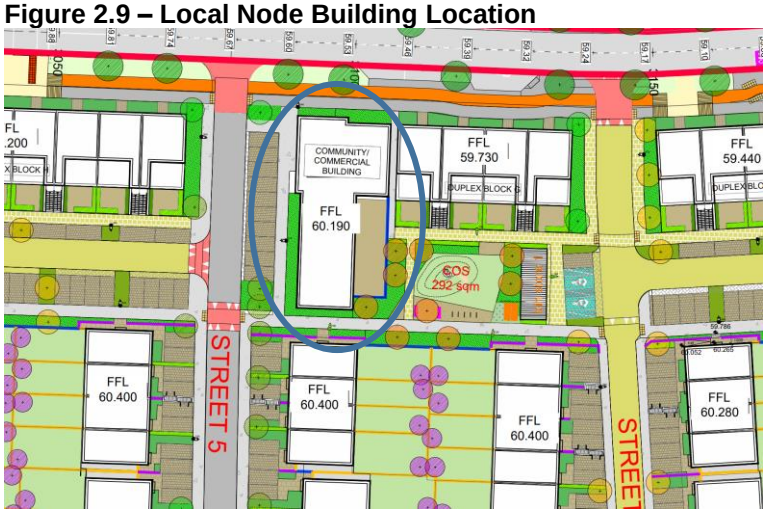
Communal open space is provided within the Development Area consisting of 1,398 sq. m, comprising 1,698 sq.m for the apartments, and 840 sq. m for the duplex units.

2.3.3.5 Car Parking and Bicycle Provision

It is proposed to provide 484 no. car parking spaces (265 for the apartments/duplex units) and 2199 no. spaces for the houses. It is proposed to provide 386 no. cycle spaces (for the duplex units and apartments) and 30 visitor spaces for Development Area CSWS4 (416 no. provided).

2.3.3.6 Local Node

Figure 2.9 – Local Node Building Location



It is proposed to provide a two storey creche of c. 547 sq. m along with an external play area, within the local node building, which is located centrally within the CSWS4 Development Area. The local node building also includes commercial space of c. 626 sq. m comprising an innovation hub office space in an overall building of part 3/part 4 storeys.

Figure 2.10 – Local Node Building Elevation

2.3.4 Development Area CSW-S3

The proposed development includes the southern portion of the Development Area CSW-S3 which is located to the north of the permitted Clonburris Southern Link Street and includes 2 no. 4 storey apartment buildings, 6 no. 3 storey duplex buildings and 2 storey houses. The duplex buildings front onto the Clonburris Southern Link Street which in

turn are bookended by the 2 no. apartment buildings. To the west of the proposal, is a substantial local park which includes a MUGA. In addition, communal open space areas are provided close to the apartments and duplex apartments.

Figure 2.11 – Development Area CSW-S3

Within DA CSW-S3 it is proposed to provide 162 no. dwellings, comprising 76 no. apartments, 60 no. duplex units, and 26 no. houses all within a site of c. 4.37 hectares.

Table 2.5 – Overall Dwelling Mix – Development Area CSW-S3

	1 bedroom	2 bedroom	3 bedroom	4 bedroom	Overall
Houses			26		26
Duplex Apartments/Apartments		30	30		60
Apartments	32	44			76
Overall Mix	32	74	56		162
	19.6%	45.7%	34.6%		

Source: MCORM Architects Schedule of Areas

Table 2.6 – House Types – Development Area CSW-S3

House Type		Height	No.
House Type C3	3 Bed - Semi Detached	2 Storey	4
House Type F1	3 Bed - Mid Terrace	2 Storey	10
House Type F2	3 Bed - End Terrace	2 Storey	8
House Type G3	3 Bed - Semi Detached	2 Storey	4
			26

2.3.4.1 Apartments CSWS3

It is proposed to provide 76 no. apartments (32 no. 1 bedroom apartments) and 44 no. 2 bedroom apartments in 2 no. 4 storey apartment buildings.

2.3.4.2 Duplex Buildings

The duplex buildings are located primarily along the southern edge of DA CWSS3 along the Clonburris Southern Link Street and along the eastern and western sides of the development cell.

2.3.4.3 Communal Open Space

Communal open space is provided within the Development Area consisting of 1,398 sq. m, comprising 930 sq.m for the Duplex buildings, and 234 sq. m for Block 2 and 234 sq. m for Block 3.

2.3.4.4 Car Parking and Bicycle Provision

It is proposed to provide 143 no. car parking spaces for the apartments/duplex units and 39 no. spaces for the houses (172 no. provided). It is proposed to provide 206 no. cycle spaces (for the duplex units and apartments) and 20 visitor spaces for Development Area CSWS3 (226 no. provided).

2.3.5 Refuse Storage

Waste storage is provided for the individual Development Areas by the provision of separate single storey bin stores. The refuse stores provide adequate storage space to satisfy the three-bin system for the collection of mixed dry recyclables, organic waste and residual waste.

2.4 INTERNAL ROAD LAYOUT & DMURS

The subject site's internal road layout has been designed with a number of junctions and a meandering alignment through the development to promote traffic calming and discourage "rat running" through the development. The proposed road hierarchy and typologies are generally consistent with those set out in section 2.2.4 of Clonburris SDZ. The proposed Local streets will be 5.5m wide with a 2m wide footpath on the side of residential units. Intimate Scale/Home-Zone Streets are 4.8m wide with a 1.5m vulnerable user / service strip on each side. This design allows enough room for perpendicular parking, accommodates utility infrastructure utilities while creating a safe shared use area for all road users. The development's internal layout has been designed with speed reduction bends to provide traffic calming together with a combination of road vertical and horizontal deflections to reduce speeds.

Flat top table ramps have been provided at strategic locations to calm traffic at junctions in particular at Homezone /vehicular interfaces. Design speed limits of 30km/hr are applied throughout the development as per Design Manual for Urban Roads and Streets (DMURS). It is intended that the roads and footpaths of the proposed development are designed to accommodate pedestrian and cycle links to future infrastructure to be constructed as part of the overall Clonburris SDZ. There are number of vehicular and pedestrian/cycle bridges proposed within the SDZ boundary. It is intended that the road, pedestrian and cycle infrastructure of the proposed development will be extended in the future to provide links to these locations.

The proposed development's road layout is will comprise the following;

- Local Streets – typically 5m to 5.5m wide carriageway with 2m footways and intermittent 2.4m wide private parking bays. Where required to accommodate perpendicular parking either the parking bay width has been increased or the road with increased.

- Intimate Scale / Home-Zone Streets – 4.8m wide home zone with 1.5m vulnerable user strip each side. Road surfaces are to be in a different colour contrast and texture to Local Streets. Vulnerable user strips will be concrete with an exposed aggregate finish.

Maximum road corner radii of 4.5m are provided within the local streets, with the exception of certain turning heads which have corner radii 6m to accommodate refuse vehicles, and 6m on the main access road as per DMURS and the requirements of South Dublin County Council.

2.5 ACCESS, PARKING AND TEMPORARY HAUL ROUTES

The future Clonburris Southern Link Street (CSLS) bisects the proposed development. North of the CSLS the site is within sub sector CSW S3 while the south is within sub sector CSW S4 of the Clonburris South West Development Area. The Clonburris South Link Street which links the R113 to the R136 will provide access to the subject site. The Fonthill Road is located to the east of the proposed development.

The proposed development will be accessed from the Clonburris Southern Link Street (CSLS) which has been granted permission in August 2021 under planning reference SDZ20A/0021. The CSLS includes minor priority-controlled junctions along the street alignment to provide access to future development cells within the Clonburris SDZ including the subject site. The subject site's internal road layout has been designed with a number of junctions

and a meandering alignment through the development to promote traffic calming and discourage "rat running" through the development.

2.5.1 Car Parking and Bicycle Parking

It is proposed to provide 656 no. car parking spaces comprising 172 no. car parking spaces within CSWS3 and 484 no. car parking spaces in CSWS4.

The development includes provision for secure cycle storage. The apartment/duplex blocks will have access to bike stores and the provision is outlined below:

Table 2.7 – Overall Bicycle Provision

	Bicycle Provision
Apartments	358
Duplex units	234
Houses	-
Visitor	80
	672

Source: MCORM Architects Schedule of Areas

2.5.2 Temporary Haul Routes

2 no. temporary haul routes are being proposed to provide access to the subject site. Potions of the haul route coincide with the permitted Clonburris Southern Link Street (CSLS) to be constructed as part of the Clonburris Joint Infrastructure Works (JIW) under planning permission SDZ20A/0021. The proposed haul routes being proposed will be approximately 6.0m wide. These will consist of a temporary road build up as shown on drawing 162119-DBFL-RD-SP-DRC-5203. Generally, the haul routes follow the route of proposed local streets as set out in the overall SDZ. All construction materials, debris, temporary hardstands involved in the construction of these roads will be removed off-site on completion of the works or else will be incorporated as capping material into the future local street network (subject to planning permission.

2.6 LANDSCAPING

The Landscape Design Statement prepared by Murray Associates sets out the Landscaping Strategy for the subject lands.

Figure 2.12 – Landscape Strategy

The design intent is to create a high quality and appropriate landscape for future residents, which will meet their recreational needs and provide an attractive visual setting and associated social amenity spaces. The principles of inclusivity for all age groups, universal accessibility and sustainable development are applied to ensure an inclusive and environmentally responsible design solution. A restrained palette of materials will also be used to integrate the proposed architectural forms and materials within the landscape. There are two main open spaces identified within

the Phase 1 Lands. The Local Park (1.56ha) and a portion of the wider Grand Canal Park (2.85ha), totalling 4.41 Hectares. Out of a net developable area of 14.12 ha, this accounts for 31% public Open Space within the development.

Regarding the Communal Amenity Space there is a requirement over the whole site (as per Design Standards for New Apts (2020) of 2,570sqm. Space provided totals 3,936 sqm over the entire site, with appropriate locations adjacent to the respective duplexes and apartments. This accounts for a 53% increase on the required area. This mosaic of open spaces gives every resident easy and convenient access to recreational amenity and allows distinct landscape treatments and elements to be applied to different spaces. This aids way-finding and contributes towards giving areas within the development a recognisable character.

2.6.1 Local Park CSWS3

Located within the CSWS3 sector, the Local Park provides amenities at neighbourhood level, complimenting the amenity provision within future strategic parks (Griffen Valley Park, Na Cluanite and parts of Grand Canal Park). As set out in the SDZ planning Scheme (Table 2.10.2) a variety of elements have been included within the space. A Multi-Use Games Area is positioned to the north-east of the open space to take advantage of the slope in this area for a natural grassed amphitheatre-type setting. The park allow acts as a detention basin to cater for the 1:100 year stormwater runoff, with a further attenuation facility below the grassed area. The grassed area is accessed by accessible ramps to allow for universal access. The park is enclosed with shelterbelts of native woodland planting. These give shelter from the surrounding roadways while also providing enough visibility through to the park for good passive observation.

Figure 2.13 – Local Park CSWS3

Source Murray Associates

2.6.2 Grand Canal Park

The open space to the south of the proposed site is part of the Grand Canal Park, a large linear open space that runs along the entire southern portion of the SDZ lands, linking in at certain points with the SDZ landscape network via the Griffeen Valley Park and the Na Cluainte Park. The entire SDZ Grand Canal Park encompasses both sides of the canal and contains significant ecological and biodiverse landscape elements, particularly to the northern bank of the Grand Canal.

The canal is covered by a Proposed Natural Heritage Area (pNHA) designation, with no significant development within 50 metres of the pNHA boundary. As such, the proposed landscape layout takes the retention of this strategic ecological corridor as of prime importance within the park design, and is designed to ensure that future expansion of the park to the west is easily achieved, with the linear landscape structure of the existing vegetation to the northern banks being retained and enhanced with additional native planting where needed. While the existing vegetation to the northern bank is retained, there is also additional planting of native woodland, native meadows, native hedgerows and native trees within the open space, with the intention of enhancing and increasing the ecological diversity along this important strategic green infrastructure corridor.

Figure 2.14 – Grand Canal Park

Source: 3D Design Bureau

Figure 2.15 – Grand Canal Park

Source Murray Associates

A single wide path catering for pedestrians and cyclists weaves through the space from east to west, off which various spaces and routes open up. The path links together grassed kickabout spaces, native meadows, woodland spaces, a large natural play area, seating spaces and allows for further connection to the west. A proposed further link utilising the existing crossing over the overflow stream from the existing canal towpath northwards towards the Fonthill Road gives additional pedestrian/cycle connectivity. There is also opportunity to link the development with the canal at certain points, to future detailed design and agreement with the relevant authorities.

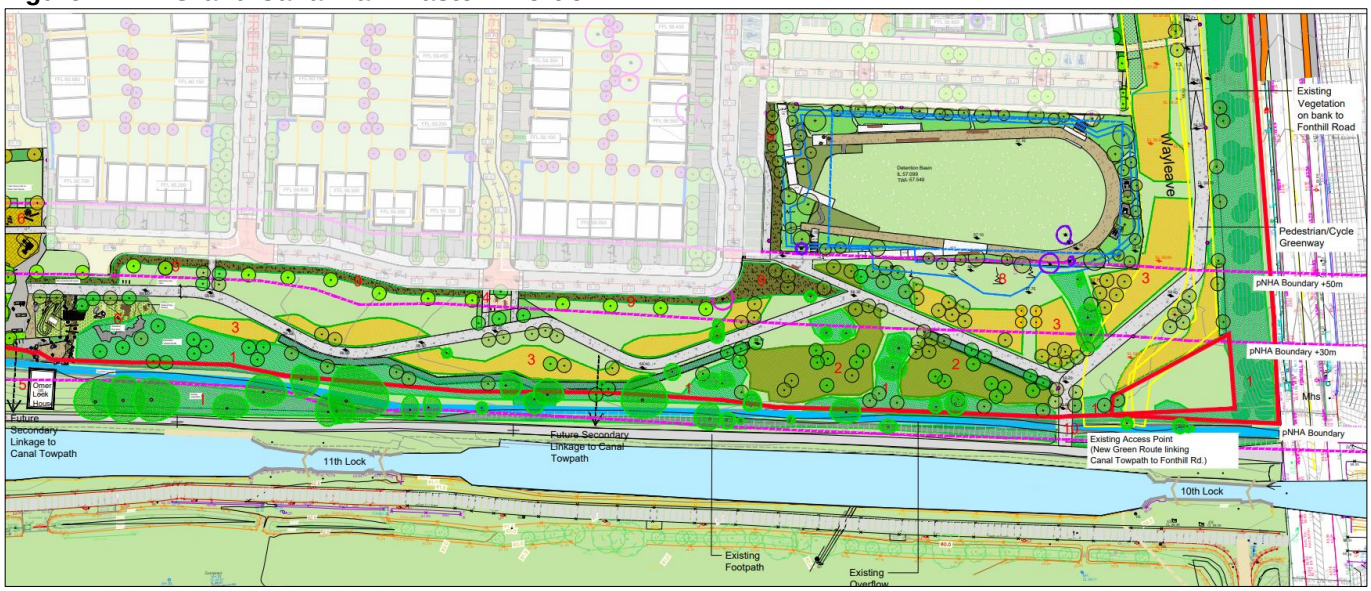
There is a large neighbourhood play area to the north within the Local Park and a large neighbourhood play area to the south, within the Canal Park. Within the Local Park there is a multi-use games area, a natural & formal play space, and large open kickabout area. Younger children are also catered for within this space. The neighbourhood

play space within the Canal Park incorporates natural and formal elements and also caters for younger children. This space also incorporates a sensory woodland garden area, and there is scope to include play areas closer to the overflow stream, that allows for water and sand play spaces. Local Play spaces within the development include smaller intimate play spaces for local use by adjacent residents within the communal amenity spaces. Young children, up to six years of age, are catered for in these spaces

Figure 2.16 – Play Areas

Source Murray Associates

Figure 2.17 – Grand Canal Park Eastern Portion



Source Murray Associates

Figure 2.18 – Grand Canal Park Western Portion

Figure 2.19 – Omar House Play Area

Source Murray Associates

2.6.3 Communal Open Space

With reference to Appendix 1 of the Apartment Guidelines 2020, communal open space the proposed development would require a communal open space provision of 2,714 sq. m. The communal open space provided of c. 3,936 sq. m is substantially above the requirements.

Table 2.8 – Communal Open Space Requirement

Communal Open Space	Requirement	No. of Units	Requirement	Provided
Overall Development				
1 bed	5 sq.m.	108	540	
2 bed	7 sq.m.	209	1,463	
3 bed	9 sq.m.	79	711	
		396	2,714 sq. m	3,936 sq. m
Development Area CSWS4				
1 bed	5 sq.m.	76	380	
2 bed	7 sq.m.	135	945	
3 bed	9 sq.m.	49	441	
		260	1,766 sq. m	2,538 sq. m
Development Area CSWS3				
1 bed	5 sq.m.	32	160	
2 bed	7 sq.m.	74	518	
3 bed	9 sq.m.	30	270	
		136	948 sq. m	1,398 sq. m

2.6.4 Planting Strategy

The various open spaces and public realm areas will have a defined appearance by the use of different varieties of trees and planting within certain character areas. This reinforces the architectural placemaking and aids wayfinding within the development. In order to minimise the need for mowing, extensive lawn areas are avoided where possible; meadow areas or wilder, natural open space areas are included in their place. Where mown areas are required they should cater for informal play. Native trees and shrub species are predominantly used throughout the areas where possible, and suited to the micro-climactic conditions. Where native species are not proposed, planting should have reference to the All-Ireland Pollinator Plan. Ornamental shrubs, perennials and hedging are proposed adjacent to seating areas and entrances to add interest in these intensively used spaces. This intensification of planting can also be proposed around other thresholds and pedestrian nodes, and can aid wayfinding. These public realm planting mixes are to be selected for vigour and once established should require minimal maintenance.

While there are 84no. trees to be removed (51no. due to construction, 34no. due to poor condition), including all bare-root woodland areas, in total there will be approximately 7,426 new trees planted with the development and the open spaces. Within this, there are 1,842 standard trees proposed. Of this, 40no. trees are on-curtilage to the street, with 172no. in rear gardens. This accounts for 16% of the total trees planted. Additionally, within the open spaces here will be 5,260 sqm of native woodland and 5,770 sqm of native meadow planting. Also included is 510 linear metres of native hedgerow planting (1305m removed due to construction). Also within the development area there will be approximately 11,505sqm of shrub and perennial planting. Where native planting is not specified, specific attention will be paid to species specified with the All-Ireland Pollinator Plan. This additional planting associated with the proposed development will greatly enhance the existing habitat and landscape potential of the lands, leading to a strongly positive impact on the landscape in the medium to long term.

2.7 SERVICES

The proposed site will benefit from trunk infrastructure proposed as part of the Clonburris Infrastructure Development for which planning has been granted in August 2021 under planning reference SDZ20A/0021. The CSLS includes trunk road, drainage, watermain and utility infrastructure to serve the Clonburris Strategic Development Zone lands to the south of the Kildare/Cork Railway Line which includes the subject site.

2.7.1 Surface Water Drainage and Attenuation

DBFL Consulting Engineers have undertaken a "Surface Water Management Plan" (SWMP) for the overall Clonburris Strategic Development Zone (SDZ). The SWMP for the SDZ been submitted to SDCC and agreed with SDCC. The SWMP outlines the surface water strategy for the overall SDZ lands and the requirements for each individual site within the SDZ which includes the subject site. The SWMP includes the strategy for attenuation design, SUDS features, run off rates and trunk infrastructure layout. The subject site has been designed in accordance the strategy agreed upon in the SWMP.

The proposed site will benefit from trunk surface water infrastructure proposed as part of the Clonburris Infrastructure Development for which planning was granted under reference SDZ20A/0021. The planning application included trunk surface water sewers and regional attenuation to serve the subject site, this strategic infrastructure aligns with the SWMP proposals and allows for a treatment train of Suds measures within individual sites and within the regional features.

It is intended that the stormwater run-off generated from the proposed development will be collected in a new gravity sewer and discharged to the regional attenuation systems constructed as part of the JIW. The subject site spans across two separate catchments within the SWMP.

In accordance with the GDSDS it is proposed to use Sustainable Urban Drainage systems (SUDS) for managing storm-water for the proposed development. The aim of the SUDS strategy for the site will be to;

- Attenuate storm-water runoff.
- Reduce storm-water runoff.
- Reduce pollution impact.
- Replicate the natural characteristics of rainfall runoff for the site.
- Recharge the groundwater profile

The proposed layout of the drainage and SUDS is detailed on drawings 162119-DBFLCS-SP-DR-C-1301 to 1304.

The attenuation systems for the CSLS have been approved under planning reference SDZ20A/0021. Minor amendments to the plan footprints permitted under SDZ20A/0021 are proposed as part of the current application however the overall general arrangement, levels and attenuation volumes are to be maintained as per the permitted application.

2.7.2 Foul Sewer

The existing site is predominantly greenfield and therefore has no foul loading at present. The planning application SDZ20A/0021 includes the trunk foul sewers which the subject site will connect into. The subject sites foul layout will be designed to connect into the trunk foul sewers.

The overall SDZ lands are relatively flat therefore the pumping of wastewater is required. It is proposed that the wastewater generated from the new houses and apartments for this application will be collected by new gravity sewers that discharges to the trunk sewer within the new Link Road. This in turn discharges to a future Irish Water pumping station (Pumping Station #1 as shown in Figure 4.2) adjacent to the R113 Fonthill Road. This future pumping station and its rising main connection to the existing 9B trunk sewer on Fonthill Road is being delivered by Irish Water as part of the Irish Water Clonburris Local Infrastructure Housing Activation Fund (LIHAF) Scheme. The pump station is currently at planning application stage with SDCC under planning reference SDZ21A/0006.

This application comprises 569 residential units, 540m2 of creche/employment area with 623m2 of community/civic space above. The development will discharge to Pumping Station 1. The estimated average daily load from the development is 236m3.

2.7.3 Water Supply

The proposed site will benefit from trunk watermain infrastructure proposed as part of the Clonburris Infrastructure Development for which was granted permission under planning reference SDZ20A/0021. The planning application includes a 400mm diameter watermain running along the Proposed CSLS at the north of the subject site.

The subject section of the site will connect into the CLSL trunk watermain infrastructure at two locations creating a two separate 150mm watermain loops serving the north and south sections of the site. The 150mm loops within the subject site will then feed smaller 100mm distribution watermains.

The connection to the public water main will include a metered connection with sluice valve arrangement in accordance with the requirements of Irish Water. Individual houses will have their own connections to the distribution main via service connections and boundary boxes. Individual service boundary boxes will be of the type to suit Irish Water and to facilitate domestic meter installation. Hydrants are provided for fire-fighting at locations to ensure that each dwelling is within the required Building Regulations distance of a hydrant.

The average daily demand (litres per day) is estimated at 244,664 litres or 244.6 m3.

The development's proposed water-main distribution system is shown on drawings 162119-DBFL-WM-SP-DR-C-1351,1352, 1353 & 1354.

2.7.4 ESB Networks

The existing overhead services on the site will be undergrounded and diverted as required. A new Medium Voltage below ground network will be provided in the proposed development which will connect to the existing ESB Networks infrastructure in the area. Up to 4 new "unit sub-stations" will be provided throughout the site to meet the electrical demands associated with the new houses and duplex units while a further 1no "in-building" sub-station will be provided to serve the apartments.

The exact extent and location of the connections will be agreed with ESB Networks during the design stage of the project.

2.8 CONSTRUCTION MANAGEMENT STRATEGY

2.8.1 Introduction

It is envisaged that the development of the lands will occur for up to approximately 2-3 years having regard to the nature of the project and the need for flexibility to respond to market demand. A Preliminary Construction Management Plan has been prepared by DBFL and is included with the application. The CMP will be developed and agreed between the contractor and South Dublin County Council prior to commencement of development. The contractor shall also incorporate all mitigation measures outlined in the EIAR.

Construction of the development involves the following principal elements:

- Site strip. Earthworks associated with the construction of the houses and roads in the development.
- Construction of new buildings - houses, duplex units & creche.
- Construction of roads, footpaths & hard/soft landscaping.
- Buried site services installation. Connection to public services.

2.8.2 Coordination

The proposed development is intended to be constructed in parallel with the CSLS works. Therefore, interactions will be required between the two developments throughout the works.

In order to manage interactions between the two sites a Project Liaison Group will be established. This group will have regular meetings to ensure a co-ordinated approach to design interfaces, works programmes and environmental management activities for both sites. The group will consist of the Construction Project Manager for both sites and both sites' PSCS, PDSP and key design staff as required.

As part of the southern SDZ planning scheme the infrastructure and services of the proposed development are to connect into those provided by the CSLS works. Co-ordination is required between the two developments to ensure a programme detailing an accurate sequence of works for each infrastructure and services element of the CSLS is established. The following elements need to be co-ordinated prior to commencement of the works:

- Works programmes. Activities which may impact the adjoining site will be co-ordinated. For example where road construction works or service installation affect access along the CSLS to the residential development, the works shall be phased so that alternative access routes are maintained via haul routes or second site access. Likewise key residential development phases such as bulk material import/export shall be co-ordinated with CSLS so that arrangements can be made to maintain this traffic through the CSLS site

- Site Levels- Permanent access to the proposed development is to be via the Clonburris Southern Link Street. All road, footpath and floor levels are to be finalised and co-ordinated with the CSLS levels prior to construction of the internal roads network.

- Attenuation/Surface Water Drainage – Stormwater run-off generated on the proposed site is to be collected and discharged to the network within the CSLS and stored and controlled via the attenuation structures provided. The surface water network constructed as part of the CSLS needs to be complete prior to final connection from the proposed development. All drainage works for the proposed development to be carried out in accordance with the Clonburris “Surface Water Management Plan”.

- Foul Sewer – The foul sewers constructed as part the CSLS to be complete prior to final connection from the proposed development. All connections and discharge points to be approved by Irish Water.

- Water Supply – All watermains within the CSLS to be complete prior to final connection from the proposed development. All connections and discharge points to be approved by Irish Water.

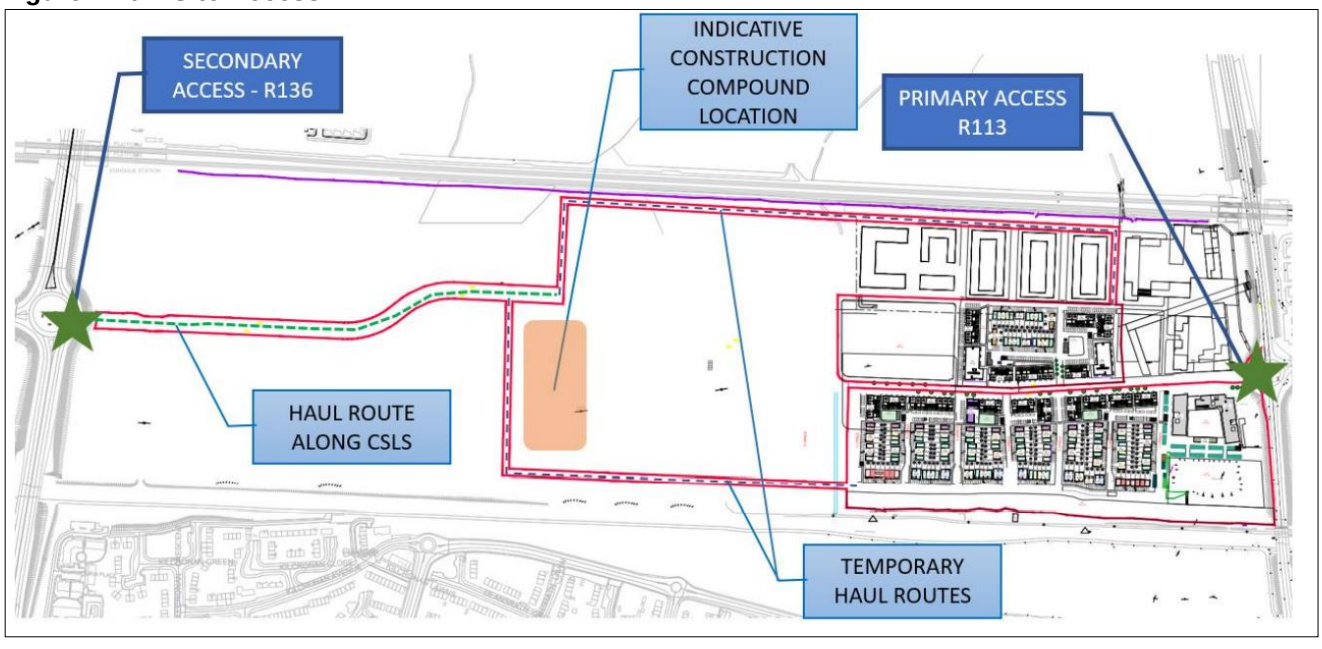
2.8.3 Demolition

There are no demolition works required on the subject lands.

2.8.4 Site Access

The primary site access is to be from the R113 where an existing stubbed access has been formed from the Roundabout. This location coincides with the intended location for the junction of the CSLS with the R113.

Figure 2.20 – Site Access



There may be certain times when access from this location is constrained due to works as part of the CSLS, for example during works to modify the existing roundabout to a signalised junction. Therefore alternative routes to access the site are provided via haul routes from the west. The haul routes initially follow the route of the permitted CSLS from the R136 before diverging to provide a route to both the northern and southern development parcels. The routes are generally designed to follow the future road network identified in the SDZ to minimise environmental impacts.

2.8.5 Site Compound Facilities and Parking

The exact location of the construction compound is to be confirmed in advance of commencement of the works. The location of the construction compound may be relocated during the course of the works.

- The construction compound will include adequate welfare facilities such as washrooms, drying rooms, canteen and first aid room as well as foul drainage and potable water supply.
- The proposed construction compound is to be located in area with easy access to the CSLS and the two proposed haul routes. Indicative location shown above.
- Contractor is to liaise with the CSLS construction team to ensure access to and from the compound has minimal impact on the CSLS construction.
- Foul drainage discharge from the construction compound will be tankered off site to a licensed facility until a connection to the public foul drainage network has been established
- The construction compound's potable water supply shall be protected from contamination by any construction activities or materials
- The construction compound will be enclosed by a security fence
- Access to the compound will be security controlled and all site visitors will be required to sign in on arrival and sign out on departure
- A permeable hardstand area will be provided for staff carparking
- A separate permeable hardstand area will be provided for construction machinery and plant
- The construction compound will include a designated construction material recycling area
- A series of way finding signage will be provided to direct staff, visitors and deliveries as required
- All construction materials, debris, temporary hardstands etc. in the vicinity of the site compound will be removed off-site on completion of the works
- Site security will be provided by way of a monitored infrastructure systems such as site lighting and CCTV cameras, when deemed necessary.

2.8.6 Working Hours

For the duration of the proposed infrastructure works, the maximum working hours shall be 07:00 to 19:00 Monday to Friday (excluding bank holidays) and 09:00 to 13:00 Saturdays, subject to the restrictions imposed by the local authority. No working will be allowed on Sundays and Public Holidays. Subject to the agreement of the local authority, out of hours working may be required for water main connections, foul drainage connections etc.

2.8.7 Traffic and Transportation

A construction stage Traffic Management Plan (TMP) will be prepared for the works by the main contractor. The principal objective of the TMP 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 thereby ensuring that both the public's and construction workers safety is maintained at all time, disruptions minimised and undertaken within a controlled hazard free / minimised environment.

The TMP shall be prepared in accordance with the principles outlined above and shall comply at all times with the requirements of:

- Department of Transport Traffic Signs Manual 2010 – Chapter 8 Temporary Traffic Measures and Signs for Roadworks
- Department of Transport Guidance for the Control and Management of Traffic at Road Works (2010)
- Any additional requirements detailed in the Design Manual for Roads and Bridges (DMRB) & Design Manual for Urban Roads & Streets (DMURS)

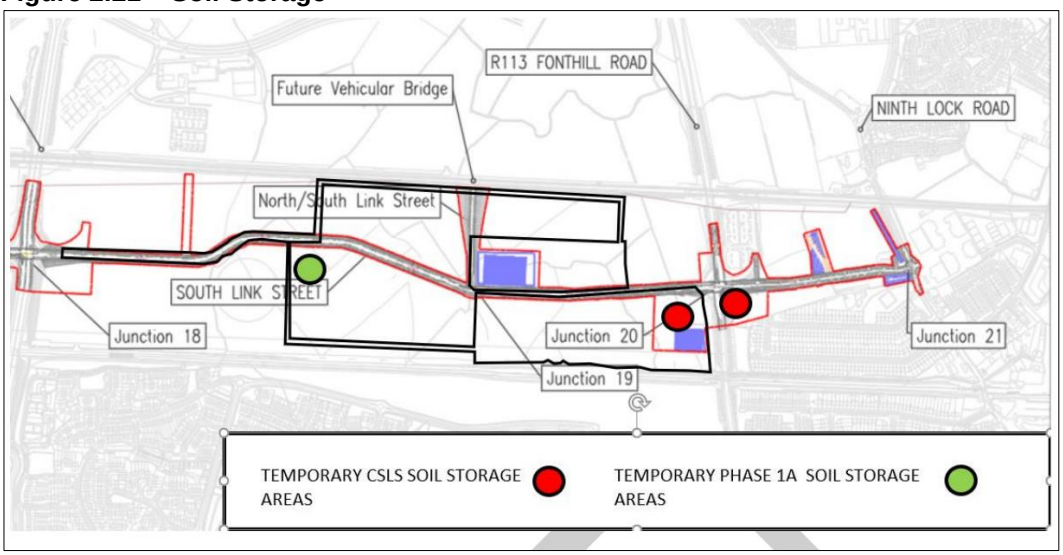
In general, the impact of the construction period will be temporary in nature and less significant than the operational stage of the proposed development (HGV vehicle movements not expected to exceed 5 vehicles per hour during the busiest period of construction works). Construction Traffic will consist of the following categories:

- Private vehicles owned and driven by site staff and management
- Construction vehicles e.g. excavation plant, dump trucks
- Materials delivery vehicles involved in site development works (including trucks for delivery of imported fill to site. On-site employees will generally arrive before 08:00, thus avoiding morning peak hour traffic. These employees will generally depart after 16:00, unless otherwise required.
- Excavated material will be reused as part of the site development works (e.g. use as non-structural fill under green areas) in order to minimise truck movements to and from the site

2.8.8 Soil Stripping/Storage

Site development works will include stripping of topsoil, excavation of subsoil layers and importation of fill. These activities have potential to expose the soils and geological environment to pollution. The Contractor shall obtain approval of their proposed erosion and sediment control measures from South Dublin City County Council's Environment Section prior to commencing works on site.

Figure 2.21 – Soil Storage

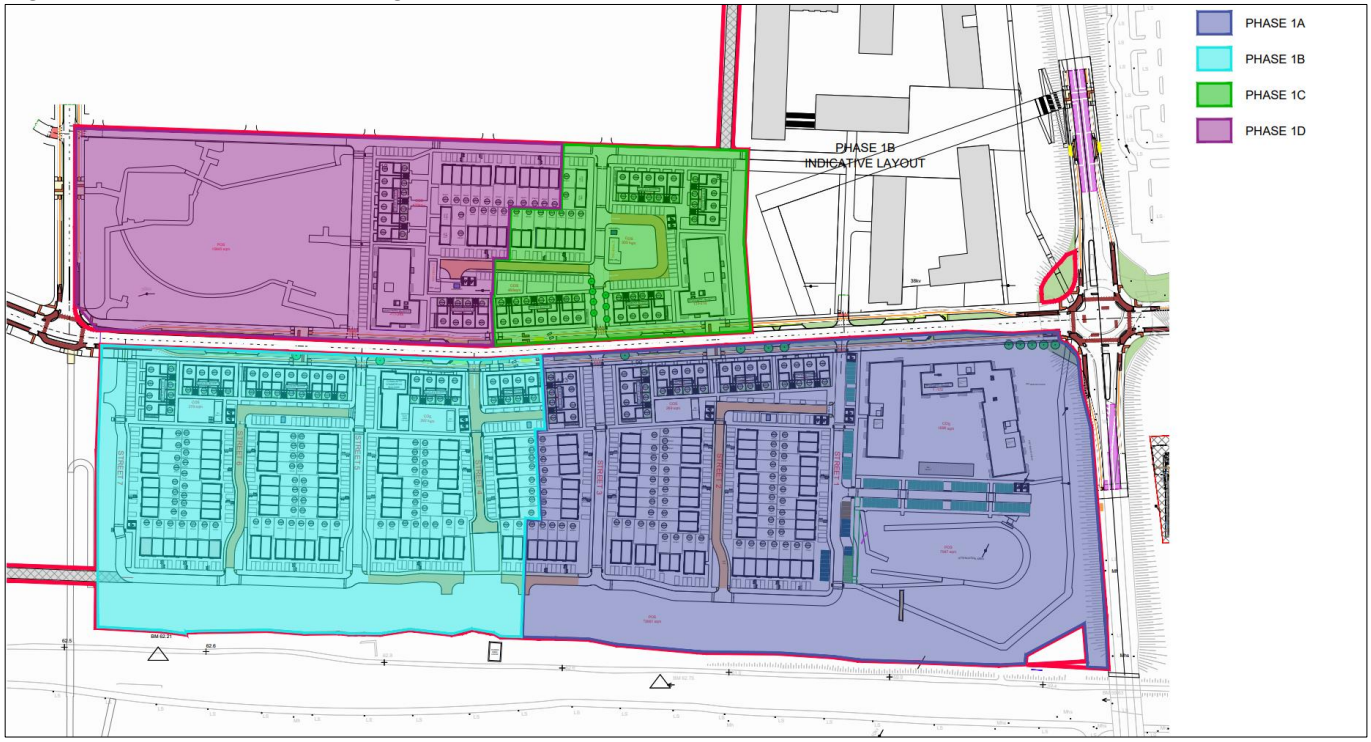


2.8.9 Construction Phasing

At present it is envisaged that the development will be constructed in 5 phases. The project is currently at planning stage and subject to approval and detailed design. It is estimated that the works would be tendered in the first quarter of 2022 with commencement expected in the second quarter of 2022. The development would have an estimated site program of 24 - 36 months depending on construction phasing. The construction works will be phased. An indicative construction phasing plan is presented below.

It is envisaged that the open space will be delivered within each phase.

Figure 2.22 – Indicative Phasing



However, the project may be constructed over in a number of phases for commercial reasons. The exact number of phases and the make-up of each will be subject to market conditions and commercial considerations at the time.

2.9 ENERGY STATEMENT

The Waterman Moylan Energy Statement enclosed with the application sets out to demonstrate a number of methodologies in Energy Efficiency, Conservation and Renewable Technologies that will be employed in part or in combination with each other for this development. These techniques will be employed to achieve compliance with the building regulations Part L and NZEB standards.

2.9.1 Environment / Global Issues

Increasing levels of greenhouse gases have been linked with changes in climate and predicted global warming. By far the biggest human contribution to the greenhouse gases is in emissions of carbon dioxide. The development is likely to increase carbon dioxide levels in the atmosphere by the embodied emissions in the building materials used, and in the operational energy consumed during the life of each building.

To minimise the embodied emissions impact, materials will be sourced locally where possible (reducing carbon dioxide emissions associated with transportation), and preference will be given to reusing materials, and using materials in their natural state (reducing the emissions associated with processing). Chapter 7 of the EIAR sets out the potential impacts and mitigation in respect of Air Quality and Climate.

2.10 EMISSIONS AND WASTE

2.10.1 Effluents

Effluent arising from foul drainage from the proposed development will be discharged through piped systems to the local authority sewers. Operation of the development will involve the discharge of uncontaminated surface water from the impermeable areas to a proposed network all linking into the established public system in the environs. Details of the impacts and mitigation measures for surface water and foul drainage are recorded at Chapter 6 of this Environmental Impact Assessment Report. Mitigation measures include measures designed to avoid, reduce, remedy or offset impacts.

2.10.2 Construction Waste Disposal Management

Chapter 11 of the EIAR (Material Assets – Waste Management) and the Construction and Demolition Waste and By-Product Management Plan, prepared by Byrne Environmental (included with the application), provides detail on the construction related waste management for the proposal.

The Objective of the Waste Management Plan is to minimise the quantity of waste generated by construction activities, to maximise the use of materials in an efficient manner and to maximise the segregation of construction waste materials on-site to produce uncontaminated waste streams for off-site recycling.

The Waste Management Plan shall be implemented throughout the construction phase of the development to ensure the following:

- That all site activities are effectively managed to minimise the generation of waste and to maximise the opportunities for on-site reuse and recycling of waste materials.
- To ensure that all waste materials are segregated into different waste fractions and stored on-site in a managed and dedicated waste storage area.
- To ensure that all waste materials generated by site activities are removed from site by appropriately permitted waste haulage contractors and that all wastes are disposed of at approved waste licensed / permitted facilities in compliance with the Waste Management Act 1996 and all associated Waste Management Regulations.

2.10.3 Contaminated Soil

Where contaminated soils/materials are discovered or occur as a result of accidental spillages of oils or fuels during the construction phase, these areas of ground will be isolated and tested in accordance with the 2002 Landfill Directive (2003/33/EC) for contamination, and pending the results of laboratory WAC testing, will be excavated and exported off-site by an appropriately Permitted Waste Contractor holding an appropriate Waste Collection permit and that this hazardous material will be sent for appropriate treatment / disposal to an appropriately Permitted / Licensed Waste Facility.

2.10.4 Domestic Municipal Waste/Waste Management

Chapter 11 of the EIAR (Material Assets – Waste Management) and the Operational Waste Management Plan, prepared by Byrne Environmental, provides detail on the domestic waste management for the proposal.

The Objective of the Waste Management Plan is to maximise the quantity of waste recycled by providing sufficient waste recycling infrastructure, waste reduction initiatives and waste collection and waste management information to the residents of the development. The Operational Phase of the Waste Management Plan has been prepared with regard to The Eastern-Midlands Region Waste Management Plan 2015-2021 as referenced in the South Dublin County Council Development Plan 2016 – 2022.

Key Aspects to achieve Waste Targets include

- All residential units shall be provided with information on the segregation of waste at source and how to reduce the generation of waste by the Facilities Management Company.
- All waste handling and storage activities shall occur in the dedicated communal apartment waste storage areas or within the curtilage of individual houses.
- The development's Facility Management Company shall appoint a dedicated Waste Services Manager to ensure that waste is correctly and efficiently managed throughout the development.

All accommodation units shall be provided with a Waste Management Information document, prepared by the Facilities Management Company, which shall clearly state the methods of source waste segregation, storage, and recycling initiatives that shall apply to the Management of the development. This Information document shall be issued to all residential units on an annual basis.

2.10.4.1 Houses / Duplex Units

The design of residential houses and duplex units shall provide sufficient internal kitchen space for the storage of up to 10kg of general unrecyclable waste, green recyclable waste and organic waste. Individual houses shall have external storage space for 3 no. 220 litre waste bins for segregating recyclable, non-recyclable and organic waste.

Residential houses shall be served by private waste collection contractor. Duplex Units shall avail of the communal waste storage areas.

2.10.4.2 Apartment Units

The design of the residential apartments shall provide sufficient internal kitchen space for the storage of up to 10kg of general domestic waste, green recyclable waste and organic waste. A 3-compartment bin system shall be integrated into the kitchen design or be included as free-standing system to have a capacity of up to 30 litres. Each unit shall include waste storage bins which will be of such a size that will allow their easy manual handling to be brought to the communal waste storage areas.

2.10.5 Emissions

The principal forms of air emissions relate to discharges from motor vehicles and heating appliances. With regard to heating appliances, the emission of nitrogen oxides and carbon monoxide will be minimised by the use of modern, efficient heating appliances and as a result, the potential impact is estimated to be negligible. Exhaust gases from motor vehicles will arise from car parking areas and will be discharged directly to the atmosphere. Car parking for motor vehicles is provided at surface level. Chapter 7 of the EIAR sets out the potential impacts and mitigation in respect of Air Quality and Climate.

Noise may be considered in two separate stages, during construction, and when the development is operational. Construction related noise impacts are an inevitable short term limited inconvenience feature which, in general, is accepted by members of the public, subject to the standard controls typical of planning conditions attached to urban based development projects. These impacts can be reduced in a number of ways. It is standard practice to limit construction to normal working hours during the day. In addition, there are a number of regulations relating to noise during construction which the contractor will be expected to adhere to throughout the construction phase. Chapter 8 of the EIAR sets out the potential impacts and mitigation in respect of Noise and Vibration.

2.11 DIRECT AND INDIRECT EFFECTS RESULTING FROM USE OF NATURAL RESOURCES

Details of significant direct and indirect effects arising from the proposed development are outlined in Chapters 3-15 which deal with *'Aspects of the Environment Considered'*. No significant adverse impact is predicted to arise from the use of natural resources.

2.12 DIRECT AND INDIRECT EFFECTS RESULTING FROM EMISSION OF POLLUTANTS, CREATION OF NUISANCES AND ELIMINATION OF WASTE

Details of emissions arising from the development together with any direct and indirect effects resulting from same have been comprehensively assessed and are outlined in the relevant in Chapters 3-15 which deal with '*Aspects of the Environment Considered'*. There will be no significant direct or indirect effects arising from these sources.

2.13 FORECASTING METHODS USED FOR ENVIRONMENTAL EFFECTS

The methods employed to forecast and the evidence used to identify the significant effects on the various aspects of the environment are standard techniques used by each of the particular individual disciplines. The general format followed was to identify the receiving environment, to add to that a projection of the *"loading"* placed on the various aspects of the environment by the development, to put forward amelioration measures, to lessen or remove an impact and thereby arrive at net predicted impact.

Where specific methodologies are employed for various sections they are referred to in the Receiving Environment (Baseline Scenario) sections in the EIAR. Some of the more detailed/specialised information sources and methodologies for a number of the environmental assessments are outlined hereunder.

2.14 TRANSBOUNDARY IMPACTS

Large-scale transboundary projects[6] are defined as projects which are implemented in at least two Member States or having at least two Parties of Origin, and which are likely to cause significant effects on the environment or significant adverse transboundary impact.

Having regard to the nature and extent of the proposed development, which comprises a residential development, located in the Clonburris SDZ, within the administrative area of South Dublin County Council, transboundary impacts on the environment are not considered relevant, in this regard.

2.15 ALTERNATIVES CONSIDERED

As the site is located in a SDZ and subject to an adopted Planning Scheme, this means that alternatives were considered in the adoption of the Planning Scheme. The requirement to consider alternatives within an eIAR is set out in Annex IV (2) of the EIAR Directive (2014/52/EU) and Article 94 and Schedule 6, paragraph 1(d) of the Planning and Development Regulations 2001, as amended, requires the following information to be furnished in relation to alternatives:

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

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. Reasonable alternatives may relate to project design, technology, location, size and scale which were studied in the preparation of the EIAR pertinent to the proposed development and its particular characteristics, together with the main reasons for selecting the chosen option, including a comparison of the environmental effects. 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."*** *(Emphasis added).*

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 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'".

[6] The definition is based on Articles 2(1) and 4 of the EIA Directive and Article 2(3) and (5) of the Espoo Convention, respectively. http://ec.europa.eu/environment/eia/pdf/Transboundry%20EIA%20Guide.pdf

The consideration of the main alternatives in respect of the development of the subject lands was undertaken by the Design Team and has occurred throughout an extensive and coordinated decision-making process, over a considerable period of time. The main alternatives considered are identified below.

2.15.1 Alternative Locations

The South Dublin County Council County Development Plan 2016-2022 zoning map notes the subject site as being within the Clonburris SDZ. As such the Clonburris SDZ Planning Scheme applies to this site. Given the project comprises the development of a site within the Clonburris SDZ and Planning Scheme area, the consideration of alternative locations is not relevant in this instance.

The Clonburris SDZ Planning Scheme was prepared by SDCC to provide a framework for the future development of the subject lands. The Planning Scheme itself was subject to the Strategic Environmental Assessment (SEA) process.

2.15.2 "Do-Nothing" Alternative

A *"do-nothing*" scenario was considered to represent an inappropriate unsustainable and inefficient use of these serviced residential zoned lands within the SDZ.

SI No. 604 of 2015 states that the SDZ at Clonburris:

"is designated as a site for the establishment of a strategic development zone in accordance with the provisions of Part IX of the Act for residential development and the provision of schools and other educational facilities, commercial activities, including employment office, hotel, leisure and retail facilities, rail infrastructure, emergency services and the provision of community facilities."

The Draft EIAR Guidelines also note that:

"Higher level alternatives may already have been addressed during the strategic environmental assessment of relevant strategies or plans. Assessment at that level is likely to have taken account of environmental considerations associated, for example, with the cumulative impact of an area zoned for industry on a sensitive landscape."

Article 5 of SI no 604 confirms the rationale for the designation of the lands as a SDZ for significant residential development noting:

"The site referred to in Article 4 has been designated for the establishment of a strategic development zone for the development specified in that Article, taking into consideration the deficiency in the supply of housing nationally and in the Greater Dublin Area particularly, the number and phasing of the housing units which would be delivered by the inclusion of the lands within a strategic development zone, the potential for comprehensive planning and development of the site due to its scale and configuration, the efficient use of public investment in infrastructural facilities, including public transport, water, waste water and roads and that development of the site will help give effect to the policies in the Regional Planning Guidelines for the Greater Dublin Area 2004-2016."

On the strategic or 'higher' matters of already determined policy, we refer to the SDZ designation of the lands and the supporting Planning Scheme of Clonburris 2019, which support the development of the lands.

In this regard, it is worth highlighting that by virtue of the development in question being located in the Clonburris SDZ and where the acceptability of any development is determined by compliance with the Clonburris Planning Scheme, the extent of any alternatives that in fact open to be considered have been reduced as compared to a development located outside of an SDZ.

A do-nothing approach would be contrary to the Council's objectives to promote the development of the SDZ, in accordance with the adopted Planning Scheme and an opportunity to achieve efficient and compact development which will benefit from existing and improved public transport (Dart+ programme) would be lost. A do nothing approach is considered to be inappropriate and an unsustainable use of zoned land in close proximity to public transport.

2.15.3 Alternative Uses

The proposed development is located in the Clonburris SDZ and subject of a Planning Scheme. The proposed residential development with creche, innovation hub and open space is consistent with the zoning and related uses of the Clonburris Planning Scheme 2019. The location of new residential development at this site has therefore been pre-empted in the adopted Planning Scheme which itself was subject to Strategic Environment Assessment (SEA) and the consideration of alternatives for this site and area.

2.15.4 Description of Alternative Processes

This is not considered relevant to this EIAR having regard to the nature of the proposed (residential) development. It is noted the proposed construction works comprise relatively standard building construction processes. As such there are no specific alternative construction processes identified. With reference to the operational phase, no new, unusual or technically challenging operational techniques are required, as such no alternative operational processes have been considered.

2.15.5 Alternative Designs and Layouts

The project architects undertook an extensive appraisal to determine the appropriate scale, massing and layout of the proposed development. We refer the Planning Authority to the Architectural Design Statement prepared by MCORM Architects.

The analysis includes an assessment of:

- The characteristics of the subject site and wider environs
- Site constraints such as high-pressure gas pipeline & the Grand Canal to the south.
- The provisions of the Clonburris Planning Scheme which provides a range of design standards and objectives uses, masterplan form, and a range of building heights.

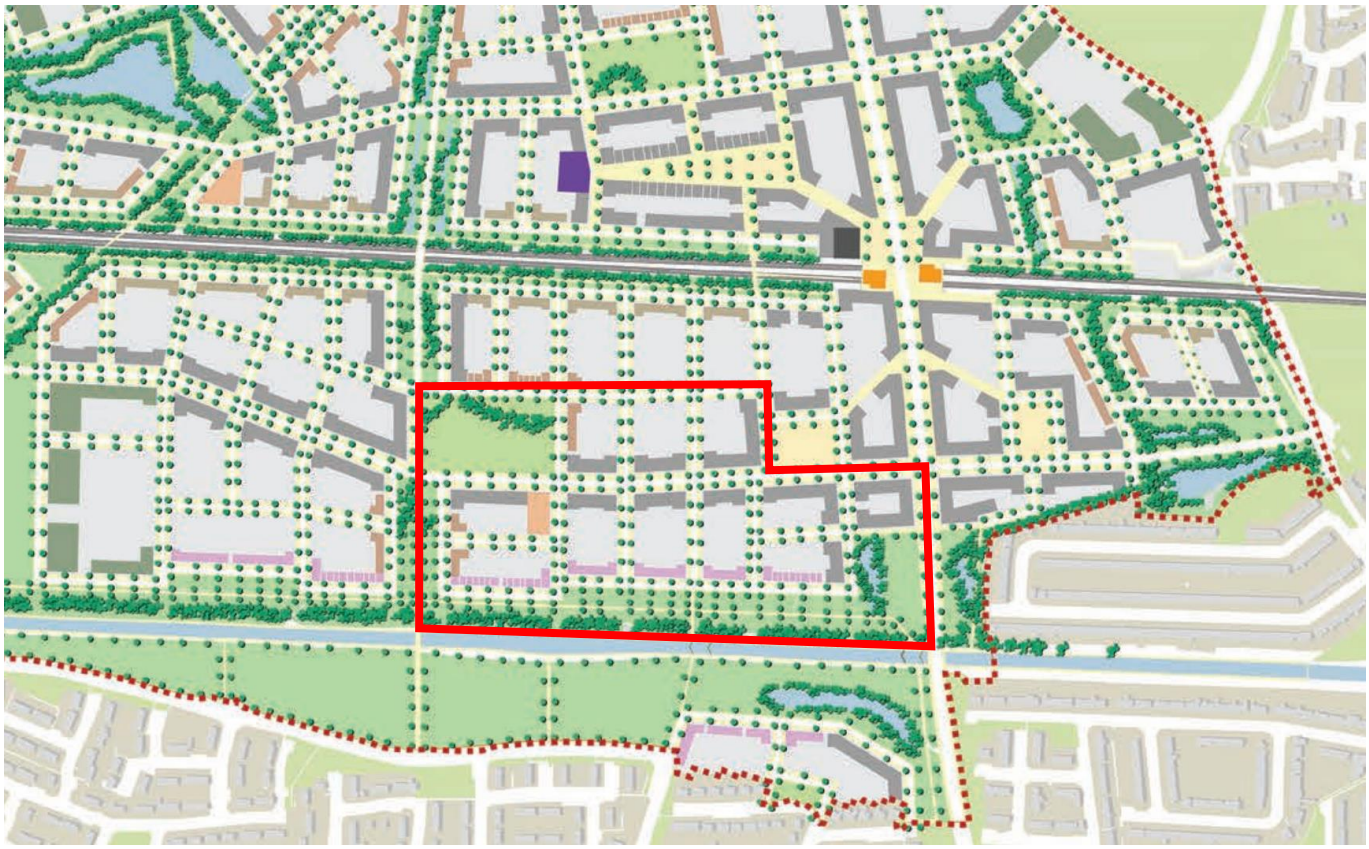
The masterplan for the site has been informed by the guidance set out in the Clonburris Planning Scheme 2019, with respect to the placement of blocks on the site, including the fixed elements which relate to the permitted Clonburris Southern Link Street, which bounds the CSWS3 to the south and CSWS4 to the north. To the east, the alignment of the Fonthill Road is fixed as is the high-pressure Gas Networks Ireland gas main wayleave, which is located along the western side of the Fonthill Road.

The principle of all designated streets under this Planning Scheme is fixed and the alignment of each street including its centre line (see Figure 2.8.5 in Section 2.8 – Building Centre Line & Urban Grain) are either fixed or flexible depending on typology. The planned street hierarchy for the SDZ lands is illustrated in Figure 2.2.1. The arterial streets and Link streets are fixed whereas the local streets are flexible.

It is noted the Planning Scheme outlines that some slight plot adjustment for each Sub Sector may be acceptable provided that this would not affect prescribed dwelling numbers/densities or non-residential floorspace for any Sub Sector; would not significantly affect the gross or net development area of any Sub Sector.

In this regard the main alternative would have been to present the blocks closer to the Fonthill Road. However, given the location of the Gas Networks Ireland wayleave which prohibits development over the wayleave, from a Human Health and Safety, as well as Risk Management perspective, that particular alternative was discounted as not possible.

The proposed layout of the preferred alternative will not affect the alignment or centre line of any fixed street; would not significantly affect prescribed building lines of any fixed street; would not adversely impact on the environment or environmental objectives contained in the SEA Environmental Report (including required setback from the Grand Canal); and would not have any implications in relation to European Sites.



2.15.5.1 Alternative Design 1

The key structuring principles of the Planning Scheme Development Area CSW3 and CSW4 within which the proposed development is located was also taken into account. The proposal will support the range of densities identified in the Planning Scheme.

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

- The need to achieve an appropriate density in the context of the Sustainable Residential Development in Urban Areas Guidelines for Planning Authorities (2009) having regard to the location of the site within the Clonburris Planning Scheme.
- Transition in scale between proposed buildings on site.
- Building heights proposed and compliance with the Planning Scheme.
- The need to ensure any residential development provides a good mix of housing typologies which meet current market demand and which are deliverable in the short to medium term.
- Interface of proposed buildings and constructed roads to ensure as much passive surveillance as possible for animation and security.
- Building heights proposed in compliance with the Planning Scheme 2019.
- The need to provide a sustainable level of housing provision on the residential zoned lands.
- The need to deliver good quality open space in appropriate locations with a clear hierarchy as set out in the Clonburris Planning Scheme
- Protection of existing trees and hedgerows where possible,

The final layout proposed is not considered to give rise to any significant adverse environmental impacts. Mitigation measures to be implemented at construction and operational phases of the project are summarised in Chapter 16 (Summary of Mitigation and Monitoring Measures).

With reference to Population and Human health (and Biodiversity), the potential impacts are broadly similar with the preferred alternative providing additional open space in the eastern portion of CSWS4, and therefore slightly more positive.

With regard to Landscape and Visual Impact, the preferred alternative would result in a reduced landscape and visual impact compared to Alternative no. 1 which proposed additional apartments in the southern portion of the CSWS4.

Air and noise impacts from the alternatives are broadly similar. Principally these impacts will occur as a result of the construction phase of the development as operational impacts would be largely restricted to traffic and these volumes are generally low. As these impacts can be largely mitigated through good construction practices, the residual impact is considered low and temporary in all cases.

The inclusion of pedestrian links through the site, facilitating access to the southern open space along the Canal, which will link to a strategic network of open spaces, is a positive aspect of the proposal. The potential impacts relating to archaeology are considered to be broadly similar as the previously unrecorded features, will be preserved *in situ*. With regard to Material Assets (Utilities and Waste Management), it is considered the alternatives are similar as they would require servicing and also ESB etc.

With reference to the final layout, the iterative process outlined above, which included alternative site layouts were considered with the objective of producing a new high quality residential development, which has undergone a robust consideration of relevant alternatives having regard to the comparison of environmental effects and meets the requirements of the EIA Directive, based on the multidisciplinary review across all environmental topics.

2.16 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 including associated infrastructural works, creche 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, cumulative secondary and indirect impacts are unlikely to be significant and are addressed in the content of this EIAR document.

2.16.1 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 Clonburris Planning Scheme 2019. 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.

2.16.2 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.

2.16.3 Risks of Major Accidents and/or Disasters

The surrounding context consists of a mix of residential, agricultural, employment, educational and open space public amenity lands. It does not include any man-made industrial processes (including SEVESO II Directive sites (96/82/EC & 2003/105/EC) which would be likely to result in a risk to human health and safety.

Article 3 of the Environmental Impact Assessment (EIA) Directive 2014/52/EU, requires the assessment of expected effects of major accidents and/or disasters within an EIA. Article 3(2) of the Directive states that *"The effects referred*

to in paragraph 1 on the factors set out therein shall include the expected effects deriving from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned".

2.17 RELATED DEVELOPMENT AND CUMULATIVE IMPACTS

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. All cumulative, secondary and indirect impacts are unlikely to be significant and, where appropriate, have been addressed in the content of this EIAR document.

Each Chapter of the EIAR includes a cumulative impact assessment of the proposed development with other permitted 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.

For the noise impact assessment in Chapter 8 the potential noise emissions arising from the proposed development during construction and operation are combined (using cumulative AADT figures from Traffic chapter) with background noise levels (predominantly road traffic) were assessed.

Each of the relevant specialists has considered the potential for cumulative impact in preparing their assessments, where relevant. While there is the potential for negative impacts to occur during the construction stage of the scheme, with the implementation of the appropriate mitigation outlined in the EIAR, the residual cumulative impact is not considered to be significant.

3.0 POPULATION AND HUMAN HEALTH

3.1 INTRODUCTION

The 2014 EIA Directive (2014/52/EU), as transposed into Irish legislation, amended the 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 Rory Kunz, BA (MOD), MScERM, MAT&CP, Dip EIA Mgmt., Executive Director with John Spain Associates who has a Masters in Environmental Resource Management and a Diploma in EIA Management (both from UCD) as well as a Masters in Town and Country Planning. In addition, Rory is a corporate member of the of the Irish Planning Institute and has 18 years of experience of Environmental Impact Assessment and urban development.

In preparing this chapter, consideration has been given to the other inputs to this EIAR including, in particular, the chapters addressing Air Quality and Climate, Noise and Vibration, Traffic and the separate reports addressing Construction and Demolition Waste Management, Sunlight and Daylight and the Construction and Environmental Management Plan.

Population and Human Health comprise an important aspect of the environmental impact assessment to be undertaken by the competent authority. 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 concentrates on those topics which are manifested in the environment, such as the construction of the development, new land uses, more buildings or greater emissions.

3.2 STUDY METHODOLOGY

At the time of writing there is no specific guidance from the EU Commission on the 2014 EIA Directive to indicate how the new term 'Human Health' should be addressed. However, the European Commission's *Guidance on the preparation of the Environmental Impact Assessment Report* (2017) does reference the requirement to describe and, where appropriate, quantify the primary and secondary effects on human health and welfare. Moreover, the European Commission guidance states the following in relation to the assessment of Human Health:

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

In accordance with this approach to Human Health espoused in the Commission Guidance, this chapter addresses human health in the context of other factors addressed elsewhere in further detail within the EIAR where relevant. Relevant factors identified include inter alia water, air quality, noise, and the risk of major accidents and disasters.

In addition, this chapter of the EIAR 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.

Moreover, the content of the Institute of Environmental Management and Assessment [IEMA] high level primer document (2017), which was prepared having considered the provisions of the 2014 EIA Directive, has also been considered in the preparation of this chapter. The IEMA document posits that human health spans environmental, social and economic aspects and does not merely represent an absence of disease. A broad conception of human health is put forward, that should encompass factors such as local economy and community, rather than relying on a narrower focus on biophysical health factors and determinants. In this regard, the current chapter seeks to address population and human health in a holistic manner, including consideration of economic factors, settlement patterns, landscape and visual impact, and land-use.

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, site visits were undertaken to appraise the location and likely and significant potential impact upon human receptors of this proposed development. A desk-based study of published reference documents such as Central Statistics Office Census data, the ESRI Quarterly Economic Commentary, the *Regional Spatial and Economic Strategy for the Eastern and Midlands Regional Assembly, 2019*, the *South Dublin County Development Plan 2016-2022, and the Clonburris Planning Scheme 2019* has also been undertaken. The Strategic Environmental Assessments (SEA) for the County Development Plan and the Clonburris Planning Scheme have also been reviewed, as both provide a consideration of Population and Human Health.

With reference to Population and Human Health, the SEA relating to the Clonburris Planning Scheme states:

"The promotion of sustainable development by balancing complex sets of environmental, social and economic goals in planning decisions can deliver positive effects for population and human health. Overall, the SDZ Planning Scheme is likely to improve the status of the SEO's on population and human health. The SDZ Planning Scheme promotes the development of quality, sustainable settlements with policies relating to integrated landuse and transport, environmental protection and energy efficiency balanced with economic vitality."

For Biodiversity, the SEA relating to the Planning Scheme states:

"Proposals within the SDZ Planning Scheme to increase accessibility particularly along the Grand Canal pNHA could impact adversely on biodiversity resources through disturbance and fragmentation unless mitigation is provided for. This is particularly important in relation to the northern towpath and the habitats and species associated with this area, including bats and bird species. Indirect and cumulative impacts are identified for biodiversity in the event of damage to soil and water resources associated with development activities. Water pollution or surface water run off could give rise to negative effects on water quality and streams/ rivers within the SDZ lands with subsequent adverse effects on biodiversity. Therefore, a number of mitigation measures are recommended for the above."

In relation to water the SEA relating to the Planning Scheme states that while the provision of the Planning Scheme *"will minimise adverse effects, at Planning Scheme level Infrastructural and built development may adversely affect water resources due to potential impacts on water quality; to provide for greater protection of water resources, additional mitigation measures are recommended."*

With regard to Soils, the SEA relating to the Planning Scheme states "Historical dumping has been identified as a potential issue on the SDZ lands and these would require remediation as required. The most significant soil and geology effect identified relates to new built development and conversion of predominantly greenfield lands to a mixed use residential community over time in line with the Planning Scheme objectives."

The SEA relating to the Planning Scheme states that "Overall the SDZ Planning Scheme will contribute positively to climate change adaptation."

With reference to Cultural Heritage, SEA relating to the Planning Scheme states *"the Overall the impacts of the SDZ Planning Scheme are long term and positive in relation to cultural heritage due to the recognition of the value of cultural heritage and the range of cultural heritage features including built heritage, natural heritage and landscapes." Section 2.12 Archaeological and Architectural Heritage contains specific measures to minimise adverse effects and promote reuse of architectural features such as the Omer lockhouse.*

For Material Assets – (transport), The SEA for the Planning Scheme states that *"provisions including in Section 2.2 Movement and Transport Strategy are of particular relevance. These are identified as generating positive impacts for a number of SEOs including population and human health, air quality and climate and sustainable transport."*

The SEA notes in relation to Landscape that *"The preparation of a Parks and Landscape Strategy in the early phasing of the Planning Scheme is a positive effect on the landscape SEOs; again to promote and strengthen environmental*

protection and ensure biodiversity considerations are aligned with such a strategy, additional mitigation measures are recommended for this proposal."

The SEA concludes that:

"The SEA and Screening for Appropriate Assessment has been undertaken in line with the Planning and Development (Strategic Environmental Assessment) Regulations 2004 to 2011 (as amended). Subject to the full and proper implementation of the mitigation measures outlined in this SEA Environmental Report and the SDZ Planning Scheme including detailed design at planning application stage, it is considered that significant adverse impacts on the environment will be avoided."

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 townscape and visual impact, archaeology and cultural heritage, air quality and climate, noise and vibration, water, land and soils, material assets including traffic and transport impacts, are of intrinsic direct and indirect consequences 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, 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 European Commission, the EPA and the DHPLG, the assessment of impacts on population and human health refers to those environmental topics under which human health effects might occur, e.g. noise, water, air quality etc. An outline of the likely evolution without implementation of the project as regards natural changes from the baseline scenario is also provided. This is the "Do Nothing" scenario.

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

- Economic Activity
- Social Patterns;
- Land Use and Settlement Patterns;
- Employment;
- Health & Safety;

The subject site is located in the south-eastern section of Clonburris SDZ (Strategic Development Zone) and forms a section of the Clonburris Character Area within the Clonburris SDZ. The Clonburris SDZ Planning Scheme comprises 280 hectares and is located to the west of Dublin City Centre and the M50 - within the triangle between Lucan, Clondalkin and Liffey Valley.

The subject site is located in the south-western section of the SDZ lands, within development areas CSW-S3 and CSW-S4 as defined within the Clonburris SDZ Planning Scheme.

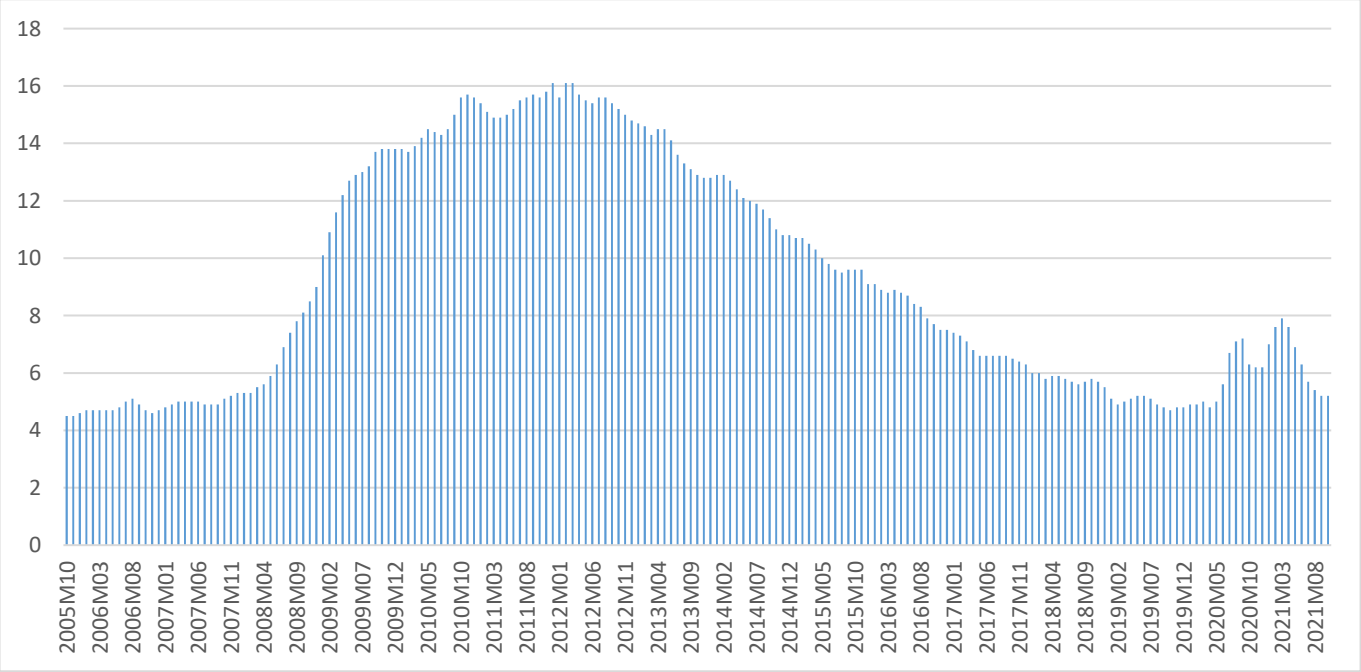
The subject lands comprise an undeveloped, greenfield site of c. 17.02 hectares and is situated to the north of the Grand Canal and to the west of the Fonthill Road (R113). The site is located approximately 200m from Clondalkin Train Station, 500m from Banougue Neighbourhood centre and c. 1km from Clondalkin Centre. There is a vehicle access point to the site from Fonthill Road which is currently unused.

3.3.2 Economic & Employment Activity

The CSO's Quarterly Labour Force Survey for Q1 2021 (published June 23rd 2021), indicated that the number of persons in employment was down 5.0% (-116,600) from 2,347,200 over the year while the employment rate was down from 69.6% in Q1 2020.

Because employment was down over the year and the number of absences from work increased over the year, the number of employed persons at work in the reference week fell by 10.2% (-217,700) over the year. The COVID-19 Adjusted Measure of Employment, or the lower bound for the number of employed persons aged 15 years and over, rose from 1,785,923 to 1,845,383 between the end of March 2021 and the end of April 2021. This was accompanied by a rise from 52.0% in March 2021 to 56.1% in the associated COVID-19 Adjusted Employment Rate, for those aged 15-64.

Figure 3.1 – Unemployment by Month 2005-2021



3.3.2.1 Monthly Unemployment[7]

According to the CSO, the COVID-19 crisis has continued to have a significant impact on the labour market in Ireland in July 2021. While the standard measure of Monthly Unemployment was 5.2% in October 2021, the COVID-19 Adjusted Measure of Unemployment could indicate a rate as high as 7.9% if all claimants of the Pandemic Unemployment Payment (PUP) were classified as unemployed. This alternative measure is down from a revised rate of 8.9% in September 2021 and down from 20.3% in October 2020

The CSO Monthly release note that the application of the standard methodology gives a seasonally adjusted Monthly Unemployment Rate of 4.9% for October 2021, down from the rate of 5.0% in September 2021 and down from 6.0% in October 2020. The seasonally adjusted number of persons unemployed was 135,200 in October 2021, compared

[7] CSO Statistical Release 3rd November 2021.

to 133,700 in September 2021. When compared to October 2020, there was an annual decrease of 18,400 in the seasonally adjusted number of persons unemployed.

The ESRI quarterly economic commentary for Autumn 2021[8] notes that *"The recent National Accounts confirm that the Irish economy in general has performed in a particularly robust manner in the present year despite the ongoing effects of the COVID-19 pandemic. It is clear that both domestic and foreign sources of growth have contributed to a strong performance in 2021."*

The ESRI anticipates that the Irish economy the economy is set to register growth of 12.6% in the present year. Unemployment is now set to fall to 9% by the end of the year, and that the economy will continue to grow strongly in 2022 with GDP set to increase by 7%.

The ESRI Commentary outlines that *"The significant reduction in unemployment will help to restore the public finances to a more sustainable long-term path as the economy slowly emerges from the pandemic*' and that *"Inflationary pressures in the economy are beginning to pick up. While some of these effects are transitory (coming from so called base effects), global factors such as higher energy prices are also playing a role. Further inflationary risks, in particular in domestically non-traded goods and services, could materialise if the domestic economy recovers particularly rapidly."*

In the general assessment of the Irish Economy, the ESRI notes is the requirement to increase the supply of housing where they state:

"One issue which this Commentary has consistently noted is the requirement to increase the supply of housing to deal with considerable bottlenecks in provision, in particular for social and affordable housing. The recent government 'Housing for All' strategy commits to increases in investment in housing which, if delivered, should contribute to raising housing output. Welcome developments include the move to long-term, multi-annual housing budgets and other supply-side activities, such as boosting the role of the Land Development Agency (LDA). If the housing needs of the country are to be met it will require collaboration between both the public and private sector to finance the continued delivery requirements." (page 65 Autumn 2021 commentary).

3.3.3 Social Patterns

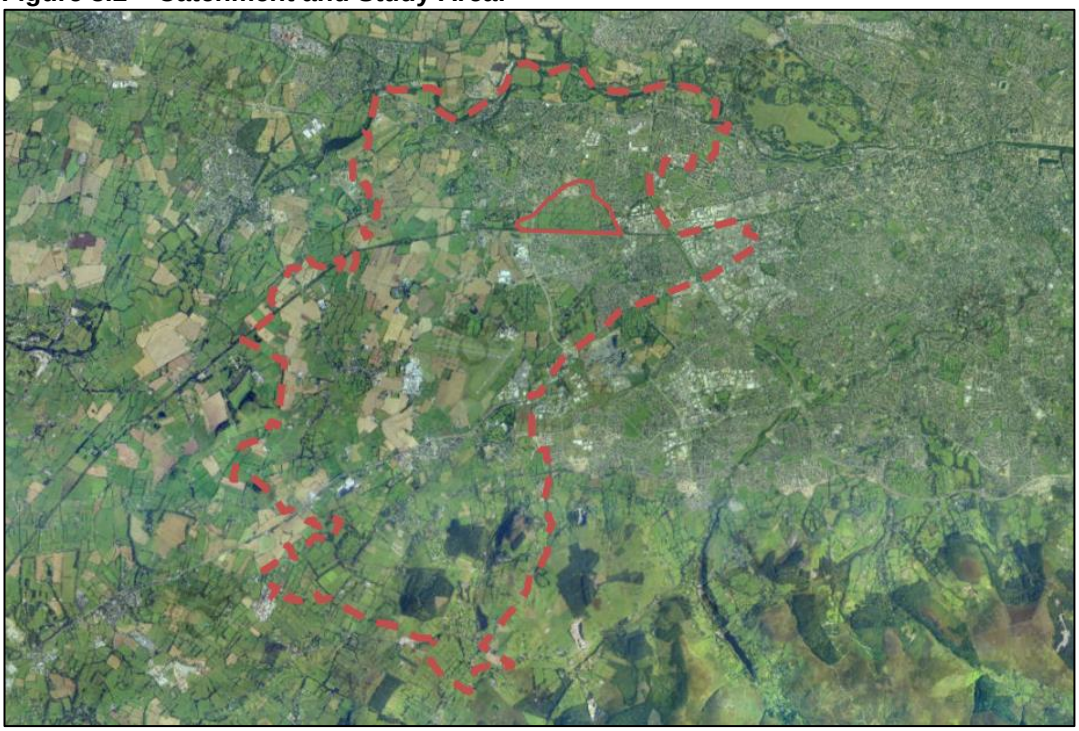
For the purposes of this chapter, a review has been carried out of data from the 2006, 2011 and the 2016 Census of Population in order to identify any significant changes in population levels and age profile at national, regional, county, city and local levels. The 2016 Census results provide for an overview of the current population, employment and economic statistics and trends of the State.

The subject site is located within the boundaries of the Electoral division (ED) of Clondalkin-Cappaghmore as defined by the Central Statics Office. This Electoral Division comprised the immediate catchment area of the subject site.

The ED's comprising the wider study area of the Dublin Mid-West constituency include the Clondalkin-Dunawley, Clondalkin-Moorfield, Clondalkin-Rowlagh, Clondalkin Village, Lucan-Esker, Lucan Heights, Lucan-St. Helens, Newcastle, Palmerston Village, Palmerston West, Rathcoole and Saggart. Figure 3.1 indicates the geographical extent of the immediate catchment and the wider study area.

[8] Published October 7th 2021.

Figure 3.2 – Catchment and Study Area:



Source: Google Maps

A review was also carried out of the census data relating to social class and household size at each of these levels. The following section provides a summary description of the existing environment in terms of each of these indicators.

3.3.3.1 Population

Table 3.1 below shows the population of the State, the Greater Dublin Area, Dublin County and City, South Dublin and the wider study area of Dublin Mid-West constituency and the Clondalkin-Cappaghmore electoral division area for 2006, 2011 and 2016. (It should be noted that that the Greater Dublin Area (GDA) includes Dublin County as well as Wicklow, Kildare and Meath. Dublin County includes Fingal, South Dublin, Dún-Laoghaire Rathdown and Dublin City).

Table 3.1 – Population at State, Regional, County and Local Level, 2006- 2016

Area	2006	2011	2016	Change 06 - 16	% change
State	4,239,848	4,588,252	4,757,976	518,128	**12.2%**
Greater Dublin Area	1,662,536	1,804,156	1,904,806	242,270	**14.5%**
Dublin County	1,187,176	1,273,069	1,345,402	158,226	**13.3%**
Dublin City	506,211	527,612	553,165	46,954	**9.2%**
South Dublin	246,935	265,205	278,767	31,832	**12.9%**
Dublin Mid-West	99,459	110,427	117,986	18,527	**18.6%**
Clondalkin-Cappaghmore ED	1,925	2,605	2,581	656	**34.1%**

Source: Census of Population 2006, 2011 and 2016

Table 3.2 indicates that the population of the state grew from approximately 4.2 million to 4.7 million between 2006 and 2016, representing an increase of 12.2% in 10 years. The population of Dublin County increased by 13.3% (158,226 persons) over the same period while Dublin City grew by 9.2% (46,954 persons) between 2006 and 2016. The population of South Dublin county grew faster than the city with a growth rate of 12.9%. The lower population growth rate experienced in Dublin City compared to the increase experienced in South Dublin county may reflect the restricted availability of development land within the area. There is an abundance of available land in South Dublin and if its potential is realised, the county would be more than able to accommodate the significant quantities of housing needed to facilitate such a growing population. The subject lands at Clonburris would see such potential realised through the proposed development.

In particular, population growth within the wider study area of Dublin Mid-West constituency rose from 2006 to 2011 by 18.6%, while Clondalkin-Cappaghmore electoral division itself experienced major growth of 34.1% since 2006 to 2016. This trend of rapid growth in the surrounding area of Clonburris brings with it a proportional increase in demand for housing and associated services provision in the area to accommodate present and future population growth in the area. The proposed development at Clonburris would help alleviate such demand pressures while also providing much needed social and affordable housing options for a range of family and individual demographics.

3.3.3.2 Age Profile

Table 3.2 shows the population of the State, the Greater Dublin Area, Dublin County and City, South Dublin, the wider study area of Dublin-Mid West constituency and the Clondalkin-Cappaghmore ED level for 2006, 2011 and 2016.

Table 3.2 – Age Profile at State, County and Local Level, 2006-2011-2016

Area	0-14	15-24	25-44	45-64	65+
State 2006	20.4%	14.9%	31.7%	21.9%	11.0%
State 2011	21.3%	12.6%	31.6%	22.7%	11.7%
State 2016	21.1%	12.1%	29.5%	23.8%	13.4%
GDA 2006	19.6%	15.6%	34.4%	20.7%	9.7%
GDA 2011	20.8%	13.1%	34.2%	21.5%	10.4%
GDA 2016	20.7%	12.4%	32.5%	22.5%	11.9%
Dublin County 2006	18.3%	16.2%	34.5%	20.6%	10.3%
Dublin County 2011	19.3%	13.6%	34.9%	21.3%	10.9%
Dublin County 2016	19.3%	12.7%	33.8%	22.0%	12.2%
Dublin City 2006	15.0%	16.9%	35.7%	19.7%	12.7%
Dublin City 2011	15.2%	14.5%	37.2%	20.5%	12.6%
Dublin City 2016	15.0%	13.2%	37.4%	21.3%	13.0%
South Dublin 2006	21.7%	16.4%	33.1%	21.6%	7.2%
South Dublin 2011	23.1%	13.1%	33%	22.1%	8.7%
South Dublin 2016	23%	12.3%	31.4%	22.3%	11%
Dublin Mid-West 2006	22.9%	15.9%	36.4%	19.2%	5.6%
Dublin Mid-West 2011	24.7%	12.8%	35.7%	20.2%	6.5%
Dublin Mid-West 2016	24.5%	12%	33.2%	21.6%	8.7%
Clondalkin-Cappaghmore ED 2006	28.4%	20.1%	25.8%	17.8%	7.9%
Clondalkin-Cappaghmore ED 2011	33.4%	15.8%	27.1%	16.7%	7%
Clondalkin-Cappaghmore ED 2016	28%	16.5%	29.3%	18.4%	7.8%

Source: Census of Population 2006, 2011 and 2016

The table indicates that the highest percentage of population in the study area relates to the working age group (22-44). It is considered that the available working population in the immediate vicinity of the proposed development will enhance the attractiveness of investors to locate in this area to benefit from the significant available work force. In addition the following statistics further indicate the appropriateness of the proposed office development in relation to the highly skilled and educated work force in the surrounding area.

3.3.3.3 Social Class

The Census of Population determines social class by the nature of employment and is therefore useful as a guide to the principal types of occupation in which the population is employed or in which the population is capable of being

employed. Table 3.3 shows the number and percentage of people in each of the 11 socio-economic groups identified in the 2016 Census of Population.

Table 3.3 – Persons by Socio-Economic Group, 2016

Socio-Economic Group	State	GDA	Dublin County	Dublin City	South Dublin	Dublin Mid-West	Clondalkin-Cappaghmore ED
A Employers and managers	735,031 (15.4%)	348,591 (18.7%)	241,883 (18.5%)	78,685 (15.0%)	47,948 (17.3%)	18,354 (15.8%)	196 (7.7%)
B Higher professional	338,897 (7.1%)	163,667 (8.8%)	124,836 (9.5%)	49,281 (9.4%)	18,435 (6.7%)	6,870 (5.9%)	63 (2.5%)
C Lower professional	623,756 (13.1%)	237,363 (12.7%)	171,934 (13.1%)	67,162 (12.8%)	32,421 (11.7%)	13,014 (11.2%)	138 (5.4%)
D Non-manual	996,696 (20.9%)	364,033 (19.5%)	261,082 (19.9%)	107,212 (20.4%)	58,882 (21.2%)	25,330 (21.7%)	496 (19.5%)
E Manual skilled	359,586 (7.6%)	150,215 (8.1%)	96,384 (7.4%)	37,527 (7.1%)	26,593 (9.6%)	12,037 (10.3%)	179 (7%)
F Semi-skilled	369,501 (7.8%)	134,146 (7.2%)	88,725 (6.8%)	38,039 (7.2%)	22,152 (8%)	9,926 (8.5%)	272 (10.7%)
G Unskilled	153,784 (3.2%)	61,768 (3.3%)	43,541 (3.3%)	22,222 (4.2%)	9,663 (3.5%)	4,535 (3.9%)	149 (5.9%)
H Own account workers	179,281 (3.8%)	92,556 (5.0%)	60,087 (4.6%)	19,790 (3.8%)	15,243 (5.5%)	6,422 (5.5%)	84 (3.3%)
I Farmers	154,022 (3.2%)	21,105 (1.1%)	3,174 (0.2%)	390 (0.1%)	442 (0.1%)	268 (0.2%)	3 (0.1%)
J Agricultural workers	23,145 (0.5%)	5,469 (0.3%)	1,384 (0.1%)	269 (0.1%)	176 (0.1%)	49 (0.1%)	1 (0.1%)
Z All others gainfully occupied and unknown	828,166 (17.4%)	286,242 (15.3%)	215,824 (16.5%)	104,652 (19.9%)	45,213 (16.3%)	19,710 (16.9%)	968 (37.8%)
Totals	**4,761,865**	**1,865,155**	**1,308,854**	**525,229**	**277,168**	**116,515**	**2,549**

Source: Census of Population 2016

Table 3.4 indicates that the wider study area of Dublin Mid-West is predominantly in tune with the norms of the Dublin region, GDA and State, the electoral division of Clondalkin-Cappaghmore shows some divergent results in relation to more professional occupations and skill-levels. The Clondalkin-Cappaghmore ED indicates a lower percentage of people in higher skilled and professional socio-economic groups such as 'Employers and mangers', 'higher professionals' and 'lower professionals', while the ED also sees higher percentages of people in unskilled or partially skilled professions. This would indicate that there is a considerable increase in uneducated persons in the area's workforce in comparison to the norms of the State, GDA and wider study area of Dublin Mid-West.

3.3.3.4 Educational Attainment

Advancing from second level education to third level assists the ability of the population to gain access to employment and enter the labour market for higher earnings. Table 3.5 overleaf contains CSO data from 2016 relating to the educational attainment of people at national, regional, county, city and local level.

Table 3.4 – Persons by Educational Attainment, 2016

Education	State	GDA	Dublin County	Dublin City	South Dublin	Dublin Mid-West	Clondalkin-Cappaghmore ED
No Formal Education	52,214 (1.7%)	16,711 (1.4%)	11,856 (1.3%)	5,807 (1.5%)	2,727 (1.6%)	1,252 (1.8%)	65 (4.6%)
Primary Education	334,284 (10.8%)	113,325 (9.2%)	81,187 (9.2%)	43,102 (11.3%)	18,045 (10.4%)	7,067 (10%)	242 (17%)
Lower Secondary	449,766	152,464	102,020	44,219	25,123	10,473	293

Education	State	GDA	Dublin County	Dublin City	South Dublin	Dublin Mid-West	Clondalkin-Cappaghmore ED
	(14.5%)	(12.4%)	(11.6%)	(11.6%)	(14.4%)	(14.8%)	(20.6%)
Upper Secondary	573,643 (18.5%)	217,173 (17.7%)	149,177 (17.0%)	56,059 (14.7%)	34,240 (19.6%)	13,896 (19.6%)	258 (18.2%)
Technical or Vocational qualification	271,532 (8.8%)	99,092 (8.1%)	65,919 (7.5%)	25,005 (6.6%)	15,819 (9%)	6,861 (9.7%)	121 (8.5%)
Advanced Cert. / Completed Apprenticeship	182,318 (5.9%)	63,322 (5.1%)	40,123 (4.6%)	14,191 (3.7%)	9,912 (5.7%)	4,230 (6%)	50 (3.5%)
Higher Certificate	153,351 (5.0%)	59,886 (4.9%)	40,165 (4.6%)	14,340 (3.8%)	8,598 (4.9%)	3,542 (5%)	44 (3.1%)
Ordinary Bachelor Degree or National Diploma	237,117 (7.7%)	99,679 (8.1%)	70,487 (8.0%)	27,047 (7.1%)	13,073 (7.5%)	5,339 (7.5%)	59 (4.2%)
Honours Bachelor Degree, and/or Professional Qualification	231,293 (10.7%)	156,350 (12.7%)	118,090 (13.4%)	50,756 (13.3%)	18,568 (10.7%)	6,826 (9.6%)	48 (3.4%)
Postgraduate Diploma or Degree	284,107 (9.2%)	147,700 (12.0%)	116,562 (13.3%)	43,063 (13.9%)	15,260 (8.8%)	5,669 (8%)	42 (2.9%)
Doctorate (Ph.D.) or higher	28,759 (0.9%)	15,550 (1.3%)	12,643 (1.4%)	5,897 (1.5%)	1,322 (0.7%)	441 (0.6%)	4 (0.3%)
Not Stated	198,668 (6.4%)	89,037 (7.2%)	70,870 (8.1%)	41,268 (10.8%)	11,603 (6.7%)	5,330 (7.4%)	195 (13.7%)
Totals	**3,097,052**	**1,230,289**	**878,829**	**380,754**	**174,290**	**70,926**	**1,421**

Source: Census of Population 2016

The table indicates that only 3.4% of people living in the Clondalkin-Cappaghmore ED respectively have studied up to Honours Bachelor Degree / Professional Qualification level. A further 2.9% have studied to Postgraduate Diploma or Degree level, which is significantly lower than the national averages of 10.7% and 9.2% respectively.

Predominantly, as the date in Table 3.5 illustrates, the majority of the population in the Clondalkin-Cappaghmore ED chose to leave their education reasonably early with 17% leaving their education at primary school level and a further 20.6% only attaining their education to junior certificate level. While the rate of completion at Leaving Certificate level (18.2%) is relatively coordinated with national and regional norms, the completion rates at lower levels of education as discussed remains significantly higher than such averages. The incidence of 'No Formal Education' amongst the population of the Clondalkin-Cappaghmore ED (4.6%) is almost 2.5 times greater than that of the state, GDA, Dublin county and wider study area of Dublin Mid-West constituency.

Overall, Table 3.4 indicates that when compared to other areas that the resident population of the wider study area, and the Clondalkin-Cappaghmore ED is characterised by considerably low levels of educational attainment. This is consistent with the indicative data in Table 3.4 showing the concentration of unskilled workers in the area.

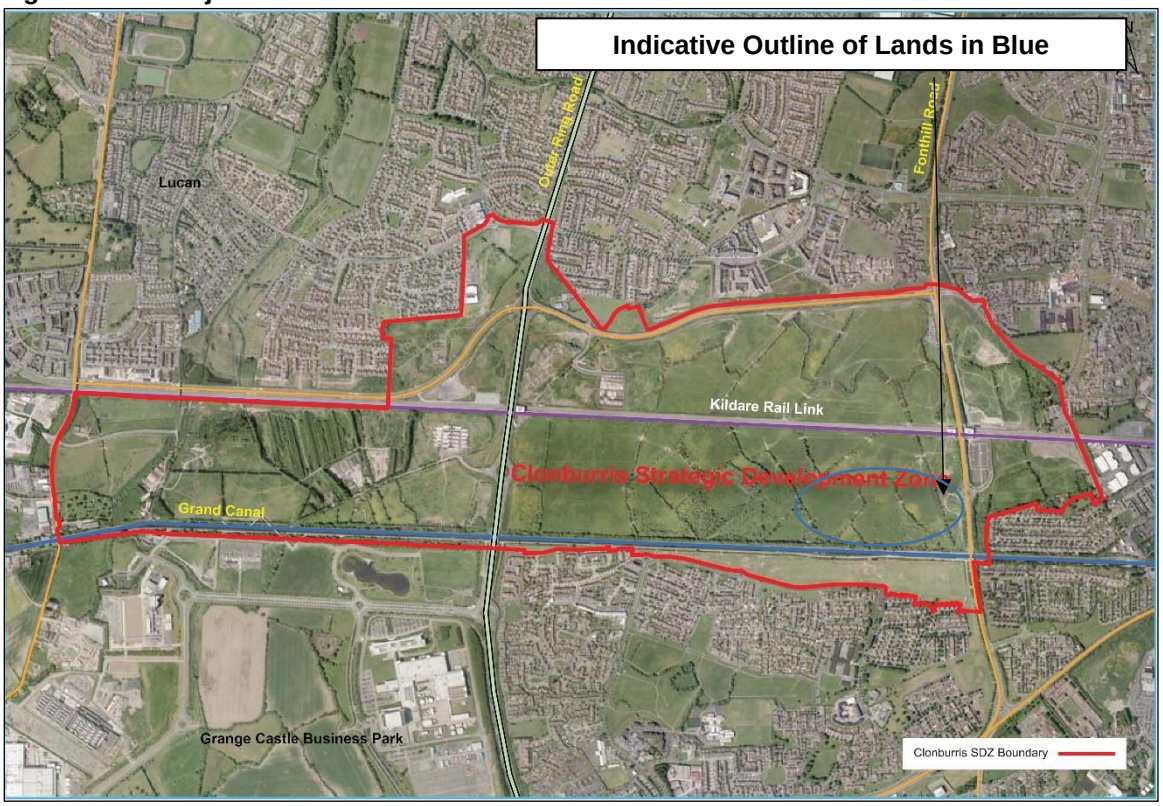
3.3.4 Land Use & Settlement Patterns

In December 2015, 280 hectares of lands at Balgaddy-Clonburris were designated as a site for the establishment of an SDZ following the Government approval. Order 2015 (S.I. No. 604 of 2015) established and extended the designated area for the Clonburris SDZ. Under the Designation of Strategic Development Zone: Balgaddy – Clonburris, South Dublin County Order 2015, the lands which are deemed to be of economic and social importance to the state, are: *"designated as a site for the establishment of a strategic development zone in accordance with the provisions of Part IX of the Act for residential development and the provision of schools and other educational facilities, commercial activities, rail infrastructure, emergency services and the provision of community facilities as referred to in Part III of the First Schedule to the Act, including health and childcare services."*

The Development Agency (SDCC) published a notice of approval of the Scheme on September 30th, 2019 as required under the Planning and Development Act, 2000, as amended. The subject site is located on a substantial greenfield site. The predominant land use immediately surrounding the subject site is the remainder of undeveloped greenfield land at the Clonburris SDZ. Beyond the boundaries of the SDZ, predominant land-uses include; a mix of residential development to the north (i.e. Balgaddy), east (i.e. Ronanstown, Neilstown and Cappaghmore) and south (i.e. Bawnogue, Deansrath and Kilmahuddrick) of the site; educational development, in the form of Kishoge Community College and Griffeen Community College, to the immediate north-west of the site; and, a considerable amount of commercial and industrial development lying to the west and south-west of the wider Clonburris site also at Grange Castle Industrial Park.

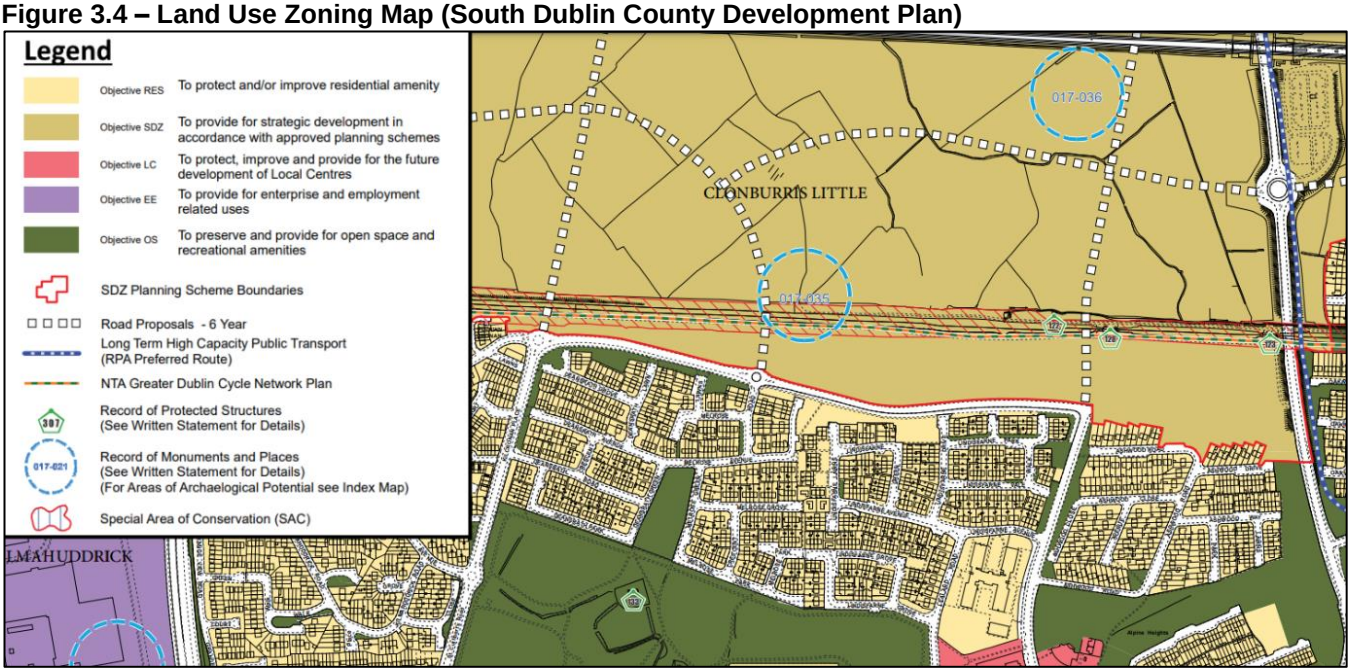
The land use pattern of much of the wider study area is also consistently characterised by such land-uses. The site is within a short walking distance of Clondalkin Village, and with it associated retail, commercial and cultural uses.

Figure 3.3 – Subject Lands in Clonburris SDZ



The site is located within the administrative area of South Dublin County Council and is therefore subject to the land use policies and objectives of the South Dublin County Development Plan 2016-2022. The lands are zoned objective SDZ which seeks *"To provide for strategic development in accordance with approved planning schemes".*

Figure 3.4 – Land Use Zoning Map (South Dublin County Development Plan)



Map 4 Extract

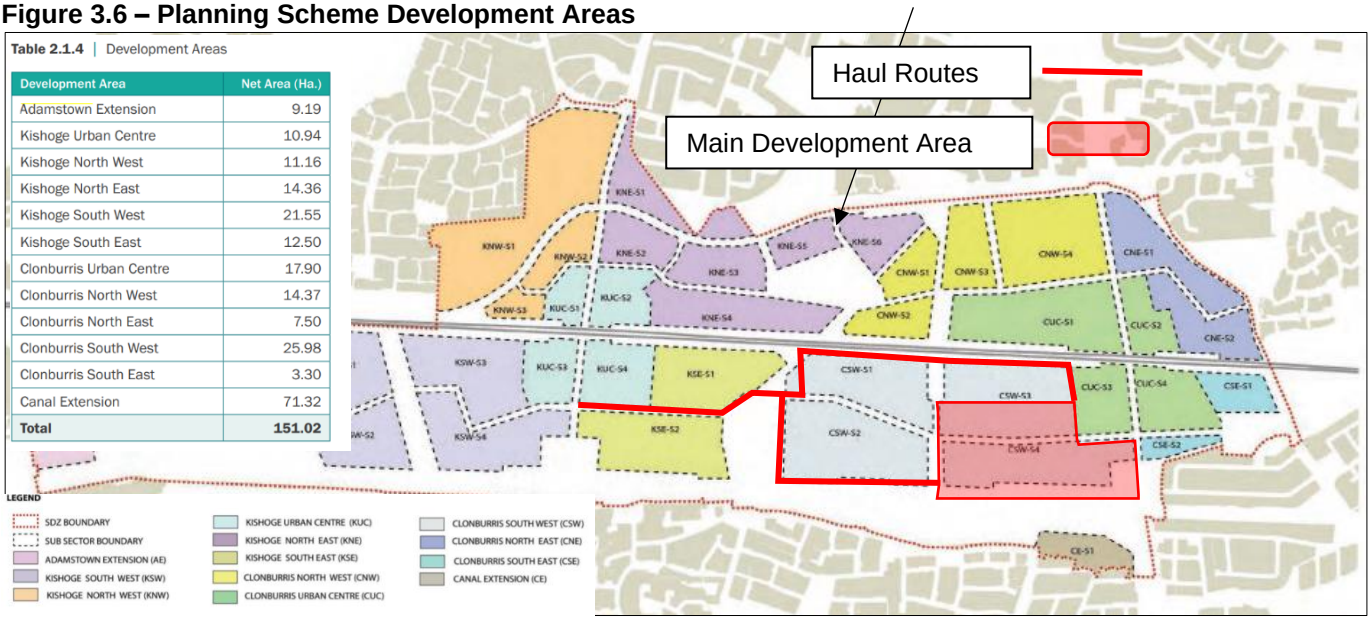
The Planning Scheme provides for the establishment of three Character Areas - Clonburris, Kishoge and Adamstown Extension. Clonburris and Kishoge with a focus around an urban centre established at the two points of highest accessibility within the SDZ lands, namely Clondalkin-Fonthill and Kishoge railway stations.

The subject lands are situated within the Character and Development Area 3 Clonburris South West as outlined below:

Figure 3.5 – Location of subject lands within Development/Character Areas

(approximate outline in blue)

Figure 3.6 – Planning Scheme Development Areas



The following land uses are permissible in the residential area

Table 2.1.1 | Uses Permissible & Open for Consideration in Residential Areas

Permitted in Principle	Bed & Breakfast, Childcare Facilities, Community Centre, Cultural Use, Doctor/Dentist, Education, Embassy, Enterprise Centre, Funeral Home, Guest House, Health Centre, Housing for Older People, Hotel/Hostel, Industry-Light, Live-Work Units, Nursing Home, Offices less than 100 sq.m, Open Space, Public House, Public Services, Recreational Facility, Recycling Facility, Residential Institution, Residential, Restaurant/ Café, Retirement Home, Shop-Locala, Shop-Neighbourhoodb, Sports Club/Facility, Traveller Accommodation, Veterinary Surgery..
Open for Consideration	Advertisements and Advertising Structures, Agriculture, Allotments, Betting Officea, Crematorium, Garden Centre, Home Based Economic Activities, Industry-General, Motor Sales, Nightclub, Office-Based Industry, Offices 100 sq.m - 1,000 sq.m, Off-Licencea, Petrol Station, Place of Worship, Science and Technology Based Enterprise, Social Club, Stadium.

a. *Local Nodes only*

b. *Local Nodes only and subject to SDZ Section 2.5 (Retail) convenience cap for Local Nodes*

The residential, childcare and employment uses are permitted in principle.

3.3.5 Housing

In terms of housing delivery, the proposed development is located at a location which is zoned for development, and which is appropriate for the uses proposed. There is a significant and established housing need in the Greater Dublin Area, including South Dublin, and the State as a whole, as recognised within Government housing and planning policy, including the 2016 Rebuilding Ireland Plan for Housing and Homelessness and Housing for All 2021.

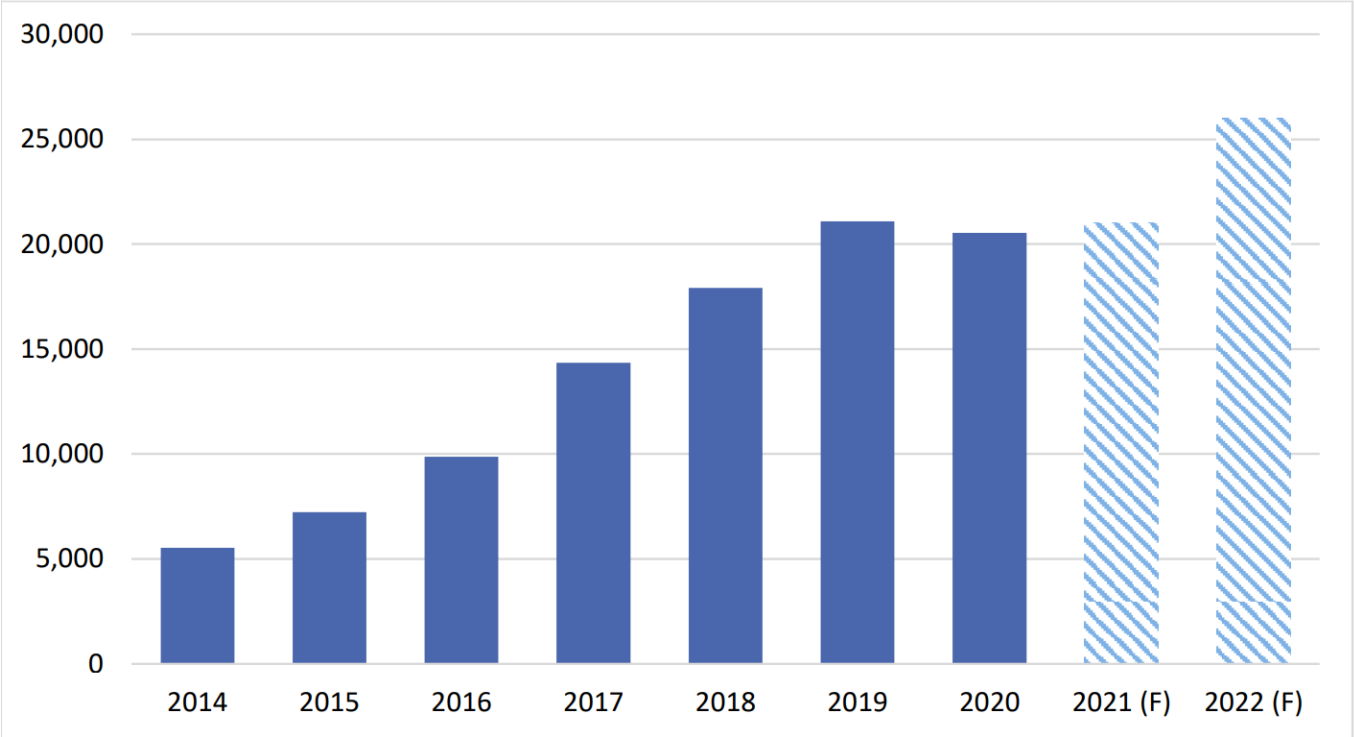
Recent trends show that population growth is set to continue having regard to the Region's young demographic profile and a return to net inward migration. In fact, the level of in-migration to Ireland experienced over the last two years was in the order of 30,000.

While the number of residential units being completed yearly nationally has rebounded, the level of completions remains significantly less than the estimated equilibrium demand for housing in the State. Moreover, the current level of housing need and demand is not at equilibrium, being significantly augmented by the extremely low level of housing completions in the decade since 2010. Over this period, a significant shortfall in housing has amassed year on year, which is reflected in the data collected in Census 2016 – which revealed overcrowding and increasing numbers of households living in cramped conditions.

It is further noted that the number of housing completions in the state is expected to reduce significantly (falling well below projected completions) for 2020, due to the impact of the ongoing Covid-19 public health crisis. There had been a gradual increase in the number of completions over the past decade as supply increased to meet the level of structural demand, estimated by the ESRI to be in the region of 35,000 new homes a year.

According to the ESRI, (Autumn Commentary 2021) "*Construction output in Ireland has displayed considerable volatility since the onset of the pandemic due to the direct impact of required public health measures on the sector's operations. In line with the limitations on the sector in Q2 2020 and Q1 2021, large drops in housing completions were recorded in these quarters. However output rebounded towards the end of 2020 and in Q2 2021 when measures were eased. In total, 20,353 dwelling completions were reported by the CSO, which is marginally down on 2019 (21,075).*"

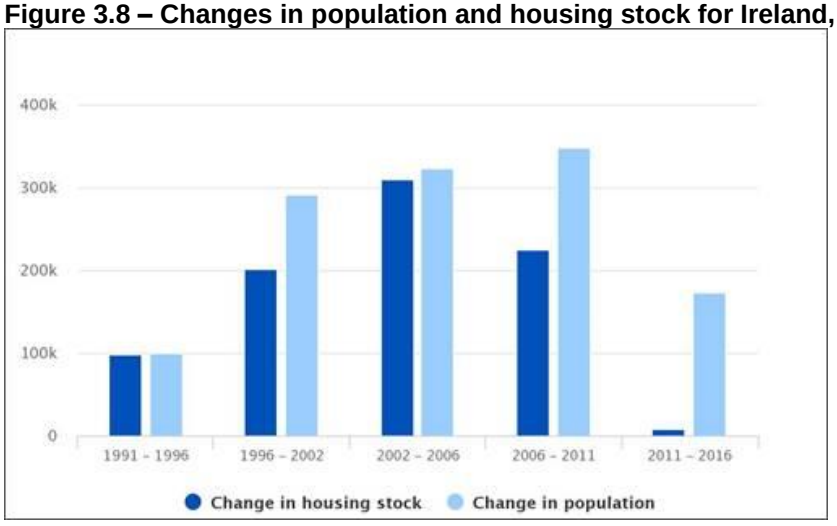
Figure 3.7 – Yearly housing completions for the State (ESRI Quarterly Commentary Autumn 2021)



Source: ESRI Autumn Commentary 2021

The ESRI state that on the back of the rebound in construction activity in Q2 2021 and the continued and sustained economic growth outlook, they expect an outturn of close to 21,000 units in 2021and that supply to increase further in 2022 with a completions level of just over 26,000 units (Figure 32). An increase in construction activity over the coming years is also likely to be facilitated by recently announced policy measures. (such as Housing for All).

Figure 3.8 – Changes in population and housing stock for Ireland, 1991-2016

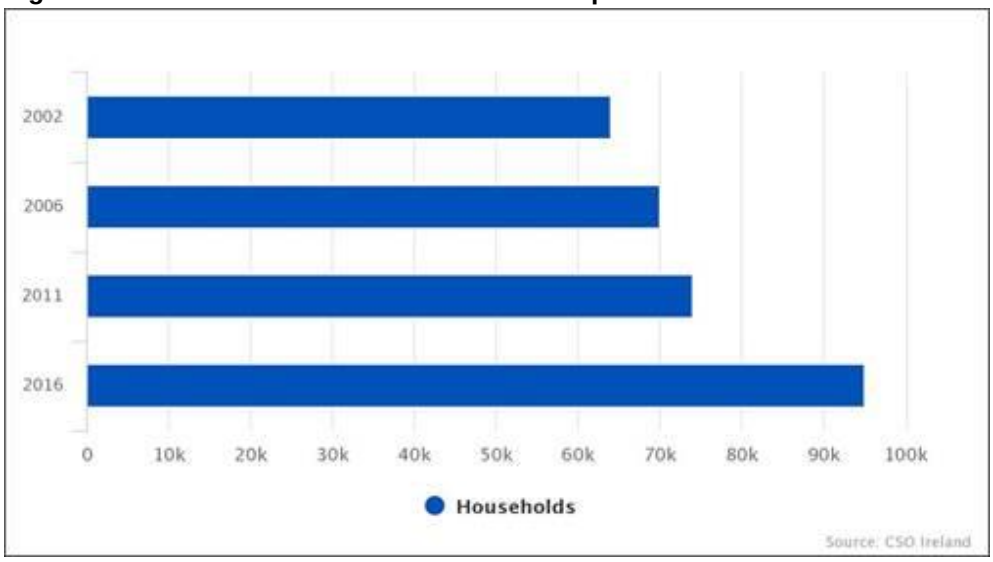


Source: Central Statistics Office, 2017

Census 2016 revealed an increase in the national housing stock of just 8,800 units during the five-year intercensal period (taking into account obsolescence during that period) representing an increase of just 0.4 percent (as shown in the figure below).

This is notable given the increase in population seen concurrently (173,613 or 3.8%). Furthermore, almost 40% of these additional units were one off houses, the majority of which would never have come to market. Census 2016 also revealed a rise in the average household size (from 2.73 to 2.75) (CSO, 2017). This was attributed to household formation falling behind population growth, another indicator of lacking housing availability and increasing housing need.

Figure 3.9 – Number of households with more persons than rooms



Source: Central Statistics Office, 2017

The 2011-2016 intercensal period also saw a notable increase in the number of households with more persons than rooms in their dwelling (see figure below). There were 95,013 permanent households with more persons than rooms according to Census 2016, a 28 per cent rise on the equivalent number in 2011 (73,997).

Close to 10 per cent of the population resided within these households in 2016 at an average of 4.7 persons per household. This is an indicator of increased overcrowding (and housing need) which may be attributed to lack of housing availability and rising costs.

These figures set out above all point to a significant and increasing housing need in the state which is not being met at present.

The Central Bank of Ireland has published a study entitled 'Population Change and Housing Demand in Ireland'[9], which includes the following key points:

- *"Growth in population has significantly exceeded the increase in the housing stock since 2011 and the average household size has risen, reversing a previous long-running trend.*
- *To keep pace with population growth and changes in household formation, our estimates indicate that an average of around 27,000 dwellings would have been required per annum between 2011 and 2019.*
- *Assuming unchanged household formation patterns and net inward migration close to current levels, around* ***34,000*** *new dwellings would be required each year until 2030."*

3.3.6 Health & Safety

The surrounding context consists of a mix of residential, employment, retail and recreational lands. It does not include any man-made industrial processes (including SEVESO II Directive sites (96/82/EC & 2003/105/EC) which might result in a risk to human health and safety. From a review of the South Dublin County Council Development Plan

[9] Available at: https://www.centralbank.ie/news-media/press-releases/press-release-economic-letter-population-change-and-housing-demand-in-ireland-10-december-2019

maps there are no SEVESO Site as defined by the Health and Safety Authority, in the immediate vicinity of the proposed development.

3.3.7 Risk of Major Accidents and Disasters

The EIA Directive states 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.

In this respect, taking cognisance of the other chapters contained within this EIAR document, the proposed development site does not present risks of major accidents or disasters, either caused by the scheme itself or from external man made or natural disasters. Chapter 8 (Water) sets out that the proposed development site is located within Flood Risk Zone C, which is appropriate for a residential development.

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 Chapter 2 of this EIAR document.

The proposal will entail the development construction of 569 no. dwellings (173 no. houses, 148 no. duplex units & 396 no. apartments, 4.1 hectares of open space along with an innovation hub of c. 626 sq. m and a creche of c. 547 sq. m.

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.

The specific chapters of the EIAR (4-15) assess the environmental topics outlined in the EIA Directive.

3.5.1.1 Water

Construction Phase

Provision of water infrastructure for the proposed development would involve construction activities within the subject lands mainly involving trench excavations conducted in parallel with the other services. The potential impact on the local public water supply network would be short term and imperceptible. Therefore the impact on human health and population in this regard is considered to be not significant.

During the course of the construction phase of the proposed development, there is potential, in the absence of mitigation, for surface water runoff to suffer from increased levels of silt or other pollutants, in addition to potential pollution from spillages, wheel washing and water from trucks on site. The Preliminary Construction and Environmental Management Plan, and the Construction and Demolition Waste Management Plan (CDWMP) set out how all materials will be managed, stored and disposed of in an appropriate manner, mitigating the potential negative effects as outlined.

Potential impact on water is addressed in Chapter 6 (Water) and a number of mitigation measures are outlined in in that chapter of this Environmental Impact Assessment Report. These mitigation measures will serve to minimise potential adverse impacts of the construction phase to the water environment, thereby minimising any associated risk to human health from water contamination. Therefore, the impact of construction of the proposed development in relation to water is likely to be short-term and imperceptible with respect to human health.

Operational Phase

All new foul drainage lines will be constructed in accordance with Irish Water Standards. Foul sewers will be pressure tested and will be subject to a CCTV survey in order to identify any possible defects prior to being made operational. The design of proposed site levels (roads, buildings etc.) has been carried out in such a way as to replicate existing surface gradients where possible, therefore replicating existing overland flow paths, and not concentrating additional surface water flow in a particular location.

Surface water runoff from the site will be attenuated to the greenfield runoff rate as part of the greater SDZ as outlined in the SWMP prepared for the overall Clonburris SDZ. Surface water discharge rates will be controlled by a Hydrobrake flow control device in conjunction with attenuation storage.

SuDS features such as swales and filter drains to provide additional storage and promote infiltration of and treatment of surface water run-off have been provided in landscaped areas.

All new surface water drainage on site will be pressure tested and will have a CCTV survey carried out prior to being made operational. The site is attenuated to mimic the greenfield scenario as part of the overall Clonburris SDZ.

3.5.1.2 Noise and Vibration

Construction Phase

Noise and Vibration are addressed in Chapter 8 (Noise and Vibration) which was prepared by Byrne Environmental.

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 and during rock excavation. The construction noise levels 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.

Chapter 8 of this EIAR sets out mitigation measures in relation to noise.

Any construction activities undertaken on the site will be required to operate below the recommended vibration criteria set out in Chapter 8. Following the implementation of mitigation and based on the standards which will be maintained, Chapter 8 predicts that vibration impacts during the construction stage will be negative, not significant, and temporary.

Operational Phase

Once operational, if building services plant items are required to serve the development, the cumulative operational noise level at the nearest noise sensitive location within the development (e.g. apartments, etc.) will be designed/attenuated to meet the relevant BS 4142 noise criteria for day and night-time periods.

The residual construction noise impact will be negative, temporary to short-term and moderate to significant.

3.5.1.3 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 could have a potential impact on population and human health.

Various elements associated with the construction phase of the proposed development have the potential to impact local ambient air quality, human health and climate. However, the potential construction phase impacts shall be mitigated as detailed above to ensure there is no adverse impact on ambient air quality for the duration of all construction phase works. It is predicted that the construction phase of the development will not generate air

emissions that would have an adverse impact on local ambient air quality or on local human health or on the local micro-climate or the wider macro-climate.

The predicted construction phase residual impacts on air quality will be negative, slight and short-term.
The predicted residual operational phase impacts on air quality and climate will be negative, imperceptible and long-term.

3.5.2 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 sector has grown strongly in recent years and this development will help to further enhance growth and reduce the increasing pressure on the housing market. Given the short term negative economic impact of COVID-19, this development will help to sustain and promote employment, and short term slight positive impacts.

The construction of the development and all associated infrastructure will precipitate a short term slight positive impact on construction-related employment for the duration of the construction phase. The phased construction of the proposed residential units, open space, and a childcare facility, alongside associated physical infrastructure will result in a construction period over an approximate 24-36 month timeline and will consequently enhance economic activity during this period, which is considered to be a slight temporary positive impact. A considerable amount of the work will be undertaken by sub-contractors who will also work elsewhere on a phased basis over the construction phase.

The construction phase will also have secondary and indirect '*spin-off*' impacts on ancillary support services in the wider 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 not significant positive 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.

Operational Phase

The operational phase of the proposed development will result in the provision of 569 residential units, employment floorspace and a creche. This has the potential to provide accommodation for approximately 1,560 persons, based upon the existing average occupancy rate of 2.74 per household (based on CSO 2016 Census figures for the State). 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, which will accrue as the development of the Planning Scheme progresses. The proposal will provide much needed residential accommodation and accords with National Policy on delivering Sustainable Residential Communities and is considered a positive permanent slight impact.

3.5.3 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 significant.

It is acknowledged that the construction phase of the project may have the potential for some short-term not significant 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 7 - Air Quality and Climate and Chapter 9 - Noise and Vibration and also Chapter 10 - Traffic and Transportation. Any disturbance is predicted to be commensurate with the normal disturbance associated with the construction industry where a site is efficiently 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 (prepared by DBFL) has been prepared and is submitted with this planning

application. The mitigation contained in Chapter 16 of this EIAR and CMP will be contained in the contractor's CEMP/CMP.

Operational Phase

The addition of new residents and an additional employment to the area will improve the vibrancy and vitality of the area and will help to support existing community and social infrastructure. This is a imperceptible positive long term impact.

The proposed development includes the provision of a childcare facility with a GFA of 547 sq.m. This childcare facility will accommodate the likely demand arising from the proposed development.

Once operational, the proposed development will give rise to much needed additional residential accommodation. Residents will spend a portion of their income locally which would not happen without the proposed development. The creche and employment hub will provide some employment opportunities in the operational phase of the development.

The proposal includes an element of Part V provision in accordance with the requirements of the Planning Authority, which will provide for an enhanced mix of tenures, and add to the existing social housing stock. The overall benefit to the social patterns of the surrounding area resulting from the development can be considered slight, long term, and positive.

Having regard to the fact that the area within which the development is situated benefits from a good level of social and community infrastructure and noting the elements of the proposed development which will improve and strengthen this infrastructure, it is concluded that the proposed development will precipitate a slight positive, long-term impact on social patterns in the operational phase.

3.5.4 Land-Use & Settlement Patterns

Construction Phase

The construction phase of the proposed development will primarily consist of site clearing, excavation and construction works, and the erection of the proposed new buildings on site 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 9 of the EIAR 'Landscape and Visual Impacts'.

Secondary land use impacts include off-site quarry activity and appropriate disposal sites for removed spoil and other materials transported off site. Chapter 11 Material Assets Waste considers these potential impacts in more detail and Chapter 11 (as well as the Construction and Demolition Waste Management Plan) describes the relevant mitigation measures).

The 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 sustainable density of residential development, delivering wider public realm improvements, in accordance with national and local planning policy objectives which seeks to deliver compact growth at suitable locations. Adequate provision of high-quality housing to serve the existing and future population of the county and the wider Greater Dublin Area is an important contributor to the establishment and maintenance of good human / public health. The high-quality design of the proposed development, will contribute to a positive impact on the wellbeing of future residents.

3.5.5 Housing

Construction Phase

The proposed development will not result in any impact in terms of loss of housing stock during the construction stage.

Operational Phase

The operational phase of the proposed development will see the delivery of 569 residential units, in a range of housing typologies (houses, apartments, duplex apartments).

The proposed development will respond to established housing need and demand in the area of the proposed development, and the wider region. The proposed residential units will assist in addressing the significant shortfall of residential development, which has been further impacted by the ongoing COVID-19 crisis.

The proposed development delivers a range of housing unit sizes and types, including two, and three bedroom apartments as well as 3 and 4 bedroom dwellings. The scheme also benefits from a high level of good quality public open space, with new linkages provided through the site improving connectivity to the Grand Canal to the south.

The delivery of 569 no. well-designed high-quality residential units at an appropriate location close to public transport links will have a direct, positive, and significant impact on the future residents of the proposed development and will support the population growth targeted for the South County Dublin area and Dublin City.

3.5.6 Employment

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

3.5.7 Health & Safety

The surrounding context consists of a mix of residential, employment, retail and recreational lands. It does not include any man-made industrial processes (including SEVESO II Directive sites (96/82/EC & 2003/105/EC) which might result in a risk to human health and safety. It is not within the consultation zone of a SEVESO Site as defined by the Health and Safety Authority. Chapter 14 – Risk Management addresses the potential health and safety aspects of the proposed development during the construction and operational phases.

In the absence of mitigation, the proposed development could have a slight negative, short-term 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 7, 8 and 12 of the EIAR, in the Traffic and Transportation Assessment, Construction Management Plan and the Waste Management Plan which accompany the application. The Traffic and Transportation Chapter recommends that a Construction Traffic Management Plan be implemented for the site which will minimise disruption to the surrounding road network, which will be submitted and agreed with the Planning Authority.

No significant health and safety effects are envisaged during either the construction or operational phases of the proposed development. The standard Health and Safety policy, procedures and work practices of the proposed development will conform to all relevant health and safety legislation both during the construction and operational stages of the proposed development. The proposed development will be designed and constructed to best industry standards, with an emphasis being placed on the health and safety of employees, local residents and the community at large.

Construction Phase

The construction methods employed and the hours of work 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. A Construction Management Plan has been prepared by DBFL Consulting Engineers and the measures specified therein will be complied with during the construction phase of the project.

Operational Phase

The operational stage of the development will not precipitate long term negative 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 including DMURS. Likewise, the proposed residential units and childcare facility 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 Air Quality Chapter (Ch 7) of the EIAR predicts 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 and that there will be a negligible impact on local air quality generated by increased traffic movements associated with the development.

The proposed development will not cause significant impacts on human health and safety once completed and operational and any impact will be imperceptible, and unlikely.

3.5.8 Risk of Major Accidents or Disasters

Chapter 14 – Risk Management addresses the potential risks of major accidents or disasters relating to the proposed development during the construction and operational phases.

Construction Phase

The location of the proposed development is within Flood Zone C and it is unlikely there will be any impacts 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 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 Eastern CFRAM (Catchment Flood Risk Assessment and Management) study details the predicted risk for a variety of fluvial and coastal flood scenarios. The mapping does not include the watercourse reaches affected by the proposed scheme and only maps downstream flooding. The proposed development is therefore outside of the Q100 and Q1000 flood extents and is therefore in within Flood Zone C (low risk of flooding). The proposed development is appropriate for the application site's flood zone categories and that the proposed development is considered to have the required level of flood protection.

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

3.5.9 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. Visits to the subject site and surrounding area and desk-based review of online planning files have been undertaken to identify the existing pattern of development, nearby uses, and any permitted / ongoing developments of relevance to the current proposals in the context of population and human health. The surrounding area is defined by a broad and varied mix of uses, including residential, commercial, recreational and civic uses.

The lands on which the proposed development is to take place have been zoned under the South Dublin County Council Development Plan 2016 "*To provide for strategic development in accordance with approved planning schemes"* and in the case for the subject lands for substantial residential development under the approved Clonburris Planning Scheme 2019, which envisages c. 1,441 dwelling target for the Clonburris South West Development Area (within which the subject lands are located). This zoning and the associated approved Planning Scheme within the entire SDZ lands will see more development to the north, and a portion of residential development to the southern part of the Canal. The permitted Roads and Drainage Infrastructure works application (SDZ20A/0021), provides the infrastructure in the southern portion of the Planning Scheme, which the proposed development will utilise.

The development of the Planning Scheme will influence demographic change, population growth, and the intensity of commercial use in this area, cumulatively contributing to increasing population and employment growth in the wider area which represents a positive cumulative impact which accords with the planning policy context for the area.

An increase in local housing, and some increase in employment opportunities and service provision (crèche and employment) has the potential to generate direct, indirect impacts. The visual appearance of the landscape will be altered with the introduction of the proposed built elements including infrastructure, in cumulation with other development in the area. Implementation of the remedial and reductive measures in respect of noise/traffic management etc. in the EIAR would ensure a minimal impact on the existing communities of this area during the construction phase.

The cumulative impact of the proposed development, along with other permitted and existing developments in the vicinity, will be a further increase in the population of the wider area. This will have a moderate positive long term impact on the population in the immediate area of the SDZ, and a slight positive long term impact in the wider area of Clondalkin.

Chapter 7 (Air Quality) states that the operational phases of the subject development and other permitted residential developments in the local area will not generate cumulative air emissions that will have an adverse impact on local ambient air quality. Measured baseline air quality and National published air quality data confirm that the existing air quality is good and that the operational phases of the subject development and other local proposed developments will have a long-term imperceptible impact on existing air quality.

Chapter 8 (Noise and Vibration) states that once the subject development is completed and if the lands to the east are developed there will be no residual adverse noise impact on the receiving environment associated with their operation. Increased traffic movements associated with both developments will generate a long-term not significant impact on the local noise climate during peak hour times.

The overall cumulative impact of the proposed development will therefore be long term and positive as residents will benefit from a high quality, visually attractive living environment, with strong links and pedestrian permeability. Having regard to the assessment of cumulative impacts, it is not considered that any additional mitigation measures are required further to those which are outlined above.

3.5.10 '*Do Nothing'* Scenario

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'* scenario would result in the subject lands remaining fallow and undeveloped. This would be an underutilisation of the subject site from a sustainable planning and development perspective, also noting the lands being designated as a Strategic Development Zone.

In the do-nothing scenario, the absence of the proposed development would perpetuate the housing shortfall in the Dublin area, contrary to the aims and objectives of national, regional, and local planning and housing policy, all of which promote the delivery of additional housing at strategic locations such as the subject site.

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.

The '*do-nothing'* scenario would result in the status of the environmental receptors described throughout this EIAR document remaining 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 neutral change from the baseline scenario in relation to population (human beings) and human health.

3.6 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.

3.6.1 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 16 of this EIAR document which summarises all of the remedial and mitigation measures proposed as a result of this EIAR.

In order to protect the amenities enjoyed by nearby residents, premises and employees a Construction Environment Management Plan will be submitted by the contractor and implemented during the construction phase. The content of the CEMP will be based on the mitigation set out in this EIAR.

With reference to the construction phase of the proposed development, the objectives of the Construction Waste By Products Management Plan prepared by Byrne Environmental Consulting Ltd (and also Chapter 11 of the EIAR) is to ensure that waste generated during the proposed construction and operation phases will be managed and disposed of in a way that ensures the provisions of the Waste Management Acts 1996 - 2013 are complied with.

3.6.2 Operational Phase

The operational phase is considered to have likely positive impacts on population in relation to the provision of additional residential units, open space, childcare provision, to cater for the demands of a growing population in accordance with the residential zoning objectives pertaining to the subject site.

During the operational phase of the development the design of the scheme has had regard to Design Manual for Urban Roads and Streets (DMURS) during its design. This will promote a pedestrian friendly environment, promoting sustainable development and reducing the influence of cars. This has the potential to reduce accidents within the proposed development.

For the operational phase, no further specific mitigation is required having regard to the mitigation included within the other chapters of this EIAR.

3.7 PREDICTED RESIDUAL IMPACTS OF THE PROPOSED DEVELOPMENT

This section provides 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 EIAR and project design processes through the assessment of alternatives described in Chapter 2 of this EIAR document. Impact interactions are considered further in Chapter 15.

There are numerous inter-related environmental topics described throughout this EIAR document which are also of relevance to Population and Human Health. For detailed reference to the residual impacts of particular environmental topics please refer to the relevant corresponding chapter of the EIAR (land and soils, water and hydrology, air quality and climate, noise and vibration, traffic, and risk management).

3.7.1 Construction Phase

The construction phase of the proposed development will primarily consist of site clearance, excavation and construction works, which will be largely confined to the proposed development site (including haul routes). 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, predominantly related to noise and traffic as detailed in chapters, 8 and 10.

It is anticipated that subject to the careful implementation of the remedial and mitigation measures proposed throughout this EIAR document, and as controlled through the Construction and Environmental Management Plan, any adverse likely and significant environmental impacts will be avoided. The overall predicted likely impact of the construction phase will be short-term not significant, and neutral. A CEMP (with the mitigation contained in this EIAR) will be developed by the contractor and submitted to the Local Authority.

Imperceptible, positive short-term impacts are likely to arise due to an increase in employment and economic activity associated with the construction of the proposed development.

3.7.2 Operational Phase

The proposed development will result in a generally positive alteration to the existing undeveloped site in terms of the provision of residential units to serve the growing residential population of the area in accordance with the objectives of the South Dublin County Council Development Plan and the Clonburris Planning Scheme 2019. Positive impacts on population and human health will include health benefits associated with the provision of a significant quantity of open space, pedestrian and cyclist/green routes, a highly permeable layout which will connect to adjacent development areas within the Planning Scheme. The provision of creche and employment facilities on site enhances the quality of the development and helps to create sustainable communities.

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 (as set out in relevant chapters land and soils, water and hydrology, air quality and climate, noise and vibration, traffic, and risk management).

This chapter of the EIAR has provided an assessment of the likely impact of the proposed development on population and human health. As set out above, the proposed development will result in a long-term positive impact on housing and is not likely to result in any significant negative effects on population and human health, and will result in some other positive impacts, including settlement patterns of a sustainable density at an appropriate location and economic benefits derived from the employment opportunities within childcare facility and employment hub proposed. Through generating additional economic activity in the area, and providing for a high standard of residential accommodation, there will be a slight positive impact arising from the proposed development in the short-term (for economic activity) and in the long term for residential accommodation.

3.7.3 Cumulative

The cumulative impact of the proposed development, along with other permitted and existing developments in the vicinity, will be a further increase in the population of the wider area. The cumulative impact of the proposed development, along with other permitted and existing developments in the vicinity, will be a further increase in the population of the wider area. This will have a moderate positive long term impact on the population in the immediate area of the SDZ, and a slight positive long term impact in the wider area of Clondalkin.

Chapter 7 (Air Quality) states that the operational phases of the subject development and other permitted residential developments in the local area will not generate cumulative air emissions that will have an adverse impact on local ambient air quality. Measured baseline air quality and National published air quality data confirm that the existing air quality is good and that the operational phases of the subject development and other local proposed developments will have a long-term imperceptible impact on existing air quality.

Chapter 8 (Noise and Vibration) states that the cumulative noise and vibration impacts associated with the proposed development and future local developments will not result in an increased impact on the closest receptors to the proposed development site.

There is a possibility that multiple developments in the Planning Scheme area could run concurrently or overlap in the construction phase and contribute to additional impacts in terms of traffic, dust and noise. However, the mitigation measures highlighted above and included in the individual chapters of this EIAR, along with the fact that any other significant construction project in the Planning Scheme would also require an EIAR and inclusion of mitigation measures to reduce the cumulative impacts to sensitive receptors in the area. The construction phase of the proposed development together with any relevant other planned or permitted developments would have a positive impact in terms of employment. Contractors for the proposed development would be required to operate in compliance with a project-specific CMP and CTMP, which will include mitigation measures outlined in this EIAR. It is considered that there would be no cumulative effects on human health.

3.7.4 'Worst-case' Scenario

The failure of the proposed development to proceed will mean that there would be no resulting new housing or local employment generated. However, failure of the proposed development to proceed or failure of any proposed mitigation measures, will not lead to any profound, irreversible or life-threatening consequences. In these

circumstances no further consideration of this scenario is necessary in respect of health, community, employment or population issues.

3.8 MONITORING

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

3.9 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.

3.10 DIFFICULTIES ENCOUNTERED IN COMPILING

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

4.0 BIODIVERSITY

4.1 INTRODUCTION

This section of the Environmental Impact Assessment Report (EIAR) was carried out by Altemar Ltd. It assesses the biodiversity value of the proposed development area and the potential impacts of the development on the ecology of the surrounding area and within the potential zone of influence (ZOI). Standard construction and operational phase control measures, in addition to monitoring measures are proposed to minimise potential impacts and to improve the biodiversity potential of the proposed development site. However, it is important to note that none of the measures proposed are necessary for the protection of Natura 2000 sites or their conservation objectives. These are standard measures to comply with legislation and in particular Water Pollution Acts.

The programme of work in relation to biodiversity aspects of the EIAR have been designed to identify and describe the existing ecology of the area and detail sites, habitats or species of conservation interest. It also assesses the significance of the likely impacts of the scheme on the biodiversity elements and designs mitigation measures to alleviate identified impacts.

A separate AA Screening, in accordance with the requirements of Article 6(3) of the EU Habitats Directive, has been produced to identify potential impacts of the development on Natura 2000 sites, Annex species or Annex habitats. It concludes that '*On the basis of the content of this report, the competent authority is enabled to conduct a Stage 1 Screening for Appropriate Assessment and consider whether, in view of best scientific knowledge and in view of the conservation objectives of the relevant European sites, the Proposed Development, individually or in combination with other plans or projects is likely to have a significant effect on any European site. There is no possibility of significant impacts on Natura 2000 sites, features of interest or site specific conservation objectives. A Natura Impact Statement is not required*.'

4.1.1 Background to Altemar

Altemar Ltd. is an established environmental and ecological consultancy that is based in Greystones, Co. Wicklow that has been in operating in Ireland since 2001.

4.1.1.1 Terrestrial Habitats and Flora

Bryan Deegan MCIEEM is the Managing Director of Altemar Ltd. and holds a M.Sc. Environmental Science, BSc (Hons.) in Applied Marine Biology and a National Diploma in Applied Aquatic Science. He has over 26 years' experience as an environmental consultant in Ireland and was the lead ecologist for this project. Previous projects where Altemar were the lead project ecologists include the Lidl Ireland GmbH regional distribution centres in Newbridge and Mullingar, 18 airside projects for daa at Dublin Airport and 7 fibre optic cable landfalls in Ireland including the New York to Killala cable project in 2015.

4.1.1.2 Bird Assessments

Emmi Virkki is a Senior Consultant Ecologist with Scott Cawley Ltd. She obtained an honours degree in Environmental Biology, from University College Dublin and a Masters degree in Environmental Science from the same institution. Emmi is a member and volunteer of BirdWatch Ireland, and a member of the British Trust for Ornithology, the Irish Bryophyte Group, the Botanical Society of Britain and Ireland, and Bat Conservation Ireland. She has five years of professional experience working in ecology in Ireland and has worked with clients at both government and private levels. Emmi's specialism is ornithology, but she is also skilled in protected flora and fauna, invasive species and habitat surveys. She has conducted ecological survey and assessment (Ecological Impact Assessment, Appropriate Assessment and Biodiversity Chapters of Environmental Impact Assessment Reports) of linear infrastructure, residential, commercial and industrial projects. All surveys were completed by an independent ornithologist, André Robinson.

4.1.1.3 Terrestrial Fauna

Dr Chris Smal is a full time mammal ecologist (CIEEM) with over 30 years experience acting as a mammal specialist in Ireland. He is the author of the NRA guidelines on the protection of badgers and otters.

4.1.1.4 Bat Fauna

Dr Tina Aughney has worked as a Bat Specialist since 2000 and has undertaken extensive survey work for all Irish bat species including large scale development projects, road schemes, residential developments, wind farm developments and smaller projects in relation to building renovation or habitat enhancement. She is a monitoring co-ordinator and trainer for Bat Conservation Ireland. She is a co-author of the 2014 publication Irish Bats in the 21st Century. This book received the 2015 CIEEM award for Information Sharing. Dr Aughney is a contributing author for the Atlas of Mammals in Ireland 2010-2015. All analysis and reporting is completed by Dr Tina Aughney. Data collected and surveying is completed with the assistance of a trained field assistant. Mr. Shaun Boyle (Field Assistant) NPWS licence DER/BAT 2021-19 (Survey licence, expires 15th March 2022).

4.2 METHODOLOGY

This chapter has been prepared having regard to the following guidelines;

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning & Local Government, 2018).
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017).
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports – Draft (EPA, 2017).

A pre-survey biodiversity data search was carried out. This included examining records and data from the National Parks and Wildlife Service (NPWS), National Biological Data Centre (NBDC) and the Environmental Protection Agency (EPA), in addition to aerial, 6 inch maps and satellite imagery. A habitat survey of the site was undertaken within the appropriate seasonal timeframe for terrestrial fieldwork. Field surveys were carried out as outlined in Table 4.1. All surveys were carried out in the appropriate seasons.

4.3 SITE VISITS

Table 4.1 – Field Surveys

Area	Surveyors	Survey Dates
Terrestrial Ecology	Bryan Deegan (MCIEEM) of Altemar	04/09/2020 15/06/2021 14/11/2021
Wintering Bird Survey **(Appendix F1 of Volume III of EIAR)**	André Robinson (independent ornithologist). Emmi Virkki of Scott Cawley Ltd.	29/10/2020 30/10/2020 19/11/2020 20/11/2020 01/02/2021 02/02/2021 27/02/2021 28/02/2021 26/03/2021 27/03/2021
Breeding Bird Survey EIAR Biodiversity Chapter SDZ20A/0021	André Robinson (independent ornithologist). Emmi Virkki of Scott Cawley Ltd.	27/06/2020 30/06/2020
Barn Owl Survey **(Appendix F2 of Volume III of EIAR)**	André Robinson (independent ornithologist). Emmi Virkki of Scott Cawley Ltd.	12/11/2020 01/02/2021 02/02/2021 18/06/2021
Badger/Mammal Survey **(Appendix F3 of Volume III of EIAR)**	Dr. Chris Smal B. Sc. Ph. D. (MIEEM)	16/08/2020,
Non-Avian Fauna Winter Survey	Dr. Chris Smal B. Sc. Ph. D. (MIEEM)	22/03/2021

Area	Surveyors	Survey Dates
(Appendix F4 of Volume III of EIAR)	(Follow up assessment) Bryan Deegan (MCIEEM)	23/03/2021 14/11/2021
***Bat Fauna* (Appendix F5 of Volume III of EIAR)**	Dr Tina Aughney/ Mr. Shaun Boyle	Detector Surveys 22/09/2018 31/08/2019 12/07/2020 02/062021 Static detectors in 2018, 2019 and 2020

Desk studies were carried out to obtain relevant existing biodiversity information within the ZOI. The assessment also extends beyond the immediate development area to include those species and habitats that are likely to be impacted upon by the proposed residential development. As outlined in Chapter 6 Water of this EIAR, "*Existing surface water run-off generated on site discharges towards the east via the existing drainage ditches*." The Surface Water Management Plan intends for the proposed development to discharge east under the R113 via a new drainage network within a new gravity sewer to be constructed as part of the Clonburris Southern Link Street (CSLS), subject to a planning application SDZ20A/0021 granted on the 16th of August 2021. Trunk surface water sewers and regional attenuation are to be constructed as part of the CSLS to serve all lands in the southern portion of the SDZ including the proposed development. The canal overflow channel to the south of the proposed site is to be maintained. No surface water run-off on site will discharge to this channel. Foul wastewater will be directed to Ringsend Wastewater Treatment Plant (WwTP) for treatment. As a result, the potential ZOI extends beyond the site, with the potential for downstream impacts to extend beyond the proposed development area to the marine environment via the surface water/foul water network.

Details of the proposed development are seen in Chapter 2 of this EIAR. The proposed layout, drainage strategy and landscape design were reviewed to inform this assessment. Further, Chapter 2, Description of the Proposed Development and Alternatives Examined, Chapter 5, Land and Soils, Chapter 6 Water and Hydrology, and Chapter 12 Material Assets - Utilities of this submission were reviewed.

4.3.1 Proximity to designated conservation sites and habitats or species of conservation interest

The designated conservation sites within 15km of the proposed combined development site were examined for potential impact. Sites beyond 15km have no direct or indirect pathways or are across the marine environment where significant dilution, mixing and settlement would occur and given the scale of the proposed development, impacts on sites beyond 15km would be at negligible levels. This assessment included sites of international importance; Natura 2000 sites (Special Areas of Conservation (SAC), Special Protection Areas (SPA)) and Ramsar sites and sites of National importance ((Natural Heritage Areas (NHA), proposed Natural Heritage Areas (pNHA). Up to date GIS data were acquired and plotted against 1, 5, 10 and 15km buffers from the proposed development site. A data search of rare and threatened species within 10km of the proposed site (GIS shapefile) was provided by NPWS. Additional information on rare and threatened species was researched through the National Biodiversity Data Centre maps.

4.3.2 Terrestrial and Avian Ecology

A pre-survey data search was carried out. This included a literature review to identify and collate relevant published information and ecological studies previously conducted and comprised of information from the following sources; the National Parks and Wildlife Service, NPWS Rare and Protected Species Database, National Biodiversity Data Centre, EPA WMS watercourses data, in addition to aerial, 6 inch, satellite imagery. Surveys were carried out by means of a thorough search within the potential ZOI. Wintering Bird Surveys were carried out over the 2020/2021 wintering bird season by Scott Cawley (Appendix F1 **of Volume III of EIAR**). Barn Owl Surveys were carried out over the 2020/2021 season by Scott Cawley (Appendix F2 **of Volume III of EIAR**). Further, a Badger/Mammal Survey was carried out on 16th August 2020 by Dr. Chris Smal B. Sc. Ph. D. (MIEEM) (Appendix F3). A Non-Avian Fauna Winter Survey was carried out by Dr. Chris Smal B. Sc. Ph. D. (MIEEM) on the 22nd and 23rd of March 2021 (Appendix F4 **of Volume III of EIAR**). Bat Fauna surveys were carried out between 2018 and 2021 by Dr Tina Aughney/ Mr. Shaun Boyle (Appendix F5 **of Volume III of EIAR**). Habitat mapping was carried out according to Fossitt (2000)

using AcrGIS 10.5 and displayed on Bing satellite imagery or street mapping based on the 15/06/2021 site visit. Any rare or protected species or habitats were noted. As part of the fieldwork an invasive species assessment was carried out. Birds noted on site were classed based on the Birds of Conservation Concern in Ireland classification of red, amber and green, which is based on an assessment of the conservation status of all regularly occurring birds on the island of Ireland.

4.3.3 Rating of Effects

The terminology for rating impacts is derived from the EPA Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (2017).

4.3.4 Difficulties Encountered

No difficulties were encountered in relation to the preparation of the Biodiversity report. The bat survey was undertaken within the active bat period (April to September) and a detector survey was possible. Insects were observed in flight during the bat survey.

4.4 THE EXISTING RECEIVING ENVIRONMENT (BASELINE SCENARIO)

4.4.1 Zone of Influence

The potential zone of influence (ZOI) was set at a radius of 2km from the proposed Project. It should be noted that where there was a potential for the ZOI to be influenced by drainage connections, natural biodiversity corridors e.g. rivers or woodland these were also take into account and the assessment was extended. As outlined in Chapter 6 Water of this EIAR, it is proposed to discharge surface water drainage to an existing surface water network under the R113 (east of the subject site) via a new drainage network to be constructed as part of the Clonburris Southern Link Street (subject to SDZ20A/0021). The surface water network under the R113 ultimately outfalls to the River Camac, which in turn outfalls to the River Liffey and ultimately outfalls to the marine environment at Dublin Bay. It is worth noting that the canal overflow channel to the south of the subject site is to be maintained, however, no surface water runoff from the subject site will discharge to this channel. However during construction there is potential for surface water to enter this channel in the absence of mitigation Foul wastewater will be directed via new gravity sewers to the trunk sewer on the new Link Road, which ultimately outfalls to Ringsend Wastewater Treatment Plant (WwTP) for treatment. As a result, the potential ZOI extends beyond the site, with the potential for downstream impacts to extend beyond the proposed development area to the marine environment via the surface water/foul water network.

The proposed development cannot be considered in isolation. Having regard to this fact, the cumulative environmental impacts of the proposed development together with those of the residential development proposed in the SDZ are considered in each Chapter of this EIAR. The application site outline is shown in figure 4-1.

4.4.2 Designated Sites

As can be seen from Figures 4.2 (SAC's within 15km), 4.3 (SPA's within 15km), 4.4 (NHA and pNHA within 15km), 4.5 (Watercourses proximate to the site.), there are no Natura 2000 sites within 5km, and three National conservation sites (Grand Canal pNHA, Liffey Valley pNHA & Royal Canal pNHA) within five kilometres of the proposed development site. There is one Ramsar site within 15km of the proposed development site (Sandymount Strand/Tolka Estuary). The distance and details of the conservation sites within 15km of the proposed development are seen in Table 4.2a and Table 4.2b. Given that a portion of the subject site lies within the Grand Canal pNHA, out of an abundance of caution, it is considered that there is a direct pathway to the Grand Canal pNHA via surface water runoff and dust during construction. However, it is worth noting that it is not proposed to discharge surface water drainage from the subject site to the Grand Canal waterbody during operation. There is an indirect hydrological connection to designated conservation sites located within the marine environment at Dublin Bay via foul and surface water drainage. Foul wastewater will be connected to a public sewer network, which ultimately discharges to Ringsend WwTP for treatment. Surface water drainage will be directed to an existing surface water drainage network running under the R113 (east of the subject site), which outfalls to the River Camac, which in turn outfalls to the River Liffey and ultimately outfalls to the marine environment at Dublin Bay. Figures 4.6 – 4.11 demonstrate waterbodies proximate to the subject site and designated conservation sites with the potential for a hydrological pathway. No impacts are foreseen on this designated site outlined in Table 4-2a and 4-2b due to the significant distance from the application site and the dilution, settlement and mixing within the marine environment.

Figure 4.1 – Proposed Development Site Outline (red)

0 250 500 750 1,000 m

Project: Clonburris
Location: Clonburris Co. Dublin
Date: 1st November, 2021
Drawn By: Bryan Deegan (Altemar)

ALTEMAR
Marine & Environmental Consultancy

Table 4.2 – Natura 2000 sites within 15km (and outside 15km with potential for a pathway) of the proposed development

Natura 2000 Sites	Distance	Direct Hydrological / Biodiversity Connection
Special Areas of Conservation (SAC)		
Rye Water Valley/Carton SAC	5.1 km	**No**
Glenasmole Valley SAC	8.2 km	**No**
Wicklow Mountains SAC	10.4 km	**No**
South Dublin Bay SAC	12.8 km	**No**
Special Protection Areas (SPA)		
South Dublin Bay and River Tolka Estuary SPA	12.2 km	**No**
Wicklow Mountains SPA	12.3 km	**No**

Table 4.3 – National designated sites within 15km (and outside 15km with potential for a pathway) of the proposed development

Designation	Conservation Sites	Distance	Direct Hydrological / Biodiversity Connection
pNHA	Grand Canal	Within site outline	**Yes**
pNHA	Liffey Valley	2.9 km	**No**
pNHA	Royal Canal	4.6 km	**No**
pNHA	Rye Water Valley/Carton	5.1 km	**No**
pNHA	Dodder Valley	6.4 km	**No**
pNHA	Lugmore Glen	6.5 km	**No**
pNHA	Slade of Saggart and Crooksling Glen	7.5 km	**No**
pNHA	Glenasmole Valley	8.2 km	**No**
pNHA	North Dublin Bay	11.9 km	**No**
pNHA	Kilteel Wood	12.5 km	**No**
pNHA	Fitzsimon's Wood	12.7 km	**No**
pNHA	South Dublin Bay	12.8 km	**No**
pNHA	Booterstown Marsh	13.8 km	**No**

Figure 4.2 – Special Areas of Conservation within 15km of the proposed development site

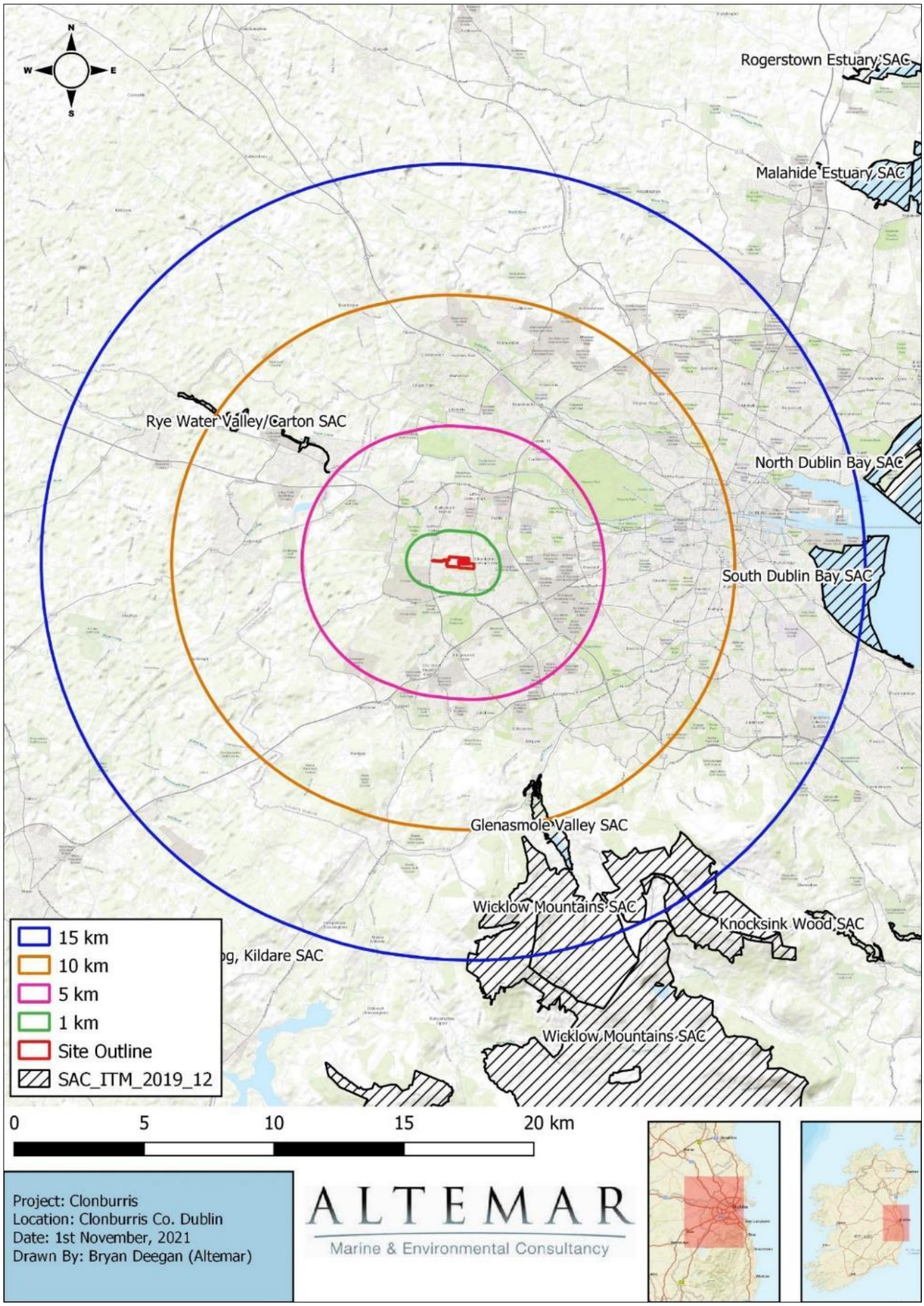


Figure 4.3 – Special Protection Areas within 15km of the proposed development site

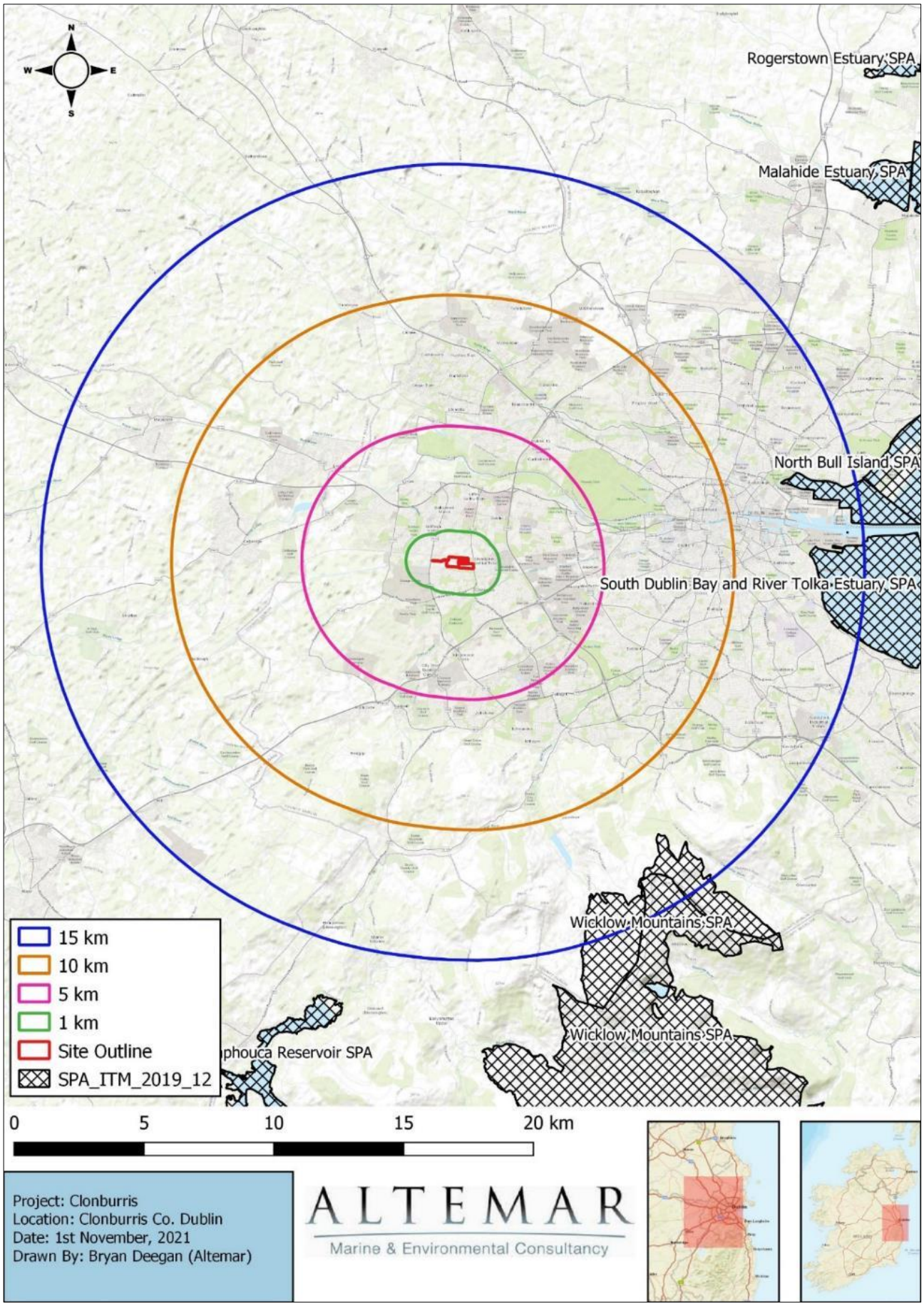


Figure 4.4 – NHAs and pNHAs within 15km of the proposed development site

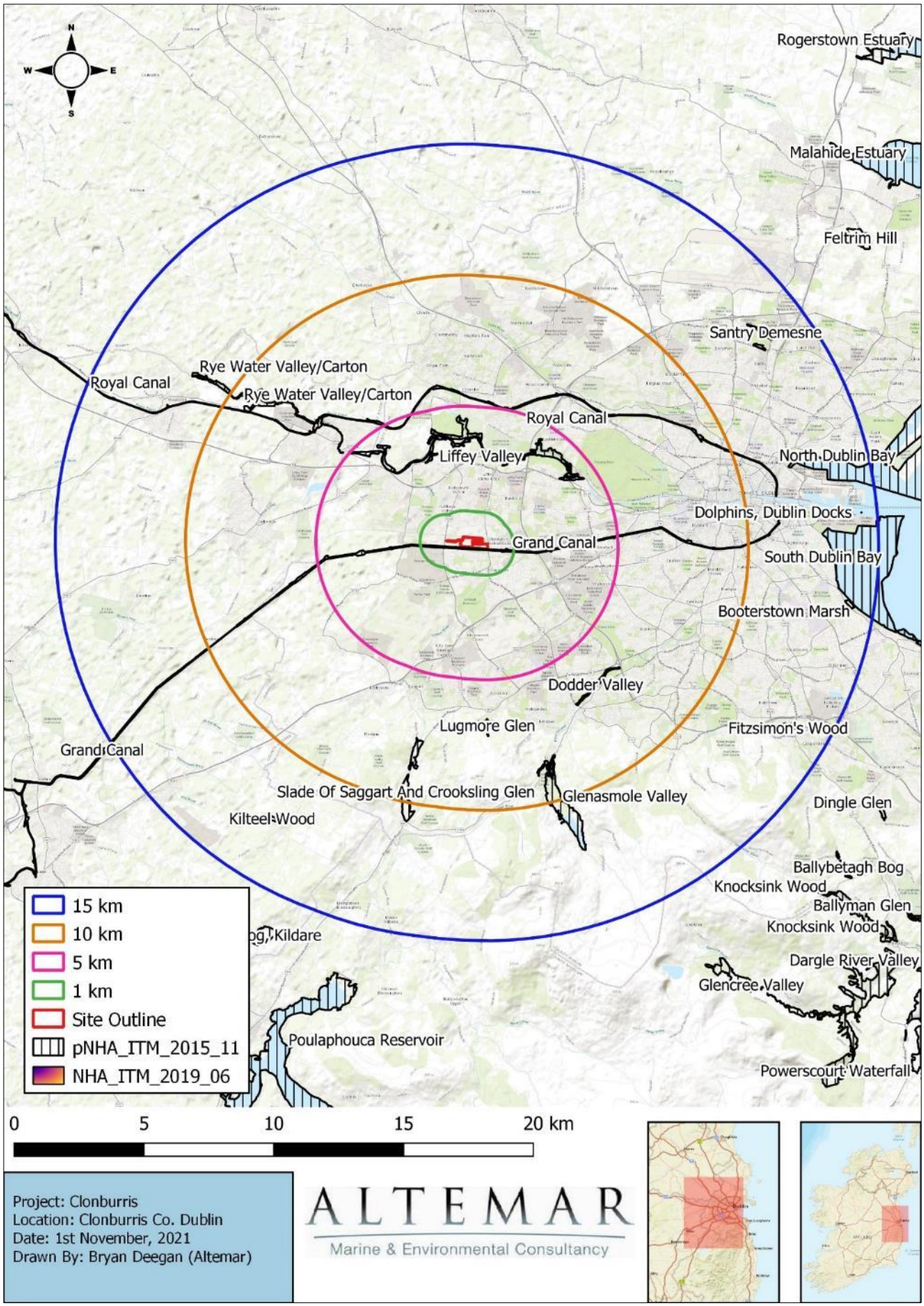


Figure 4.5 – Ramsar sites within 15km of the proposed development site

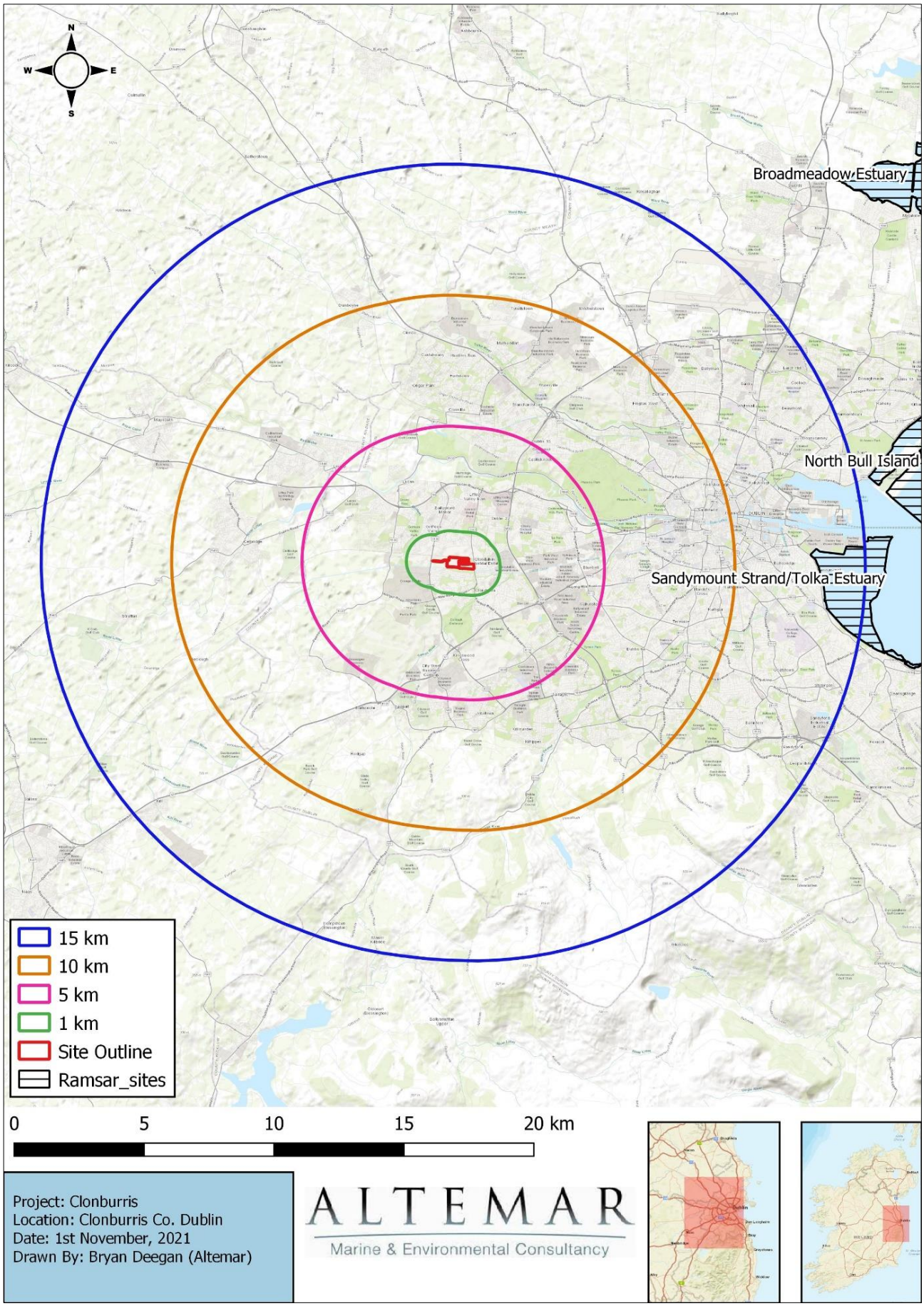


Figure 4.6 – Waterbodies within 1km of the proposed development site

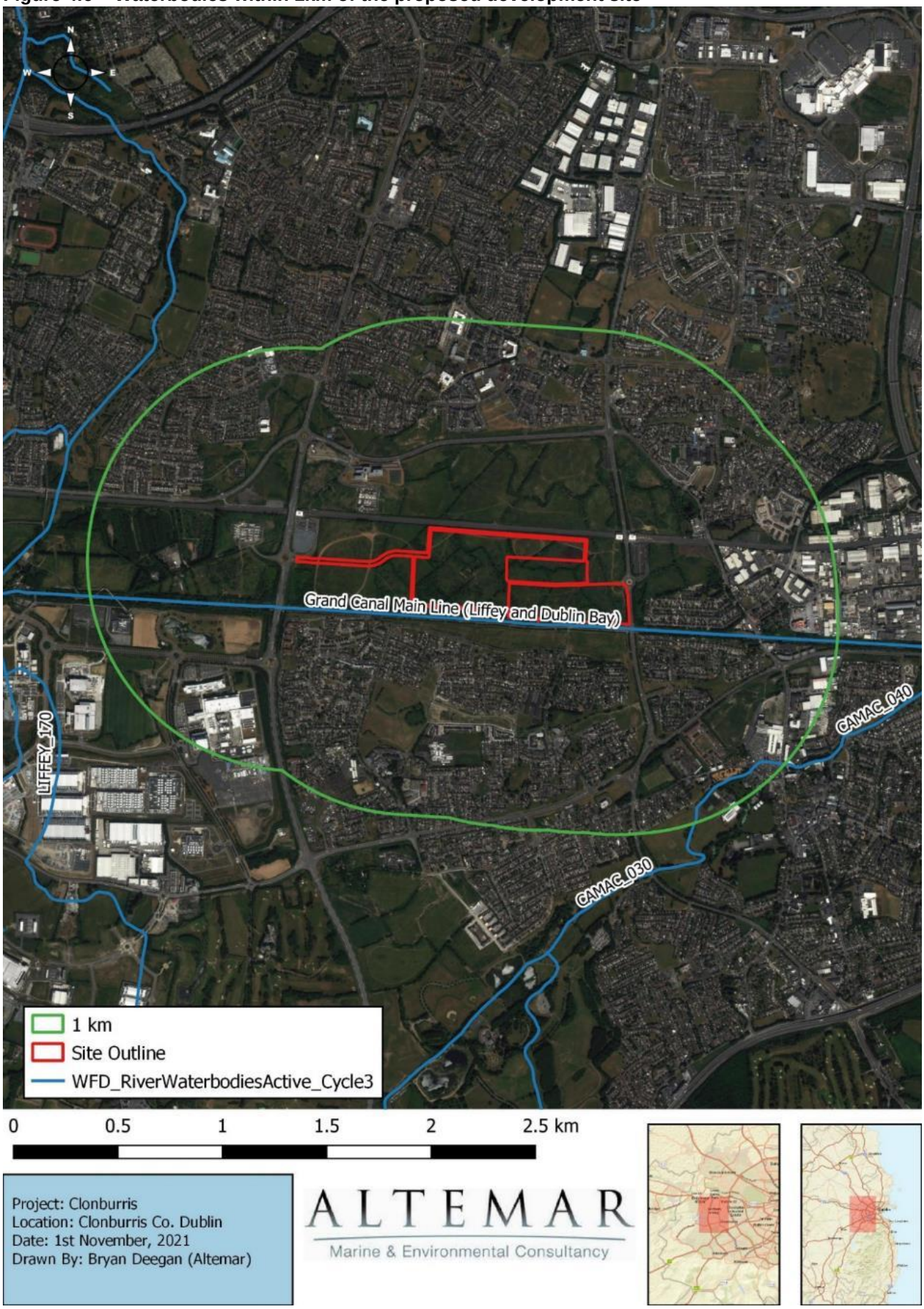


Figure 4.7 – Waterbodies proximate to the subject site and SACs with 15km of the subject site

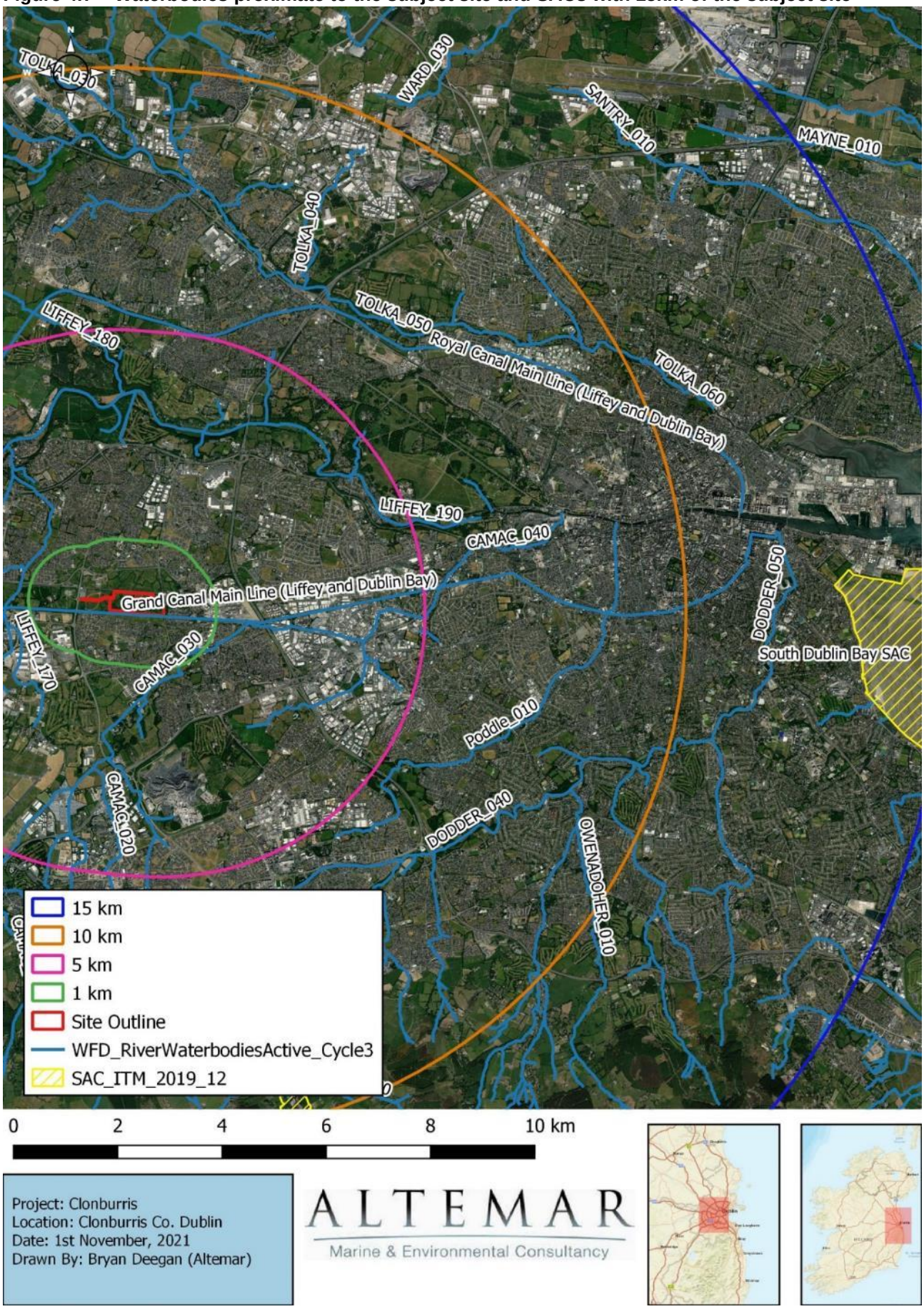


Figure 4.8 – Waterbodies proximate to the subject site and SPAs with 15km of the subject site

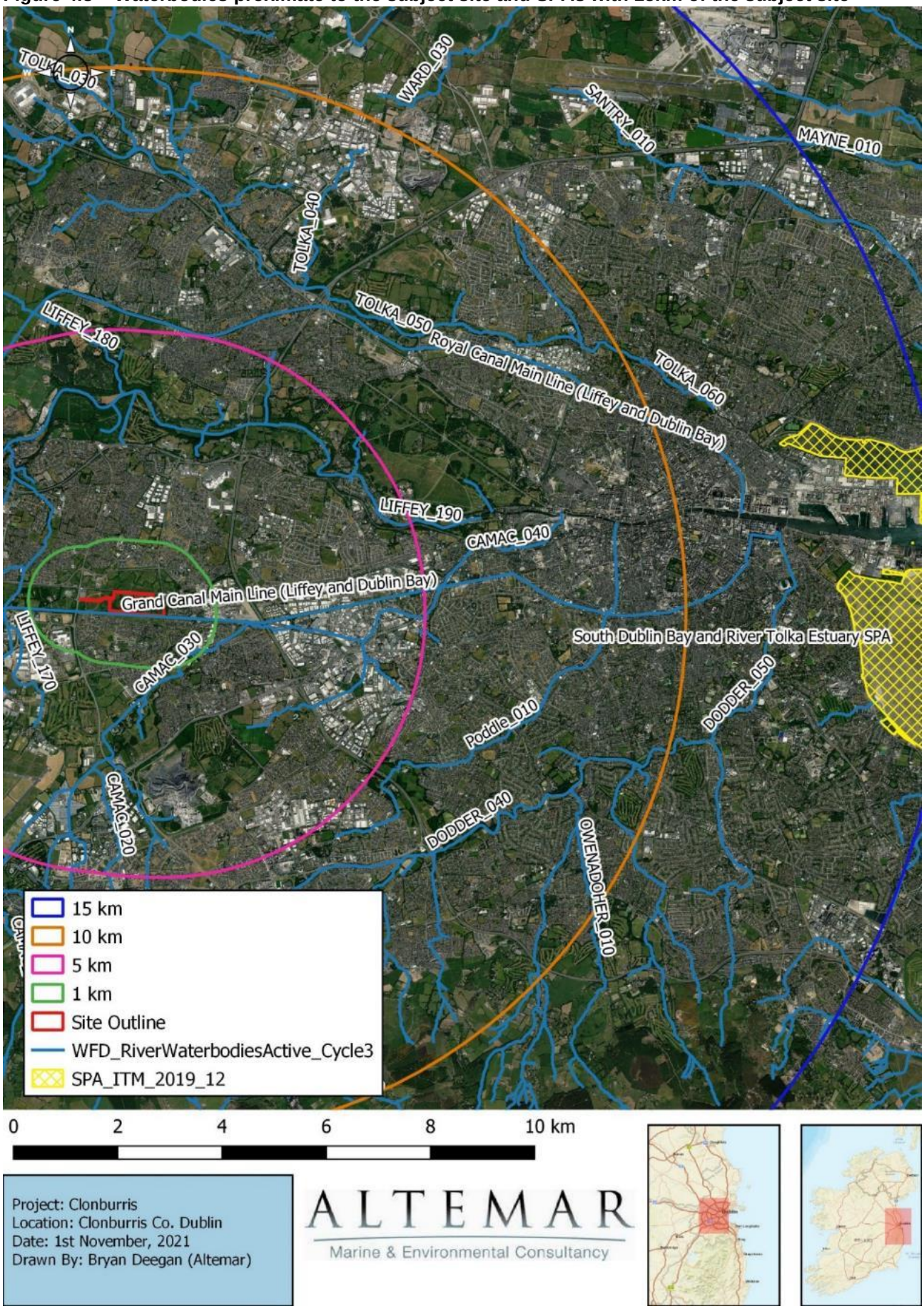


Figure 4.9 – Waterbodies proximate to the subject site and pNHAs with 15km of the subject site

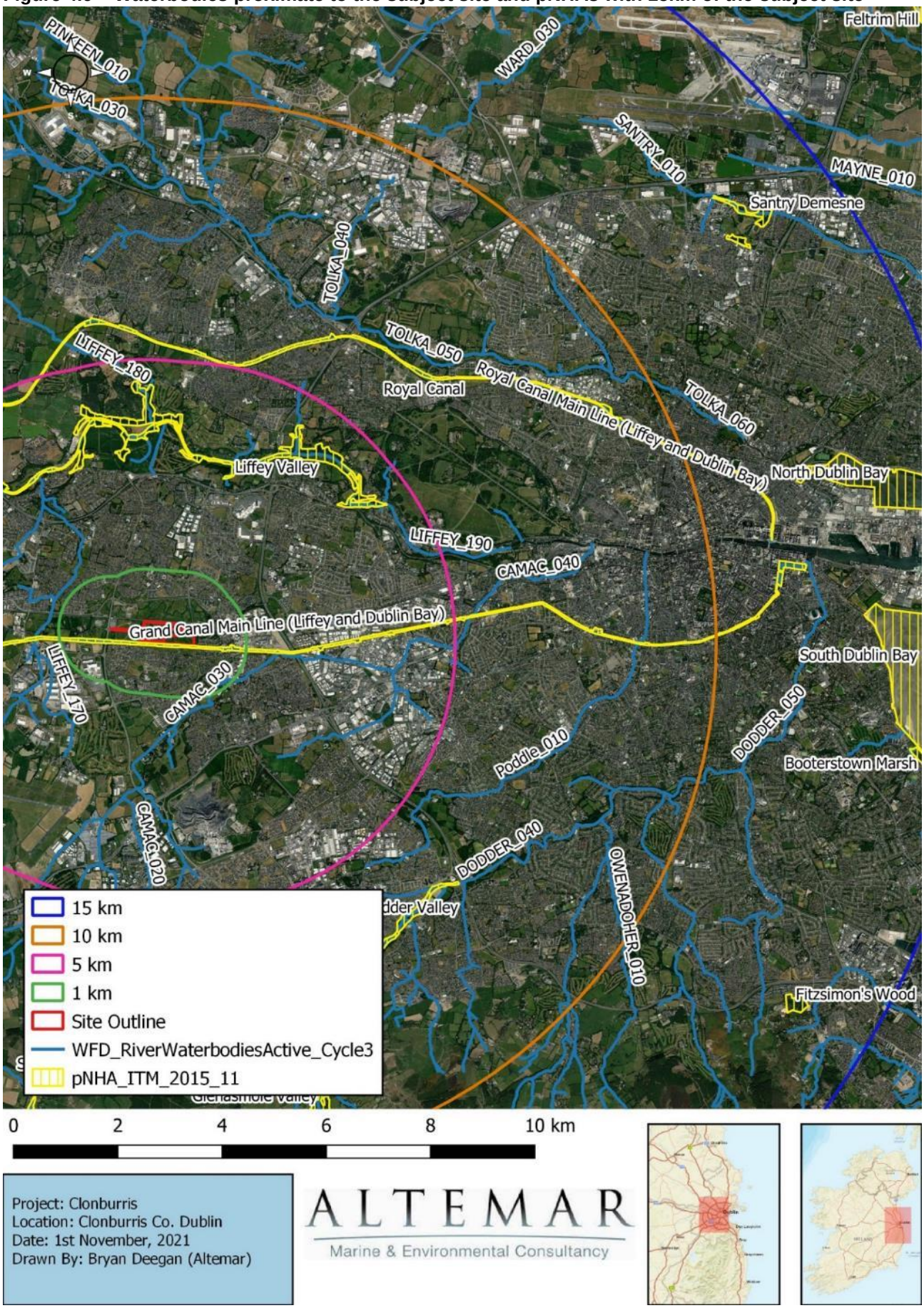
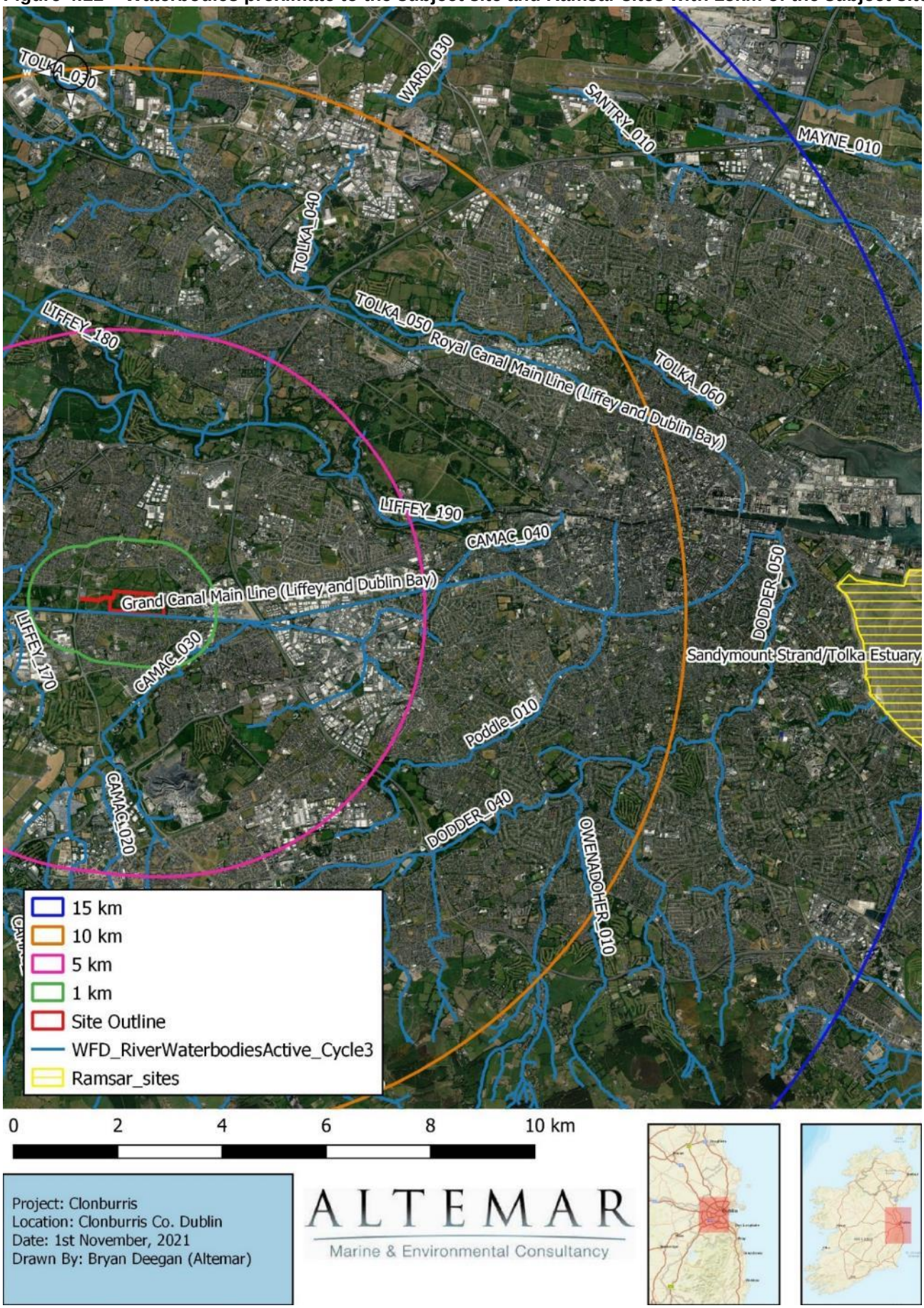


Figure 4.10 – Waterbodies and pNHAs proximate to the subject site

Figure 4.11 – Waterbodies proximate to the subject site and Ramsar sites with 15km of the subject site



4.4.3 Species Data

It should be noted that no species of conservation importance were noted on site, based on NPWS and NBDC records as fine resolution. Species recorded within the 10km^2 grid include are seen in Table 4.4.

Table 4.4 – National Biodiversity Data Centre Records within the 10km^2 grid (O03)

Common Frog (Rana temporaria); Smooth Newt (Lissotriton vulgaris); Barn Owl (Tyto alba); Barn Swallow (Hirundo rustica); Black-headed Gull (Larus ridibundus); Brent Goose (Branta bernicla); Common Coot (Fulica atra); Common Grasshopper Warbler (Locustella naevia); Common Kestrel (Falco tinnunculus); Common Kingfisher (Alcedo atthis); Common Linnet (Carduelis cannabina); Common Pheasant (Phasianus colchicus); Common Pochard (Aythya ferina); Common Redshank (Tringa totanus); Common Snipe (Gallinago gallinago); Common Starling (Sturnus vulgaris); Common Swift (Apus apus); Common Wood Pigeon (Columba palumbus); Corn Crake (Crex crex); Eurasian Curlew (Numenius arquata); Eurasian Oystercatcher (Haematopus ostralegus); Eurasian Teal (Anas crecca); Eurasian Tree Sparrow (Passer montanus); Eurasian Wigeon (Anas penelope); Eurasian Woodcock (Scolopax rusticola); European Golden Plover (Pluvialis apricaria); Gadwall (Anas strepera); Goosander (Mergus merganser); Great Black-backed Gull (Larus marinus); Great Cormorant (Phalacrocorax carbo); Great Crested Grebe (Podiceps cristatus); Grey Partridge (Perdix perdix); Herring Gull (Larus argentatus); House Martin (Delichon urbicum); House Sparrow (Passer domesticus); Lesser Black-backed Gull (Larus fuscus); Little Egret (Egretta garzetta); Little Grebe (Tachybaptus ruficollis); Mallard (Anas platyrhynchos); Merlin (Falco columbarius); Mew Gull (Larus canus); Mute Swan (Cygnus olor); Northern Lapwing (Vanellus vanellus); Northern Pintail (Anas acuta); Peregrine Falcon (Falco peregrinus); Red Grouse (Lagopus lagopus); Red Kite (Milvus milvus); Rock Pigeon (Columba livia); Sand Martin (Riparia riparia); Sky Lark (Alauda arvensis); Spotted Flycatcher (Muscicapa striata); Stock Pigeon (Columba oenas); Tufted Duck (Aythya fuligula); Whooper Swan (Cygnus cygnus); Yellowhammer (Emberiza citrinella); European Eel (Anguilla anguilla); Roach (Rutilus rutilus); Douglas Fir (Pseudotsuga menziesii); Freshwater White-clawed Crayfish (Austropotamobius pallipes); Gammarus pulex; Water Fern (Azolla filiculoides); Arthurdendyus triangulates; Black Currant (Ribes nigrum); Butterfly-bush (Buddleja davidii); Canadian Fleabane (Conyza canadensis); Canadian Waterweed (Elodea canadensis); Cherry Laurel (Prunus laurocerasus); Common Broomrape (Orobanche minor); Cornflower (Centaurea cyanus); False-acacia (Robinia pseudoacacia); Giant Hogweed (Heracleum mantegazzianum); Green Figwort (Scrophularia umbrosa); Hairy St John's-wort (Hypericum hirsutum); Himalayan Honeysuckle (Leycesteria formosa); Indian Balsam (Impatiens glandulifera); Japanese Knotweed (Fallopia japonica); Japanese Rose (Rosa rugosa); Lamiastrum galeobdolon subsp. montanum; Least Duckweed (Lemna minuta); Meadow Barley (Hordeum secalinum); Nuttall's Waterweed (Elodea nuttallii); Opposite-leaved Pondweed (Groenlandia densa); Rhododendron ponticum; Russian-vine (Fallopia baldschuanica); Spanish Bluebell (Hyacinthoides hispanica); Spring Vetch (Vicia lathyroides); Sycamore (Acer pseudoplatanus); Three-cornered Garlic (Allium triquetrum); Traveller's-joy (Clematis vitalba); Chaetarthria seminulum; Harlequin Ladybird (Harmonia axyridis); Minutest Diving Beetle (Bidessus minutissimus); Nebrioporus (Nebrioporus) depressus; Dingy Skipper (Erynnis tages); Marsh Fritillary (Euphydryas aurinia); Small Blue (Cupido minimus); Small Heath (Coenonympha pamphilus); Wall (Lasiommata megera); Andrena (Andrena) fucata; Andrena (Andrena) praecox; Andrena (Melandrena) nigroaenea; Andrena (Taeniandrena) wilkella; Barbut's Cuckoo Bee (Bombus (Psithyrus) barbutellus); Dark Nomad Bee (Nomada sheppardana); Halictus (Seladonia) tumulorum; Hill Cuckoo Bee (Bombus (Psithyrus) rupestris); Hylaeus (Prosopis) brevicornis; Large Red Tailed Bumble Bee (Bombus (Melanobombus) lapidarius); Megachile (Delomegachile) willughbiella; Moss Carder-bee (Bombus (Thoracombus) muscorum); Neat Mining Bee (Lasioglossum (Evylaeus) nitidiusculum); Nomada panzer; Trimmer's Mining Bee (Andrena (Hoplandrena) trimmerana); Ephemerella notata; Procloeon bifidum; Rhithrogena germanica; Bifid Crestwort (Lophocolea bidentata); Blueish Veilwort (Metzgeria violacea); Common Kettlewort (Blasia pusilla); Crescent-cup Liverwort (Lunularia cruciata); Delicate Germanderwort (Riccardia multifida); Endive Pellia (Pellia endiviifolia); Even Scalewort (Radula complanata); Fingered Cowlwort (Colura calyptrifolia); Forked Veilwort (Metzgeria furcata); Fringed Heartwort (Ricciocarpos natans); Greasewort (Aneura pinguis); Greater Featherwort (Plagiochila asplenioides); Marchantia polymorpha subsp. polymorpha; Marchantia polymorpha subsp. ruderalis; Narrow Mushroom-headed Liverwort (Preissia quadrata); Ribbonwort (Pallavicinia lyellii); Top Notchwort (Leiocolea turbinata); Variable-leaved Crestwort (Lophocolea heterophylla); Wall Scalewort (Porella platyphylla); Brown Snail (Zenobiella subrufescens); Budapest Slug (Tandonia budapestensis); Common Garden Snail (Cornu aspersum); Common Oyster (Ostrea edulis); Common Whorl Snail (Vertigo (Vertigo) pygmaea); Desmoulin's Whorl Snail (Vertigo (Vertigo) moulinsiana); Duck Mussel (Anodonta (Anodonta) anatina); Ear Pond Snail (Radix auricularia); English Chrysalis

Snail (Leiostyla (Leiostyla) anglica); Field Slug (Deroceras (Deroceras) agreste); Globular Pea Mussel (Pisidium hibernicum); Glutinous Snail (Myxas glutinosa); Jenkins' Spire Snail (Potamopyrgus antipodarum); Keeled Slug (Tandonia sowerbyi); Lake Orb Mussel (Musculium lacustre); Lesser Bulin (Merdigera obscura); Pisidium pseudosphaerium; Pisidium pulchellum; Plated Snail (Spermodea lamellata); Point Snail (Acicula fusca); Prickly Snail (Acanthinula aculeata); Swan Mussel (Anodonta (Anodonta) cygnea); Wrinkled Snail (Candidula intersecta); Anomalous Bristle-moss (Orthotrichum anomalum); Bird's-claw Beard-moss (Barbula unguiculata); Broom Fork-moss (Dicranum scoparium);Bryum dichotomum; Capillary Thread-moss (Bryum capillare);Chalk Screw-moss (Tortula vahliana); Common Aloe-moss (Aloina aloides); Common Bladder-moss (Physcomitrium pyriforme); Common Cord-moss (Funaria hygrometrica); Common Feather-moss (Eurhynchium praelongum); Common Pincushion (Dicranoweisia cirrata); Common Pottia (Tortula truncata); Common Striated Feather-moss (Eurhynchium striatum); Common Tamarisk-moss (Thuidium tamariscinum); Crimson-tuber Thread-moss (Bryum rubens); Cylindric Ditrichum (Ditrichum cylindricum); Ephemerum serratum var. minutissimum; Fallacious Beard-moss (Didymodon fallax); Fern-leaved Hook-moss (Cratoneuron filicinum); Fertile Feather-moss (Drepanocladus polygamus); Field Forklet-moss (Dicranella staphylina); Flat Neckera (Neckera complanata); Fox-tail Feather-moss (Thamnobryum alopecurum); Green Pocket-moss (Fissidens viridulus); Hair-pointed Feather-moss (Cirriphyllum piliferum); Hart's-tongue Thyme-moss (Plagiomnium undulatum); Heath Star Moss (Campylopus introflexus); Hook-beak Tufa-moss (Hymenostylium recurvirostrum); Lance-leaved Pottia (Tortula lanceola); Lesser Bird's-claw Beard-moss (Barbula convoluta); Lesser Potato Bryum (Bryum subapiculatum); Long-beaked Thyme-moss (Plagiomnium rostratum); Many-seasoned Thread-moss (Bryum intermedium); Marble Screw-moss (Syntrichia papillosa); Neat Feather-moss (Scleropodium purum); Pill Bryum (Bryum violaceum); Pink-fruited Thread-moss (Pohlia melanodon); Pointed Spear-moss (Calliergonella cuspidata); Raspberry Bryum (Bryum klinggraeffii); Rigid Aloe-moss (Aloina rigida); Rough-stalked Feather-moss (Brachythecium rutabulum); Schreber's Forklet-moss (Dicranella schreberiana); Silky Forklet-moss (Dicranella heteromalla); Silky Wall Feather-moss (Homalothecium sericeum); Silver-moss (Bryum argenteum); Slender Bristle-moss (Orthotrichum tenellum); Slender Ditrichum (Ditrichum gracile); Small Hairy Screw-moss (Syntrichia laevipila); Soft-tufted Beard-moss (Didymodon vinealis); Spiral Chalk-moss (Pterygoneurum lamellatum); Starke's Pottia (Microbryum starckeanum); Swartz's Feather-moss (Oxyrrhynchium hians); Twisting Thread-moss (Bryum torquescens); Variable Crisp-moss (Trichostomum brachydontium); Variable Forklet-moss (Dicranella varia); Wall Screw-moss (Tortula muralis); Wavy Beard-moss (Didymodon sinuosus); Weissia brachycarpa var. obliqua; Whitish Feather-moss (Brachythecium albicans); Wood Bristle-moss (Orthotrichum affine); Red-eared Terrapin (Trachemys scripta); American Mink (Mustela vison); Brown Long-eared Bat (Plecotus auritus); Brown Rat (Rattus norvegicus); Daubenton's Bat (Myotis daubentonii); Eastern Grey Squirrel (Sciurus carolinensis); Eurasian Badger (Meles meles); Eurasian Pygmy Shrew (Sorex minutus); Eurasian Red Squirrel (Sciurus vulgaris); European Otter (Lutra lutra); European Rabbit (Oryctolagus cuniculus); Fallow Deer (Dama dama); House Mouse (Mus musculus); Lesser Noctule (Nyctalus leisleri); Nathusius's Pipistrelle (Pipistrellus nathusii); Natterer's Bat (Myotis nattereri); Pine Marten (Martes martes); Pipistrelle (Pipistrellus pipistrellus sensu lato); Red Deer (Cervus elaphus); Siberian Chipmunk (Tamias sibiricus); Sika Deer (Cervus nippon); Soprano Pipistrelle (Pipistrellus pygmaeus); West European Hedgehog (Erinaceus europaeus); Whiskered Bat (Myotis mystacinus)

Table 4.5 – Species found by NPWS within 10km

Common Frog (*Rana temporaria*); Opposite-leaved Pondweed (*Groenlandia densa*); Freshwater Crayfish (*Austropotamobius pallipes*); Otter (*Lutra lutra*); Green Figwort (*Scrophularia umbrosa*); Blue Fleabane (*Erigeron acer*); European Badger (*Meles meles*); Irish Hare (*Lepus timidus subsq. hibernicus*); Hairy St. John's-wort (*Hypericum hirsutum*); Hairy Violet (*Viola hirta*); West European Hedgehog (*Erinaceus europaeus*); Sika Deer (*Cervus nippon*); Irish Stoat (*Mustela erminea subsq. hibernice*)

The closest species recorded by NPWS to the site was Opposite-leaved Pondweed (*Groenlandia densa*), located within an area that includes the subject site, and Common Frog (*Rana temporaria*) at 0.3 km south of the site.

4.5 SITE SURVEY

4.5.1 Habitats

Habitats within the combined site were classified according to Fossitt (2000) (Figure 4.12) based on the 15th June 2021 site visit and the species noted within each habitat are described. The site is essentially a series of agricultural grassland fields with interstitial hedgerows that borders the Grand Canal pNHA. There are no habitats on site that support populations of qualifying interest species of nearby Natura 2000 sites. As a result of lack of use over recent years scrub has commenced encroaching on the grassland in several of the fields. Habitats on site are outlined as follows:

ED3 Recolonising Bare Ground

Several areas of bare ground are noted on site. These areas have undergone relatively recent disturbance and are being recolonised by opportunistic species such as rape (*Brassica napus*), bramble (*Rubus fruticosus agg*.), clover (*Trifolium spp*.), docks (Rumex spp.), thistles (*Cirsium arvense & C. vulgare*), rosebay willowherb (Chamaenerion angustifolium), ragwort (*Senecio sp*.), plantains (*Plantago spp*.), dandelion (Taraxacum spp.), hoary willowherb (*Epilobium parviflorum*), rushes (Juncus sp), pineappleweed (*Matricaria discoidea*), cow parsley (*Anthriscus sylvestris*), daisy (*Bellis perennis*), cat's-ear (*Hypochaeris radicata*), creeping buttercup (Ranunculus repens), hedge bindweed (*Calystegia sepium*), common vetch (*Vicia sativa ssp. Segetalis*), oxeye daisy (Leucanthemum vulgare) wild teasel (*Dipsacus fullonium*), mallow (*Malva sylvestris*), butterfly-bush (*Buddleja davidii*), colt's-foot (*Tussilago farfara*), redshank (*Persicaria maculosa*), nettle (*Urtica dioica*), herb-robert (*Geranium robertianum*), and common restharrow (*Ononis repens*).

Plate 1. Recolonising bare Ground

Figure 4.12 – Fossitt Habitat map for the proposed development site

WL1- Hedgerows

Numerous hedgerows are present across the site. The majority of hedgerows are single hedgerows but several double hedgerows are present with interstitial drainage ditches. Species within the hedgerow habitat include hawthorn (*Crataegus monogyna*), elder (*Sambucus nigra*), ash (*Fraxinus excelsior*), blackthorn (*Prunus spinosa*) alder (*Alnus glutinosa*), horse chestnut (*Aesculus hippocastanum*), sycamore (*Acer pseudoplatanus*), willow (*Salix s*p), rosebay willowherb (*Chamaenerion angustifolium*), meadowsweet (*Filipendula ulmaria*), bramble (*Rubus fruticosus agg*.), butterfly-bush (*Buddleja davidii*), ragwort (*Senecio sp.*), greater stitchwort (*Stellaria holostea*), nettle (*Urtica dioica*), common figwort (*Scrophularia nodosa*) Marsh woundwort (*Stachys palustris*), hogweed (*Heracleum sphondylium*), red campion (*Silene dioica*), common broomrape (*Orobanche minor*), bush vetch (*Vicia sepium*), herb-robert (*Geranium robertianum*), wood avens (*Geum urbanum*), cleavers (*Galium aparine*), knapweed (*Centaurea nigra*), scarlet pimpernel (*Anagallis arvensis*), docks (*Rumex spp*.), plantains (*Plantago spp*.), hedge bindweed (*Calystegia sepium*), field bindweed (*Convolvulus arvensis*)and hedge woundwort (*Stachys sylvatica*). Common frog were noted at several locations where water filled the drainage dithes were present.

Plate 2. WL1-Hedgerows

GS2-Dry meadows and grassy verges/WS1-Scrub

The fields on site appear to have been unmanaged for several years and are suffering from various levels of scrub encroachment. Species observed include e.g. creeping cinquefoil (*Potentilla reptans*), oxeye daisy (*Leucanthemum vulgare*), thistles (*Cirsium arvense, C. vulgare*), common ragwort (*Senecio jacobaea*), creeping buttercup (*Ranunculus repens*), meadow buttercup (*Ranunculus acris*), dandelion (*Taraxacum spp*.), docks (*Rumex spp*.), daisy (*Bellis perennis*), clover (*Trifolium repens*), plantains (*Plantago spp.),* nettle (*Urtica dioica*), cat's-ear (*Hypochaeris radicata*),common vetch (*Vicia sativa*), cleavers (*Galium aparine*), common bird's-foot trefoil (*Lotus corniculatus*), lady's Bedstraw (*Galium verum*), bramble (*Rubus fruticosus*), hedge bindweed (*Calystegia sepium*), great willowherb (*Epilobium hirsutum*), rosebay willowherb (*Chamaenerion angustifolium*), red bartsia (*Odontites vernus*), autumn hawkbit (*Scorzoneroides autumnalis*), wild parsnip (*Pastinaca sativa*), meadow vetchling (*Lathyrus pratensis*), colt's-foot (*Tussilago farfara*) and perennial sow-thistle (*Sonchus arvensis*).

The scrub element in the grassland areas consisted of predominantly the tree and bramble elements of the hedgerow habitat beginning to encroach across the site. The scrub species consisted primarily of hawthorn (*Crataegus monogyna*) and bramble (*Rubus fruticosus agg*.).

Plate 3. GS2-Dry meadows and grassy verges (GS2-Dry meadows and grassy verges/WS1-Scrub inset)

Plate 4. FS1 Reed and large sedge swamps

FS1 Reed and large sedge swamps

A small area of FS1 Reed and large sedge swamps, was located within the hedgerows proximate to the canal. This consisted primarily of common reed (Phragmites australis) although some bulrush (*Typha latifolia*) was noted.

4.5.2 Species

4.5.3 Flora

The plant species encountered at the various locations on site are detailed above. No plant species that are rare or are of conservation value were noted during the field assessment. Records of rare and threatened species from NBDC and NPWS were examined. No rare or threatened plant species were recorded in the vicinity of the proposed site. No invasive plant species that could hinder removal of soil from the site during groundworks, such as Japanese knotweed, giant rhubarb, Himalayan balsam or giant hogweed were noted on site.

4.5.3.1 Terrestrial Fauna

A badger/mammal survey was carried out by Chris Smal in September 2020 (Appendix F3 **of Volume III of EIAR**). This covered two portions of the site. The report states that *"Otters utilise this portion of the Grand Canal and are known to forage along the Canal at Clonburris. Presently, the banks of the Canal provide a refuge and foraging habitat for this protected species. The survey was constrained by seasonal vegetation and needs to be repeated." "Badgers were not found on site, but they may forage on site on occasion. The survey was constrained by seasonal vegetation and needs to be repeated."* A follow up in season survey was carried out in March 2021 (Appendix F4 **of Volume III of EIAR**) and covered the vast majority of the proposed development site.

As outlined in Appendix F4 "The survey yielded few signs of mammals other than foxes Vulpes vulpes and rabbits Oryctolagus cuniculus. Rabbits were particularly plentiful over the whole site. There was presence of rabbits in all parts of the survey area, with many burrows and several warrens present in the banks of hedgerow boundaries and pockets of scrub.

Fox signs (droppings) were found at several locations on site whilst no den was found (a local resident reported having seen cubs earlier in the year but the den's location was not found). The mammal paths on site were attributed

mostly to rabbits but they would be in use by foxes also. Paths and tracks in regular use by humans were present throughout the site in all areas.

Also noted were signs of brown rat Rattus norvegicus and fieldmouse Apodemus sylvaticus. Other species that will be present include the hedgehog Erinaceous europaeus and pygmy shrew Sorex minutus. The house mouse *Mus musculus* is likely to be present as it does occur in agricultural areas and in association with residential areas. The Irish hare *Lepus timidus hibernicus* was not observed on site. The Irish stoat *Mustela erminea hibernica* is potentially on site but probably absent due to the mostly urban nature of areas surrounding the site.

No signs of squirrels were seen - both red squirrel *Sciurus vulgaris* and grey squirrel *Sciurus carolinensis* may occur occasionally but are likely to be infrequent, transient, animals given the lack of mature woodland on site. They may, nevertheless, utilise wildlife corridors such as that along the Grand Canal.

In summer 2020, it was noted that frogs *Rana temporaria* are to be expected on site as they are common in the Irish countryside and the rank grasslands provide good foraging habitat. At that time, few pools were seen on site and very few of the ditches on site were wet. In March 2021, a number of frog breeding sites were identified (with tadpoles present). These were situated in smaller pools in wet ditches and at several larger pools which had formed next to some of the wetter drains. The common or viviparous lizard Zootoca vivipara occurs in many habitats in Ireland and is potentially present on site"

It should be noted that an additional faunal assessment was carried out by Bryan Deegan (MCIEEM) on the 14th November 2021 in the areas of the proposed development not covered by the Chris Smal terrestrial fauna surveys. These areas primarily consist of the narrow lines for construction haul routes outside the main development areas. No evidence of faunal species of conservation importance were noted in this survey.

Amphibians/Reptiles

The common frog (*Rana temporaria*) was observed on site and is primarily associated with the drainage ditches within the double hedgerow, where present. The common lizard (*Zootoca vivipara*) or smooth newt (*Lissotriton vulgaris*) were not recorded on site.

Birds

Wintering birds

A wintering bird assessment was carried out by Scott Cawley (Appendix F1 **of Volume III of EIAR**) on the full Clonburris Strategic Development Zone lands which includes the Grand Canal. The proposed development site represents approximately 20% of the overall SDZ survey area. As outlined in the Scott Cawley report "*Wintering bird surveys carried out between November 2020 and March 2021 recorded 34 species in the Clonburris SDZ lands and its immediate vicinity. Of these species, 12 were wintering species listed as SCIs of nearby European sites, of which one species is Red-listed (i.e. of High Conservation Concern) and eight species Amber-listed (i.e. of Medium Conservation Concern) on the Bird of Conservation Concern in Ireland. In addition, eight non-SCI wetland bird species and 17 other bird species (e.g. passerines and raptors), of which six are Red-listed and nine Amber-listed, were recorded within or immediately adjacent to the Clonburris SDZ lands during the surveys.*

Observations of SCI and non-SCI wetland wintering bird species within the survey area were contextualised against the populations of these species in nearby European sites (SCI species only) and/or against their numbers in terms of international and national population thresholds, where available. The peak counts of these species present in the survey area during the wintering bird surveys were less than 1% of the international population. With regard to the national population thresholds for these species, the numbers of five species exceeded the 1% of the national threshold: coot (present at 11.6% of the national population of the species), lapwing (23.5%), little grebe (40%), mallard (20.4%) and tufted duck (5.2%). It should be noted that the records for peak counts exceeding the national threshold for coot, little grebe, mallard and tufted duck were from outside the Clonburris SDZ lands, from the pond in the Grange Castle Business Park, leaving lapwing as the only species whose numbers exceeded the national threshold within the Clonburris SDZ land.

Lapwing is a bird species of High Conservation Concern which has seen long-term declines since the beginning of I-WeBS counts (Lewis et al., 2019). Lapwing was present in the Clonburris SDZ lands in flock sizes varying mostly between 30 and up to 200+ individuals, with one flock consisting of only five individuals. In addition to the peak count of lapwings exceeding the national threshold for the species, the numbers recorded present over three times the I-WeBS peak count numbers recorded in Dublin Bay for the period of 2011/13 – 2017/18. Considering they are known

to spend winters in non-wetland habitats, such as grasslands, away from European sites designated for them (Lewis et al., 2019), and they were present in comparatively large flock sizes in the Clonburris SDZ, the grasslands within the Clonburris SDZ lands represent a relatively large, undisturbed feeding and/or roosting resource for lapwing in a largely built up area in the Greater Dublin Area.

In conclusion, the Clonburris SDZ and lands in its immediate vicinity support a variety of gull, wader and waterfowl species during winter months, with the most notable species of them being the Red-listed lapwing that can be present in large flocks. Considering these flocks of lapwing comprised of more than 1% of the national populations on one occasion, the Clonburris SDZ lands are deemed to be of local importance to this particular species. This conclusion takes into consideration the relatively small area of suitable habitat contained within the SDZ lands in comparison to suitable habitat found to the west of the Clonburris SDZ."

It should be noted that as the surveys covered the full SDZ including the Grand Canal, many of the species outlined above were not located within the proposed development area. These included coot, grey heron, little grebe, tufted duck, However, black headed gull, lesser black backed gull, common gull, mallard, herring gull were noted within the proposed housing development area while lapwing, cormorant were noted within proximate to a north west section of the proposed infrastructure links.

Barn Owl
A Barn Owl Survey Report for the Clonburris Strategic Development Zone was prepared by Scott Cawley and is seen in Appendix F2 (**of Volume III of EIAR)**. As outlined in the survey report "*Barn owl were not observed foraging within the Clonburris SDZ lands during any survey dates between October 2020 and June 2021, however there are desk study records of individuals within the SDZ lands. One of the desk study records is for a juvenile barn owl. Considering that juvenile barn owls start to disperse from their nesting sites after fledging in September (Lusby and O'Clery, 2014), and that the record for a juvenile at this site is from July 2018, this may indicate the presence of a breeding pair within the Clonburris SDZ in 2018, as any juveniles present would not yet have been ready to disperse from their nest site. The Grange Castle, the only site deemed highly suitable for nesting barn owl, is located c. 1.3km north-east of the juvenile barn owl sighting and across the Grand Canal, and therefore it is unlikely that this juvenile barn owl was from a potentially active nest at the Grange Castle in 2018, considering the distance, the presence of the Grand Canal and the roads between the two locations, and the juveniles inability to fly properly yet.*

Although there is one suitable barn owl nesting site located adjacent to the Clonburris SDZ lands at the Grange Castle and a sighting of a juvenile barn owl within the SDZ lands, indicating suitable foraging habitat for breeding barn owls, there was no evidence during the 2021 surveys of recent use of the Grange Castle nesting site. It is unlikely that the Grange Castle has recently been used by roosting barn owls either, considering that only one old pellet was found and a confirmed roosting site would be categorised as a regular roost if more than 10 pellets were present and as an occasional roost if less than 10 pellets were present (Barn Owl Trust, 2012). In addition, it cannot be said for certain if this pellet was of a barn owl, or, of another owl species, such as long-eared owl Asio otus (Green-listed Bird of Conservation Concern1), which was sighted and/or heard on six occasions within the Clonburris SDZ lands during Scott Cawley Ltd. surveys in 2020. Long-eared owl adults and juveniles were recorded during raptor surveys in June 2020 and during bat surveys in July and August 2020. Considering that barn owl prefer dark nesting sites (Hardey et al., 2013), their absence from this potential nesting site may be due to recent installation (2020) of spotlights around the castle, which would act as a deterrent. It may have been that barn owl nested and/or roosted in the castle prior to the installation of the spotlights in 2020.

Considering that barn owl home ranges can reach up to c. 6km during breeding season, it may be that the barn owls sighted in June 2020 belong to a local breeding population of barn owls; however, no active nest sites were identified within the Clonburris SDZ lands during the surveys undertaken between November 2020 and June 2021. According to Lusby and O'Clery (2014), female barn owl typically remain continuously at the nest, while males are out hunting and/or roosting away from it. Therefore, it may be that the barn owls sighted in June 2020 were hunting males, with a nesting site within c. 6km radius of Clonburris SDZ.

In conclusion, barn owl was not confirmed to be breeding within the Clonburris SDZ during the surveys undertaken between November 2020 and June 2021, however the presence of the species cannot be ruled out due to sighting records within the SDZ lands from recent years, and due to a potential barn owl pellet found at the Grange Castle."

Breeding birds

Breeding bird and raptor surveys were also carried out by Scott Cawley for the Wider SDZ in 2020 and was submitted in conjunction with the road infrastructure development in the SDZ lands which includes the proposed development

area as well as the western element of the SDZ lands. As outlined by Scott Cawley "*A range of common bird species were noted using the site for foraging and breeding purposes during the breeding bird surveys undertaken in June 2020. These include blackbird Turdus merula, blackcap Sylvia atricapilla, blue tit Cyanistes caeruleus, bullfinch Pyrrhula pyrrhula, buzzard Buteo buteo, chaffinch Fringilla coelebs, chiffchaff Phylloscopus collybita, coal tit Parus ater, dunnock Prunella greenfinch Chloris chloris, grey wagtail Motacilla cinerea, hooded crow Corvus cornix, jackdaw Coloeus modedula, linnet Linaria cannabina, magpie Pica pica, meadow pipit Anthus pratensis, pheasant Phasianus colchicus, reed bunting Emberiza schoeniclus, robin Erithacus rubecula, song thrush Turdus philomelos, spotted flycatcher Muscicapa striata, whitethroat Sylvia communis, willow warbler Phylloscopus trochilus, wren Troglodytes troglodytes, and woodpigeon Columba palumbus.*

Of these species, four (i.e. greenfinch, linnet, robin and spotted flycatcher) are Amber-listed and are therefore considered to be of Moderate Conservation Concern by Colhoun & Cummins (2013). Two (grey wagtail and meadow pipit) of the total of 29 species recorded are Red-listed and are considered to be of High Conservation Concern by Colhoun & Cummins (2013). The records for these were adjacent to the proposed development site footprint. Grey wagtail was recorded twice, one individual perching near the Griffeen River and a second individual flying over the Grand Canal towards north and the proposed development site. Meadow pipit was recorded on three occasions: one individual foraging on the ground in the grasslands adjacent to the Griffeen River, a second individual in song flight and a pair foraging and flying in the grasslands towards north-east of the proposed development site.

Breeding birds use various habitats, including trees, structures, grasslands and scrub, for nesting. The presence of several bird species with territories and with young within the proposed development site indicate that it is likely to be used for breeding by various species. No nests were observed during the surveys; however, they are usually camouflaged and therefore well hidden.

Barn swallows Hirundo rustica, house martins Delichon urbicum and swifts Apus apus frequently use eaves and crevices on buildings as nesting places. There was no evidence of them nesting within the buildings onsite, nor were they present at the time of the surveys.

Due to the aforementioned facts and the presence of suitable habitat within and directly adjacent to the proposed development site, the local breeding bird populations are considered to be of local importance (higher value).

Raptors

Four raptor species were recorded within the proposed development site during the raptor surveys undertaken in June 2020. These included buzzard, long-eared owl Asio otus, peregrine and sparrowhawk Accipiter nisus. In addition, barn owl Tyto alba and long-eared owl were recorded during bat activity surveys. Of these species, barn owl is Red-listed (a species of High Conservation Concern) and sparrowhawk is Amber-listed (a species of Moderate Conservation Concern) by Colhoun & Cummins (2013). Peregrine is listed under Annex I of the EU Birds Directive and the nearest designated site for this species is the Wicklow Mountains SPA, located c.12.3km south of the proposed development site.

Barn owl was recorded twice: once flying around near the (mixed) broadleaved woodland area within the proposed development planning boundary to the west and once perching in the hedgerows adjacent to the grassland adjacent to the Grand Canal to the east. The buildings within the proposed development site are unsuitable for nesting barn owls due to lack of optimal nesting sites (i.e., quiet barns and large tree cavities), however there is suitable foraging habitat within and adjacent to the proposed development site.

Sparrowhawk was recorded within and/or adjacent to the proposed development on five occasions. Four of these records were of individuals of flying to the south of the proposed development site over the habitats along the Grand Canal; along the northern side of the railway, near the Clondalkin/Fonthill station; or flying across the railway either towards north or south in the same location. One sparrowhawk was seen in the (mixed) broadleaved woodland area within the proposed development planning boundary to the west. As the surveyor approached the area, it started alarm calling, indicating of a potential presence of nest and/or young birds.

Peregrine was only recorded on one occasion. One individual was seen soaring over the grasslands adjacent to the R120 outside the proposed development site. Long-eared owl was confirmed to be breeding within the proposed development site, based on the presence of fledglings during surveys. A pair of buzzards is likely to breed within the site based on territorial displays observed during the surveys, however, their nest was not located.

Due to the aforementioned facts and the presence of suitable habitat within and directly adjacent to the proposed development site, the local raptor populations (excluding peregrine) are considered to be of local importance (higher value). Local peregrine populations are considered separately due to their Annex I status and are of county importance."

Bats

A Bat Assessment of the proposed development was carried out by Dr Tina Aughney of Bat Eco Services (Appendix F5 **of Volume III of EIAR**). The report states that "*Five bat species were recorded in total by the array of bat surveys completed for this survey site. Three of the bat species recorded were common pipistrelle, Leisler's bat and soprano pipistrelle and these are the three most common bat species in Ireland.*

- Soprano pipistrelles were the most frequently encountered bat species and were recorded during all walking transects and static surveillance surveys. While this species was recorded foraging and commuting throughout the survey area, the majority of the bat encounters were in vicinity of the treeline along the Grand Canal. In relation to static surveillance a Low level of bat activity was recorded for this species of bat.

- Common pipistrelle was the third most frequently encountered bat species. Common pipistrelles were recorded during all walking transects and static surveillance surveys. This species was recorded foraging throughout the survey area with records distributed along the hedgerows, treelines and located along the treeline adjacent to the canal. In relation to static surveillance a Low to Medium level of bat activity was recorded for this species of bat.

- Leisler's bats were the second most frequently recorded bat species. Leisler's bats were recorded during all walking transects and static surveillance surveys. This species was recorded foraging throughout the survey area with the majority of the records located along the mature treelines within the internal linear habitat network and along treelines adjacent to the canal. In relation to static surveillance a Low level of bat activity was recorded for this species of bat.

The remaining three bat species are considered to be less common in Ireland but also recorded in low levels within the proposed development area.

- Brown long-eared bats were only recorded during static surveillance during 2020 and on static units located along hedgerows within the internal linear habitat network of the survey area. A single bat pass of this bat species was recorded on the static units on the same night (16/7/2020) and therefore it is likely that is was one individual bat commuting and foraging through the survey area.

- Daubenton's bats were recorded during the 2018 walking transects and during static surveillance surveys completed in 2018 (one static unit, 3 bat passes) and 2020 (one static unit, 3 bat passes). The location of the static units was in the same grid refence point: hedgerow along the eastern section of the survey area. This species was only recorded during the 2018 walking transects and this was on the water surface of the canal."

4.6 ANALYSIS OF THE POTENTIAL IMPACTS

This section of the EIAR examines the potential causes of impact that could result in likely significant effects to the species and habitats that occur within the ZOI of the combined site. These impacts could arise during either the construction or operational phases of the proposed development. The following terms are derived from EPA EIAR Guidance and are used in the assessment to describe the predicted and potential residual impacts on the ecology by the construction and operation of the proposed development.

Table 4.6 – Impact description terminology

Magnitude of impact and typical descriptions.

Magnitude of impact (change)		Typical description
High	Adverse	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements.
	Beneficial	Large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality.
Medium	Adverse	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements
	Beneficial	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.

Magnitude of impact (change)		Typical description
Low	Adverse	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.
	Beneficial	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring
Negligible	Adverse	Very minor loss or alteration to one or more characteristics, features or elements.
	Beneficial	Very minor benefit to or positive addition of one or more characteristics, features or elements.

Criteria for Establishing Receptor Sensitivity/Importance

Importance	Ecological Valuation
International	Sites, habitats or species protected under international legislation e.g. Habitats and Species Directive. These include, amongst others: SACs, SPAs, Ramsar sites, Biosphere Reserves, including sites proposed for designation, plus undesignated sites that support populations of internationally important species.
National	Sites, habitats or species protected under national legislation e.g. Wildlife Act 1976 and amendments. Sites include designated and proposed NHAs, Statutory Nature Reserves, National Parks, plus areas supporting resident or regularly occurring populations of species of national importance (e.g. 1% national population) protected under the Wildlife Acts, and rare (Red Data List) species.
Regional	Sites, habitats or species which may have regional importance, but which are not protected under legislation (although Local Plans may specifically identify them) e.g. viable areas or populations of Regional Biodiversity Action Plan habitats or species.
Local/County	Areas supporting resident or regularly occurring populations of protected and red data listed-species of county importance (e.g. 1% of county population), Areas containing Annex I habitats not of international/national importance, County important populations of species or habitats identified in county plans, Areas of special amenity or subject to tree protection constraints.
Local	Areas supporting resident or regularly occurring populations of protected and red data listed-species of local importance (e.g. 1% of local population), Undesignated sites or features which enhance or enrich the local area, sites containing viable area or populations of local Biodiversity Plan habitats or species, local Red Data List species etc.
Site	Very low importance and rarity. Ecological feature of no significant value beyond the site boundary

Quality of Potential Impacts on Biodiversity

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

Significance of Impacts

Significance of Impact	Description of Potential Impact
Imperceptible	An effect capable of measurement but without significant consequences.
Not significant	An effect which causes noticeable2 changes in the character of the environment but without significant consequences.

Significance of Impact	Description of Potential Impact
Slight Effects	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate Effects	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant Effects	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound	An impact which obliterates sensitive characteristics.

Duration of Impact

Duration of Impact	Description
Momentary	Effects lasting from seconds to minutes
Brief	Effects lasting less than a day
Temporary	Effects lasting less than a year
Short-term	Effects lasting one to seven years.
Medium-term	Effects lasting seven to fifteen years.
Long-term	Effects lasting fifteen to sixty years.
Permanent	Effects lasting over sixty years
Reversible	Effects that can be undone, for example through remediation or restoration
Likely Effects	The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
Unlikely Effects	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
Extent of Effects	Description
Extent	Describe the size of the area, the number of sites, and the proportion of a population affected by an effect.

Prior to the implementation of mitigation measures the proposed development of the combined site has the potential to impact on biodiversity during both the construction and operational phases of the project. The proposed development will involve the removal of the existing terrestrial habitats on site, re-profiling, excavations and the construction of roads, footpaths, residential units and associated services including landscaping works and foul, surface water, and water supply services.

4.6.1 Construction Impacts

The construction of the proposed development is likely to impact on the existing ecology of the site and the surrounding area within the ZoI. These potential construction impacts would include impacts that may arise during the site clearance, enabling works and the building phases of the proposed development. Potential construction impacts on habitats and species are outlined in Table 4.7 and Table 4.8. Construction phase mitigation measures are required on site particularly as reprofiling of the site is proposed which will remove all existing terrestrial habitats and can lead to direct loss of species and silt laden and contaminated runoff.

4.6.1.1 Designated Conservation Sites

A small portion of the proposed development is located within the Grand Canal pNHA. Runoff during site works, re-profiling, and the construction of project elements could impact on the Grand Canal pNHA, with potential for water quality impacts. This is primarily due to the drainage ditch proximate to the site, that contains overflow water from the canal that is reintroduced back into the canal further downstream. If silt or pollution were to enter this overflow it has potential to be reintroduced back into the canal.

There is no direct pathway to Natura 2000 sites. There are indirect pathways to the designated conservation sites located within the marine environment at Dublin Bay including Natura 2000 sites, via the proposed foul and surface water drainage strategy. However, the nearest conservation site along this network is a minimum of 11.9 km from the proposed development site. Significant mixing, dilution and settlement will take place within the surface water network in the marine environment over the 11.9 km. Any silt or pollutants within foul wastewater discharge will be treated along the public network in Ringsend WwTP. Given the significant distance to the conservation sites from the subject site, across the marine environment no significant impacts are foreseen in the absence of mitigation measures on site. The project must comply with Water Pollution Acts and prevent silt laden runoff leaving the site but these measures are not necessary for the protection of European sites.

The AA Screening concludes that "No Natura 2000 sites are within the zone of influence of this development. Having taken into consideration the effluent discharge from the proposed development works, the distance between the proposed development site to designated conservation sites, lack of direct hydrological pathway or biodiversity corridor link to conservation sites and the settlement of silt over the intervening distance and dilution effect with other effluent and surface runoff, it is concluded that this development would not give rise to any significant effects to designated sites. The construction and operation of the proposed development will not impact on the conservation objectives of features of interest of Natura 2000 sites."

4.6.2 Operational Impacts

Once constructed all onsite drainage will be connected to separate foul and surface water systems. Surface water runoff will comply with SUDS. It would be expected that the ecological impacts in the long term would be minor adverse as the majority of the site will be build land. Potential operational impacts on habitats and species are outlined in Table 4.9 and Table 4.10.

4.6.2.1 Designated Conservation sites

The development must comply with SDCC drainage requirements and the Water Pollution Acts. Measures will be in place to prevent downstream impacts but these measures are not necessary for the protection of European sites. No significant impacts on designated sites are likely during operation.

4.7 INDIRECT IMPACTS

Appropriate measures should be taken to prevent the movement of silt laden surface water run-off and dust into adjacent habitats and in particular the Grand Canal pNHA and the surface water network. Mitigation measures need to be in place including silt fencing, a wheel wash and roads sweeping to ensure silt does not enter the drainage network from construction activities, particularly during enabling works. These measures are outlined in section 4.8.

4.8 MITIGATION MEASURES & MONITORING

Construction and operational controls will be incorporated into the proposed development project to minimise the potential negative impacts on the ecology within the Zone of Influence (ZoI). These measures are outlined in detail in Table 4.9.

4.8.1.1 Designated Conservation sites within 15km

No specific measures are required to protect designated sites. However, the project must comply with Water Pollution legislation to ensure that there are no contaminated discharges from the site including surface runoff leading to the marine environment. However, these measures are not necessary for the protection of designated Natura 2000 sites.

4.8.1.2 Development Construction

All construction based mitigation measures in relation to biodiversity outlined in Table 4.11 will be carried out in consultation with and to the satisfaction of the project ecologist. The project ecologist will be appointed prior to enabling works commencing on site and will be retained until completion of the landscape strategy.

4.8.1.3 Development Operation

All construction based mitigation measures in relation to biodiversity outlined in Table 4.11 will be carried out in consultation with and to the satisfaction of the project ecologist.

Table 4.7 – Construction Impacts on habitats in the absence of mitigation.

Habitat	Fossitt	Habitats Directive	Rating	Construction Impact	Impact Significance
Recolonising Bare Ground	ED3		E	Construction will result in the complete removal of this habitat.	Neutral/Site/Not significant/long term/likely
Dry meadows and grassy verges/Scrub	GS2/WS1		D	Construction will result in the removal of much of this habitat during construction. Species associated with these habitats will be displaced.	Low Adverse/Site/Negative/Not Significant/Long term/permanent.
Hedgerows	WL1		C	Construction will result in the removal of much of this habitat during construction. Species associated with these habitats will be displaced.	Low Adverse/Site/Negative/Not Significant/Long term/permanent
Reed and large sedge swamps	FS1		C	Construction will result in the removal of much of this habitat during construction. Species associated with these habitats will be displaced.	Low Adverse/Site/Negative/Not Significant/Long term/permanent
Drainage Ditches	FW4		C	Drainage ditches located within hedgerows will be removed. Frog spawning activity was noted in these areas. Surface water runoff has the potential for downstream effects on the canal Mitigation is required to prevent downstream impacts and impacts on amphibians	Low Adverse/Site/Negative/Not Significant/short term

Table 4.8 – Construction Impacts on species in the absence of mitigation

Species	Rating	Construction Impact	Impact Significance
Fauna-Terrestrial	A-D	The proposed development will lead to loss of frog foraging habitat and frog breeding sites in channels, drains and pools. Otters utilise this portion of the Grand Canal and are known to forage along the Canal at Clonburris. Presently, the banks of the Canal provide a refuge and foraging habitat for this protected species. Otter presence was ascertained on the channel at the south-east of the site. No holts were found on site but could be present in dense scrub at the south of the site (adjacent to towpath). The survey was constrained by scrub vegetation but no signs of badgers were found anywhere on site and it may be considered that the species is not present on site. Badgers may forage on site on occasion. Mitigation is required.	Low Adverse/Site/Negative/Not Significant/Long term/permanent.
Birds	A-D	The removal of hedgerows on site will result in a loss of foraging and nesting habitat. Displacement of other bird species would occur on site. Black-headed gull are the only qualifying interest seen of designated sites within 15km of the proposed development. However, no individuals were recorded using the site for foraging and/or roosting, the proposed development will not result in displacement of SCI populations of black-headed gull. Lapwing, was also noted on site. However, the Boyne Estuary SPA is the nearest designated site at >40km from the site. Mitigation is required in relation to nesting birds.	Low Adverse not significant/National - International/Negative/Long term/likely
Amphibians-Frogs	B	Frogs are present on site. Mitigation is required.	Low Adverse/Local/Negative/Not Significant//short term

Species	Rating	Construction Impact	Impact Significance
Terrestrial Flora	A-D	The majority of existing flora will be removed. The area consists of Recolonising Bare Ground, Dry meadows and grassy verges/Scrub, Horticultural Land/Tilled Land and Hedgerows. No species of conservation importance or invasive species were noted on site.	Neutral/Not significant/long term/likely
Bats		The proposed development site is an agricultural site with extensive hedgerow and treelines. In order to facilitate the proposed development, this internal network of linear habitats will be removed. Therefore the foraging and commuting habitats for local bat populations will be impacted on. One PBR tree will be felled and this will be felled in a manner to ensure that any potential roosting bats are not harmed in the process. The lighting plan will ensure that the guidelines recommended by BCT, 2018 will be implemented and therefore reducing the impact of the lighting plan on local bat populations. The landscape plan aims to retain as much of the trees and treelines along the boundary of the proposed development site. It will also undertake additional planting to provide foraging and commuting habitat for local bat populations. The development of the Grand Canal Park will provide a dark ecological corridor along the Grand Canal which will have a positive impact on local bat populations and other nocturnal wildlife. This is particularly important for commuting nocturnal wildlife. As part of the Landscape Plan, additional bat mitigation measures have been recommended in relation to a new eastern boundary and the erection of a bat box scheme. This will increase the positive conservation of the sections of the proposed development for local bat populations. Therefore the proposed development, if all mitigation measures including the Lighting Plan and Landscape Plan are strictly adhered to, will likely have a Permanent Slight Negative Effects on local bat populations, in the long-term. However due to extensive landscape mitigation measures proposed and the proposed dark corridor within the Grand Canal Park, the proposed development will likely have a Not Significant Negative Effects on local bat populations along the Grand Canal. This is an important factor in protecting this linear habitat that is the primary foraging area for local bat populations within the survey area. Mitigation is required.	Low Adverse/International/Negative/Not Significant/Long term/permanent.

Table 4.9 – Operational Impacts on habitats of the combined site

Habitat	Fossitt	Habitats Directive	Rating	Operational Impact	Impact Significance
Recolonising Bare Ground	ED3		E	Construction will result in the complete removal of this habitat.	Neutral/Site/Not significant/long term/likely
Dry meadows and grassy verges/Scrub	GS2/WS1		D	Construction will result in the removal of much of this habitat during construction. Species associated with these habitats will be displaced.	Low Adverse/Site/Negative/Not Significant/Long term/permanent.
Hedgerows	WL1		C	Construction will result in the removal of much of this habitat during construction. A robust landscaping strategy has been developed to enhance the site and offset the loss of hedgerows on site. In the long term this would be expected to be a neutral to low adverse not significant in the long term once species have established on site.	Low Adverse-Neutral /Site/Neutral-Negative /Not Significant/Long term/permanent
Reed and large sedge swamps	FS1		C	Construction will result in the removal of much of this habitat during construction.	Low Adverse/Site/Negative/Not Significant/Long term/permanent
Drainage Ditches	FW4		C	Additional habitats for frogs will be created within the landscape strategy.	Neutral/Site /Not Significant/long term

Table 4.10 – Operational Impacts on species of the combined site

Species	Rating	Operational Impact	Impact Significance
Fauna-Terrestrial	A-D	Increased lighting and human presence on site could lead to increased disturbance. However, mammals of conservation interest were not noted on site. Additional habitats for frogs will be created within the landscape strategy	Neutral/Site /Not Significant/long term
Birds	A-D	The strong native landscaping strategy is essential to offset the loss of hedgerows on site in the long term. Mitigation is required.	Low Adverse/ not significant/National - International/Negative/Moderate effects/Long term/likely
Amphibians-Frogs	B	Additional features are being created for frogs on site.	Neutral/Site /Not Significant/long term
Terrestrial Flora	A-D	The majority of existing flora will be removed. The area consists of Recolonising Bare Ground, Dry meadows and grassy verges/Scrub, Horticultural Land/Tilled Land and Hedgerows. No species of conservation importance or invasive species were noted on site.	Neutral/Not significant/long term/likely
Bats		The lighting plan will ensure that the guidelines recommended by BCT, 2018 will be implemented and therefore reducing the impact of the lighting plan on local bat populations. The landscape plan aims to retain as much of the trees and treelines along the boundary of the proposed development site. It will also undertake additional planting to provide foraging and commuting habitat for	Low Adverse/International/Negative/Not Significant/Long term/permanent.

Species	Rating	Operational Impact	Impact Significance
		local bat populations. The development of the Grand Canal Park will provide a dark ecological corridor along the Grand Canal which will have a positive impact on local bat populations and other nocturnal wildlife. This is particularly important for commuting nocturnal wildlife. As part of the Landscape Plan, additional bat mitigation measures have been recommended in relation to a new eastern boundary and the erection of a bat box scheme. This will increase the positive conservation of the sections of the proposed development for local bat populations. Therefore the proposed development, if all mitigation measures including the Lighting Plan and Landscape Plan are strictly adhered to, will likely have a Permanent Slight Negative Effects on local bat populations, in the long-term. However due to extensive landscape mitigation measures proposed and the proposed dark corridor within the Grand Canal Park, the proposed development will likely have a Not Significant Negative Effects on local bat populations along the Grand Canal. This is an important factor in protecting this linear habitat that is the primary foraging area for local bat populations within the survey area. Mitigation is required.	

Table 4.11 – Sensitive Receptors/Impacts and mitigation measures.

Sensitive Receptors	**Potential Impacts**	**Designed-in Mitigation**
Downstream impacts.	• Habitat degradation • Dust deposition • Pollution • Silt ingress from site runoff • Downstream impacts • Negative impacts on aquatic and bird fauna • Impacts from concrete works	• Local silt traps established throughout site. • Mitigation measures on site include dust control, stockpiling away from watercourse and drains • Stockpiling of loose materials will be kept to a minimum of 20m from drains. • Stockpiles and runoff areas following clearance will have suitable barriers to prevent runoff of fines into the drainage system. • Fuel, oil and chemical storage will be sited within a bunded area. The bund will be at least 50m away from drains, ditches, excavations and other locations where it may cause pollution. • Bunds will be kept clean and spills within the bund area will be cleaned immediately to prevent groundwater contamination. Any water-filled excavations, including the attenuation tank during construction, that require pumping will not directly discharge to the surface water network. Prior to discharge of water from excavations adequate filtration will be provided to ensure no deterioration of water quality. • Concrete works will be mitigated to prevent concrete or cement from entering drains or pathways to watercourses/marine environment. • Mitigation measures on site include dust control, stockpiling away from drains • During the construction works silt traps will be put in place in the vicinity of all runoff channels to prevent sediment entering the surface water network. • Petrochemical interception and bunds in refuelling area • Maintenance of any drainage structures (e.g. de-silting operations) must not result in the release of contaminated water to the surface water network. • No entry of solids to the drainage network during the connection of pipework to the public water system • Dewatering of excavations may be necessary. Appropriate monitoring of groundwater levels during site works will be undertaken. Construction phase filtering of surface water for suspended solids will be carried out in compliance with Water Pollution legislation. • Concrete trucks, cement mixers or drums/bins are only permitted to wash out in designated wash out area greater than 50m from sensitive receptors including drains and stream.

Biodiversity	• Habitat Degradation • Dust deposition • Pollution • Silt ingress • Potential downstream impacts.	**Air & Dust** Mitigation measures will be carried out reduce dust emissions to a level that avoids the possibility of adverse effects. The main activities that may give rise to dust emissions during construction include the following: • Excavation of material; • Materials handling and storage; • Movement of vehicles (particularly HGV's) and mobile plant. • Contaminated surface runoff *Mitigation measures to be in place:* • Maintain a 10m buffer from drains and drainage ditches with a double layer of silt fences • Road sweeping to clean roads proximate to the site • Wheel wash on site. • Consultation will be carried with an ecologist throughout the construction phase; • Trucks leaving the site with excavated material will be covered so as to avoid dust emissions along the haulage routes. • Speed limits on site (15kmh) to reduce dust generation and mobilisation. *Site Management* • Regular inspections of the site and boundary should be carried out to monitor dust, records and notes on these inspections should be logged. • Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken. • Make the complaints log available to the local authority when asked. • Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book. *Monitoring* • Undertake daily on-site and off-site inspection. This should include regular dust soiling checks of surfaces within 100 m of site boundary, integrity of the silt control measures, with cleaning and / or repair to be provided if necessary. *Operations* • Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.

		• Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate. • Use enclosed chutes and conveyors and covered skips. • Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate. • Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods. *Waste* • Avoid bonfires and burning of waste materials. *Measures Specific to Earthworks* • Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable. • Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable. • Only remove the cover in small areas during work and not all at once. • During dry and windy periods, and when there is a likelihood of dust nuisance, a bowser will operate to ensure moisture content is high enough to increase the stability of the soil and thus suppress dust. *Storage/Use of Materials, Plant & Equipment* • Materials, plant and equipment shall be stored in the proposed site compound location; • Plant and equipment will not be parked within 50m of the Dawson's Demesne Stream at the end of the working day; • Hazardous liquid materials or materials with potential to generate run-off shall not be stored within 50m of the drains. • All oils, fuels and other hazardous liquid materials shall be clearly labelled and stored in an upright position in an enclosed bunded area within the proposed development site compound. The capacity of the bunded area shall conform with EPA Guidelines – hold 110% of the contents or 110% of the largest container whichever is greater; • Drip trays will be turned upside down if not in use to prevent the collection of rainwater; • Waters collected in drip trays must be assessed prior to discharge. If classified as contaminated, they shall be disposed by a permitted waste contractor in accordance with current waste management legal and regulatory requirements; • Plant and equipment to be used during works, will be in good working order, fit for purpose, regularly serviced/maintained and have no evidence of leaks or drips; • No plant used shall cause a public nuisance due to fumes, noise, and leakage or by causing an obstruction;

		• Re-fuelling of machinery, plant or equipment will be carried out in the site compound as per the appointed Construction Contractor re-fuelling controls;
Birds (National Protection)	• Removal nesting habitat. • Removal foraging habitat. • Destruction and/or disturbance to nests (injury/death). • Predation • Disturbance	• Retain hedgerows and trees where possible. No works will be carried out outside the redline. • "Relevant guidelines and legislation (Section 40 of the Wildlife Acts, 1976 to 2012) Should this not be possible, a pre-works check by a qualified ecologist should be undertaken to ensure nesting birds are absent. • Removal of potential nesting habitats outside of bird breeding season (March to August inclusive). Should this not be possible, a pre-works check by a qualified ecologist should be undertaken to ensure nesting birds are absent. If nesting birds are present a derogation licence will be sought from NPWS. If this is not forthcoming works to remove the nesting habitats will not commence within bird nesting season. • An ecologist will be on site during site clearance to minimise impact on foraging/roosting bird species. The ecologist will have the ability to cease works on site that could cause disturbance, in the event of significant disturbance impacts being possible.
Hedgerows and Treelines (Local importance)	• Loss of commuting habitat. •Injury/death during construction and operation	• An ecologist will be on site during site clearance to minimise impact on foraging/roosting bird species. The ecologist will have the ability to cease works on site that could cause disturbance, in the event of significant disturbance impacts being possible.
Bats	• Loss of commuting habitat. • Injury/death during construction and operation	• Erection of an alternative roosting sites are required to be erected prior to the removal of trees. These will be erected prior 6 months to tree felling to allow local bat populations to become aware of it prior to removal of the structure. Rocket Bat Box (x3) – free-standing chamber on free standing pole (See appendices). • The PBR Tree proposed to be removed, should be felled on mild days during the autumn months of September, October or November or Spring months of February and March (felling during the spring or autumn months avoids the periods when the bats are most active). • Luminaire design for any street lighting or lighting on buildings is extremely important to achieve an appropriate lighting regime. Luminaires come in a myriad of different styles, applications and specifications which a lighting professional can help to select. The following should be considered when choosing luminaires. This is taken from the most recent BCT Lighting Guidelines (BCT, 2018). • Inspection of bat boxes within one year of erection of bat box scheme/rocket box and alternative roosts for Natterer's bat and brown long-eared bats. Register bat box scheme, rocker bat boxes and supplementary roosts with Bat Conservation Ireland. This should be undertaken for a minimum of 2 years in relation to bat boxes/rocket bat boxes.

		• Monitoring of any bat mitigation measures. All mitigation measures should be checked to determine that they were successful. A full summer bat survey is recommended post-works
Terrestrial Fauna	• Injury/death during construction and operation	• Pre construction surveys will be carried out for terrestrial fauna including frogs and badgers. If species of conservation importance relevant licencing will be acquired from NPWS prior to construction commencing in the area.

4.9 ADVERSE EFFECTS LIKELY TO OCCUR FROM THE PROJECT (POST MITIGATION)

It should be noted that the early implementation of ecological supervision on site at initial mobilisation and enabling works is seen as an important element to the project, particularly in relation to the implementation of surface water runoff mitigation.

With the successful implementation of outlined mitigation measures including a strong and biodiversity enhancing landscape strategy, no significant long term impacts are foreseen from the construction or operation of the proposed project. Residual impacts of the proposed project will be localised to the immediate vicinity of the proposed works and would be short-medium term, until the landscape strategy matures.

The construction and operational mitigation proposed for the development satisfactorily addresses the mitigation of potential impacts on biodiversity and designated conservation sites through the application the standard construction and operational phase controls as outlined above. In particular, mitigation measures to ensure compliance with Water Pollution Acts will satisfactorily address the potential impacts on downstream biodiversity. No significant adverse impacts on biodiversity or designated sites are likely from the proposed works following the mitigation described above.

In relation to downstream impacts it is essential that the measures outlined in the EIAR are complied with, to ensure that the proposed development does not have “downstream” environmental impacts. These measures are to protect the groundwater/surface water, which are potentially the primary vectors of impacts from the site.

4.10 CUMULATIVE IMPACTS ARISING FROM OTHER DEVELOPMENTS

There are several developments that received planning permission located in the area immediately surrounding the subject site. The following is a list of planning applications as identified on the Department of Housing, Local Government and Heritage’s ‘National Planning Application Map’ portal:

Table 4.12 – In-combination effects evaluated (developments surrounding the subject site)

Planning Ref.	Address	Proposal
SD20A/0309	3-4, Crag Avenue, Clondalkin Industrial Estate, Clondalkin, Dublin 22	Provision of 4 new information and communications technology (ICT) Facility buildings and associated development at the subject site, superseding elements of the extant planning permissions on site (Reg. Ref.: SD18A/0068 and Reg, Ref.: SD19A/0185). The application site is subject to an EPA Industrial Emissions Licence (Ref. No,: P1113-01) relating to the Energy Centre permitted on site, The single storey Energy Centre, gas pressure reduction station, and 110kV Gas Insulated Switchgear (GIS) substation permitted under Reg, Ref.: SD18AI0068 and Reg. Ref.: SD19AI0185 will be constructed as previously approved and are not affected by the current application. The proposed development will comprise the following: The construction of 4 ICT Facility buildings (ICT Facilities 1, 2, 3, and 4) with a combined total gross floor area {GFA) of c. 47,564.5 sq.m, Each ICT Facility building includes associated external plant areas, totalling c, 20,649.5 sq,m, ICT Facilities 1, 2, and 3 will be located in the eastern portion of the site, and each comprise a GFA of c. 15,196 sq.m (including ancillary office and administration space) over part two and part three levels with a maximum height of c, 25 metres and a parapet height of c, 19.5 metres, Each of the ICT Facilities will include an associated external plant area of c, 6,624 sq,m, ICT Facility 4 will be located in the southern portion of the site and comprises a GFA of c, 1,976.5 sq,m (including ancillary office and administration space) over two levels with a maximum height of c, 15 metres and a parapet height of c. 10.5 metres, This ICT Facility includes an associated external plant area of c. 777.5sq.m, Each ICT Facility building will accommodate ICT equipment halls, associated electrical and mechanical plant rooms, loading bays, maintenance and storage space, office administration areas, and screened plant. Construction of internal road network and circulation areas, footpaths, provision of 153 no. car parking spaces and 54 no, cycle parking

Planning Ref.	Address	Proposal
		spaces. Connections to vehicular access routes, roads, services and permitted infrastructure relating to the Energy Centre and 110kV GIS substation permitted under Reg, Ref.: SD18A/0068 and Reg, Ref.: SD19A/0185. Provision of emergency generators with associated flues, water storage tanks and associated pump rooms (comprising 150 sq,m in total) to serve each of the proposed ICT Facility Buildings. Hard and soft landscaping and planting, lighting, and all associated works, including underground foul and storm water drainage network, boundary treatments and security fencing, attenuation areas, and utility cables.
SD20A/0283	Grange Castle Business Park, Nangor Road, Clondalkin, Dublin 22	Demolition of existing single storey vacant house, garage and outhouse (total gross floor area (GFA) c.291.2sq.m) and removal of existing temporary construction car park; Construction of a single 1-4 storey Central Administration Building and 2 2-storey (with mezzanine) data centres (DUB14 & DUB15) all to be located west of data centres DUB9, DUB10, DUB12 & DUB13 within the MS campus; The Central Administration Building (c.6.03m to c.19.85m high) will comprise central office administration, with staff cafeteria, staff gym and reception (GFA c.3,520sq.m), with provision of PV panels on the roof; each data centre (c.15.6m high to parapet height and c.18.65m to top of roof plant) will include data halls, admin blocks (comprising offices, canteen, loading dock, storage and ancillary areas) and a variety of mechanical and electrical plant areas/structures including Modular Electrical Rooms (MERs), battery rooms and transformer areas. GFA of DUB14 is c.28,072sq.m and GFA of DUB15 is c.28,173sq.m (c.56,246sq.m in total); DUB14 will also include 21 diesel generators and associated sub-stations (E-houses) and 11 mechanical flues (each c.30.75m high); Provision of a gas generator compound (to serve DUB15) containing 20 generators, 5 E-houses and 5 flues (c.25m max height); Provision of a Gas Networks Ireland gas skid including 3 kiosk buildings; Expansion of existing electrical sub-station compound (originally granted under SD07A/0632) to provide 3 additional transformer bays. 3 E-houses and 1 control room, 2 auxiliary transformers; 2 sprinkler tank and pump house areas, 1 additional rainwater harvesting plant; Provision of 168 permanent car parking spaces and 40 cycle parking spaces; Provision of additional western access to the MS campus (to serves the Central Administration Building) from the Business Park estate road (including bridge over the Griffeen River) with existing temporary access to be extinguished; Physical integration with the remainder of the existing MS campus (including internal access roads and landscaping) with associated modifications to the western boundary of the DUB09/DUB10/DUB12/DUB13 data centre development as permitted under SD16A/0088; Provision of a new temporary construction car park (with 802 car spaces, shuttle bus stop and shelter) on site north of the main entrance to the business park; Total gross floor area of the development will be c.59,766sq.m; All associated site development works, drainage and services provision, landscaping, boundary treatments (including security fencing) and associated works;
SD20A/0109	Kishoge Community College, Thomas Omer Way, Lucan, Co. Dublin	2 storey modular classroom building and a single storey toilet building, steel framed covered walkway structure linking to the existing school, relocation of existing bicycle shelters and all associated site development works.
SD18A/0323	Grange Castle Business Park, Clondalkin, Dublin 22	Construction of a two storey data centre with three storey central service spine (7,246sq.m) with plant at roof level, that includes a reception area (274.4sq.m), shipping area (264.3sq.m) and three data halls (each 582.5sq.m - total 1,747.5sq.m) plus service spine and

Planning Ref.	Address	Proposal
		ancillary space at ground floor; storage (476sq.m) at mezzanine level above the shipping area; and office (560sq.m), three data halls (each 582.5sq.m - total 1,747.5sq.m) plus service spine and ancillary space at first floor level; and service spine at second floor level only. The new data centre will include plant at roof level; associated support services, 7 standby generators with associated flues (each 17.29m high). The development with include a single storey sub-station (74.5sq.m), transformer 26.8sq.m and bin compound (33sq.m) and will connect to existing Grange Castle infrastructural services the will include a new access road that will provide independent vehicular access to the site off the northern spine road that provides access to the existing data centre granted under SD15A/0034. The development will include ancillary site works as well as fencing, signage, entrance gate, 22 car parking spaces that include 2 disabled car parking spaces, as well as sheltered bicycle parking. The development will also include modifications to the attenuation pond, and to the landscaping previously permitted under SD15A/0034. Temporary permission is also sought for 72 temporary construction worker parking spaces, temporary construction compound and temporary construction access from Grange Castle Business Park lands to the west.
SD17A/0192	Grange Castle Business Park, Nangor Road, Clondalkin, Dublin 22	Single storey Modular Laboratory extension sized 470sq. m and 4.5m high and located to the south of the existing QA/QC building. This Laboratory will be built in two equal phases. Single storey Modular Warehouse extension sized 476sq.m and 5.2m high located to the south of the existing warehouse. This consists of six equally sized modular cold storage units and associated external plant. This facility will be built in phases according to need. The conversion of the existing temporary construction related car park to a permanent car park for 220 car parking spaces including lighting and ancillary works located to the south of the existing QA/QC building. A new screen wall constructed of metal cladding around the existing waste handing yard located to the south of the existing yard on site. The new screen wall is 2m high on top of an existing screen wall 2.7m high. Minor modifications to the existing 2.3m high security fence to the north of the site. This application consists of a variation to a previously permitted development on an activity for which a licence under Part IV of the Environmental Protection Agency Act 1992 (as amended) is required and full details of the proposed development and its anticipated environmental impacts will be notified to the Environmental Protection Agency.
SD16A/0236	Grange Castle Business Park, Nangor Road, Clondalkin, Dublin 22.	A new 5 storey bio-pharmaceutical manufacturing building to be built in two phases. Phase 1 sized 20,320sq.ms and 28.2 meters high including a single storey link sized 1,203sq.m, and Phase 2 sized 14,320sq.m and 28.2 meters high, including a single storey link sized 750sq.m, located to the south of their existing Drug Substance Building. A single storey warehouse extension located to the south of the existing warehouse including new docking facilities sized 1,142sq.m and 11.2 meter high. A three storey extension located to the east of the existing laboratory building sized 1,328sq.m and 17.6 meters high. A new south elevation with new windows on the fourth floor of the existing drug substance building. New site works including 565 new car parking spaces of which 282 are relocated car parking spaces - 282 spaces lost due to the development footprint - located to the north of the site, together with a new bicycle parking facility, a new permanent heavy goods entrance at the current construction entrance to the south boundary of the campus and new fencing, 2.1 meters high, to the east, west and south side boundaries. Permanent car parking of 350 spaces for sustaining construction and contract

Planning Ref.	Address	Proposal
		personnel utilising a portion of the existing temporary contractor car park. Upon completion of the construction and commissioning activities, the remainder of the contractor car park will be decommissioned. A new single storey security building sized 56sq.m and revisions and alterations to the existing road, services and landscaping and new items of plant and equipment located in the existing and proposed yards, and associated pipe bridges. All associated site works.

In relation to Planning Ref. **SD16A/0236**, an Appropriate Assessment Screening Report was prepared by Environmental Impact Services to accompany this planning application. This report concludes with the following:

'In order to determine the potential impacts if any, of the extension of a pharmaceutical facility at the Pfizer plant at Grange Castle, County Dublin, on European sites, Appropriate Assessment screening was undertaken. The likely impacts (direct, indirect and cumulative), that could arise from the proposed development (its construction, operation and decommissioning) have been examined in the context of a number of factors that could potentially affect the integrity of European sites. It has been determined that the proposed development is not directly connected with or necessary to the management of European sites. In summary it can be objectively concluded that there are not likely to be adverse effects on the Natura 2000 network of sites resulting from the proposed development and accordingly it is unnecessary to proceed to the next step and prepare a Natura Impact Statement / Appropriate Assessment, in this instance.'

In relation to Planning Ref. SD17A/0192, an Appropriate Assessment Screening report was prepared by AOS Planning Services to accompany this planning application. This report concludes with the following:

'It is concluded that the project is not foreseen to give rise to any significant adverse effects on any designated European Sites, alone or in combination with other plans or projects. This evaluation is made in view of the conservation objectives of the habitats or species for which these sites have been designated. Consequently, a Stage 2 – NIS is not required for the project.'

In relation to Planning Ref. **SD18A/0323,** an Environmental Impact Assessment Report (EIAR) was prepared to accompany this planning application. The Biodiversity Chapter of this EIAR concludes the following predicted impacts on the subject site:

'Assuming successful implementation of mitigation measures, no significant residual impacts are predicted.'

In relation to Planning Ref. **SD20A/0283**, an Environmental Impact Assessment Report (EIAR) was prepared to accompany this planning application. The Biodiversity Chapter of this EIAR concludes the following predicted impacts on the subject site:

'Habitats
The development is located in an area of low to moderate ecological value and as such predicted to have a neutral imperceptible effect on biodiversity. Specific local mitigation measures include the avoidance of cutting of vegetation during the bird nesting season with regard to the construction phase
With the employment of appropriate mitigation measures with regard to water quality and the protection of the Griffeen River during all aspect of construction and operation, the Proposed Development will have a neutral imperceptible and long-term effect on the Griffeen River.
With the employment of appropriate mitigation measures with regard to local biodiversity, the Proposed Development will have a neutral imperceptible and long-term effect on biodiversity.
Bats
There is no evidence of a current or past bat roost on site, therefore no significant negative effects on these animals are expected to result from the proposed redevelopment.
Badgers
There will be no significant impact on badger populations and the predicted impact will be neutral and imperceptible.
Birds
Potential impacts on nesting birds can be avoided by timing the cutting of vegetation as required by the Wildlife Acts with a neutral imperceptible impact.'

In relation to Planning Ref. **SD20A/0309**, an Environmental Impact Assessment Report (EIAR) was prepared by AWN Consulting to accompany this planning application. The Biodiversity Chapter of this EIAR concludes the following predicted impacts on the subject site:

'The development is located in an area of low to moderate ecological value and as such is unlikely to have any significant impacts. The current arrangement of silt settlement and further SuDS attenuation at the site will avoid local impacts on the Camac River and the Gallanstown Stream.

If the bat sensitive lighting as described in Section 8.6 is employed, then there will be no residual impact on bats. The proposed landscaping of the southern boundary of the site will have a positive impact on local biodiversity. The overall impact from the Proposed Development is predicted to be ***neutral, imperceptible*** *and* ***long-term*** *on biodiversity.'*

Further, it is worth noting that a previous planning application located within the boundaries of the subject site has been granted permission. The table below outlines this application as identified on the Department of Housing, Local Government and Heritage's 'National Planning Application Map' portal:

Table 4.13 – In-combination effects evaluated (developments located within the boundaries of the subject site)

Planning Ref.	Address	Proposal
SDZ20A/0021	In the townlands of Adamstown, Grange, Kishoge, Clonburris Litte & Cappagh, Co. Dublin	10 year permission for roads and drainage infrastructure works as approved under the Clonburris Strategic Development Zone Planning Scheme (2019) to form part of the public roads and drainage networks providing access and services for the future development of the southern half of the overall Strategic Development Zone (SDZ) lands; the roads infrastructure works are for the construction of c. 4.0km of a new road, known as Clonburris Southern Link Street, generally consisting of 7m wide single carriageway, plus on either side of the carriageway landscaped verges, 1.75m wide off-road cycle tracks and 2m wide footpath including public lighting, trees, 288 on-street car parking spaces (including 26 disabled parking spaces), pedestrian crossings, bus stops, a number of vehicular access spurs to facilitate future development of adjoining lands, a total of 8 new junctions (including 3 junctions to facilitate future road developments within the SDZ; 2 junctions with proposed local access roads and 3 new junctions with Hayden's Lane, Lynch's Lane and Ninth Lock Road) and alterations to 4 existing junctions on Newcastle Road (R120), Grange Castle Road (R136), Fonthill Road (R113) and also to the existing access road to Park and Ride facilities at both Kishoge Station and at Fonthill Station; alterations to the existing public roads Newcastle Road (R120), Hayden's Lane Access Road, Hayden's Lane, Lynch's Lane, Grange Castle Road (R136), Fonthill Road (R113) and Ninth Lock Road arising from new junctions with the Clonburris Southern Link Street consisting of reconfiguration of a c.165m long section of Newcastle Road (R120) including road widening and revisions to layout of junction with Hayden's Lane Access Road; incorporation of Hayden's Lane Access Road into proposed Clonburris Southern Link Street; provision of new junction with Hayden's Lane and Clonburris Southern Link Street; incorporation of a c. 26m long section of Lynch's Lane into proposed Southern Link Street and provision of a new junction with Clonburris Southern Link Street; reconfiguration of a c. 260m long section of Grange Castle Road, including road widening and replacement of existing roundabout with signalised junction; reconfiguration of a c. 250m long section of Fonthill Road, including road widening and replacement of existing roundabout with signalised junction; reconfiguration of a c.125m long section on Ninth Lock Road including road widening and provision of a new junction with Clonburris Southern Link Street; construction of 2 local access roads, consisting of c. 110m long road extending north from Clonburris Southern Link Street and providing access to proposed foul pumping station and generally

Planning Ref.	Address	Proposal
		consisting of a 6m wide single carriageway plus on either side of the carriageway 2m wide footpath including public lighting , 2 set-down parking spaces and vehicular access to proposed foul water pumping station; north/south Link Street (c. 240m in length) extending north from southern Link Street to the Kildare-Cork railway line and generally consisting of a 7m wide single carriageway plus on either side of the carriageway 1.3m wide landscaped verge, 1.75m wide off-road cycle lane, 2m wide footpath including public lighting and 2 vehicular access spurs to facilitate future development of adjoining lands; the drainage infrastructure works include 8 attenuation systems (with outfalls to Griffeen River, Kilmahuddrick Stream and existing storm sewers) including 4 ponds , 2 modular underground storage systems and 2 detention basins combined with modular underground storage systems all adjacent to proposed Clonburris Southern Link Street; surface water drainage culverts to existing watercourses; flood water compensation area adjacent to Griffeen River; surface water drainage and water supply trunk infrastructure within proposed road corridors; wastewater infrastructure including a foul pumping station and pipe network within proposed road corridors to facilitate drainage connections to future wastewater drainage infrastructure within the adjoining SDZ lands (including future Irish Water pumping station) and to connect to the existing sewer network in Cappaghmore housing estate; ducting for public electrical services and utilities and the diversion of existing utilities is provided for within the proposed road corridor; Permission is also sought for all ancillary site and development and landscape works associated with the development including hard and soft landscaping, boundary treatments, road markings and signage, enabling works and temporary construction works (including site accommodation, site compounds and temporary boundary fencing); the application is made in accordance with Clonburris Strategic Development Zone Planning Scheme 2019 and relates to a proposed development within the Clonburris Strategic Development Zone Planning Scheme Area as defined by Statutory Instrument No. 604 of 2015; an Environmental Impact Assessment Report accompanies the application.

In relation to Planning Ref. **SDZ20A/0021,** an Appropriate Assessment Report was prepared by Scott Cawley Ltd. to accompany this planning application. This report concludes with the following:

‘Following an examination, analysis and evaluation of the best available information, and applying the precautionary principle, it can be concluded that the possibility of any significant effects on any European sites, whether arising from the project alone or in combination with other plans and projects, can be excluded, for the reasons set out in Section 3.3 above. In reaching this conclusion, the nature of the project and its potential relationship with all European sites within the zone of influence, and their conservation objectives, have been fully considered.

Therefore, it is the professional opinion of the authors of this report that the application for consent for the proposed development does not require an Appropriate Assessment or the preparation of a Natura Impact Statement (NIS).’

Further, in relation to Planning Ref. **SDZ20A/0021,** an Environmental Impact Assessment Report was prepared by Stephen Little & Associates to accompany this planning application. The Biodiversity Chapter of this EIAR outlines the following residual impacts of the proposed development on biodiversity:

'Construction and Operational Stages

Following the implementation of the mitigation measures outlined in Section above, the proposed development will not result in any significant residual effect on the Key Ecological Receptors identified (see Table 6.8) on its own, or cumulatively together with other proposed developments.

Ecological Receptor	Ecological Valuation	Impacts with Potentially Significant Effects	Potential Significance of Effects	Mitigation Measures	Compensation	Significance of Residual Effects
Designated Sites						
Grand Canal pNHA	National	Introduction of non-native invasive species (butterfly-bush)	National	Removal of non-native invasive species prior to construction outlined in Section 6.6.1.1	N/A	None
Habitats						
(Mixed) broadleaved woodland (WD1)	Local importance (higher value)	Permanent loss of habitat (*c.* 2.46ha) Introduction of non-native invasive species (butterfly-bush)	Local importance (higher value)	Removal of non-native invasive species prior to construction outlined in Section 6.6.1.1	Landscape planting outlined in accompanying landscape plans and drawings	None
Immature woodland (WS2)	Local importance (higher value)	Permanent loss of habitat (*c.* 0.62ha) Introduction of non-native invasive species (butterfly-bush)	Local importance (higher value)	Removal of non-native invasive species prior to construction outlined in Section 6.6.1.1	Landscape planting outlined in accompanying landscape plans and drawings	None
Hedgerows (WL1)	Local importance (higher value)	Permanent loss of habitat (*c.* 2.7km) Introduction of non-native invasive species (butterfly-bush)	Local importance (higher value)	Removal of non-native invasive species prior to construction outlined in Section 6.6.1.1	Landscape planting outlined in accompanying landscape plans and drawings	None
Depositing/lowland rivers (FW2) (Griffeen River)	Local importance (higher value)	Reduction in water quality	Local importance (higher value)	Mitigation measures to protect water quality outlined in Section 6.6.1.1.	N/A	None
Fauna Species						
Badger	Local importance (higher value)	None	N/A	None	N/A	None

Otter	County importance	Water quality impacts on prey availability	County importance	Mitigation measures to protect water quality outlined in Section 6.6.1.1.	N/A	None
Small mammals	Local importance (higher value)	None	N/A	None	N/A	None
Breeding birds	Local importance (higher value)	Habitat loss Collision risk/mortality	Local importance (higher value)	Seasonal vegetation clearance (Section 6.6.1.1) Breeding bird surveys prior to vegetation clearance in breeding season These measures are in adherence for Wildlife Acts	Landscape planting outlined in accompanying landscape plans and drawings	None
Wintering birds	Local importance (higher value)	Habitat loss Collision risk/mortality	Local importance (higher value)	N/A	Landscape planting outlined in accompanying landscape plans and drawings	None
Raptors (non-Annex)	Local importance (higher value)	Habitat loss Collision risk/mortality	Local importance (higher value)	N/A	Landscape planting outlined in accompanying landscape plans and drawings	None
Raptors (Annex I: peregrine)	County importance	Habitat loss Collision risk/mortality	Local importance (higher value)	N/A	Landscape planting outlined in accompanying landscape plans and drawings	None
Bats	Local importance (higher value)	Habitat loss Collision risk/mortality	Local importance (higher value)	Bat sensitive lighting plans (Sections 6.6.1)	Landscape planting outlined in accompanying landscape plans and drawings	None
Common frog	Local importance (higher value)	None	N/A	Pre-construction checks in adherence for Wildlife Acts	N/A	None
Common lizard	Local importance (higher value)	None	N/A	N/A	N/A	None
Fish (species of conservation concern)	County importance	Habitat loss Disturbance or Displacement Habitat severance/barrier effect Water quality impacts	County importance	Mitigation measures outlined in section 6.6.1.1.	N/A	None
Freshwater white-clawed crayfish	County importance	Habitat loss Disturbance or Displacement Habitat severance/barrier effect Water quality impacts	County importance	Mitigation measures outlined in section 6.6.1.1.	N/A	None

***Table 6.8**: Summary of the significant residual ecological effects of the proposed development during construction and operational stages.*'

Based on a review of the planning application viewer there are no committed developments in proximity to the subject site which are likely to give rise to cumulative impacts with it. Given this, it is considered that in combination effects with other existing and proposed developments in proximity to the application area would be unlikely, neutral, not significant and localised. No significant cumulative effects are foreseen on biodiversity from cumulative impacts.

4.11 RESIDUAL IMPACTS CONCLUSION

The construction and operational mitigation proposed for the development satisfactorily addresses the mitigation of potential impacts on the sensitive receptors. The overall impact on the ecology of the proposed development will result in a not significant low adverse impact on the ecology of the area and locality overall, with not significant adverse impact on birds in the long term. This is primarily as a result of the loss of terrestrial habitats on site, supported by strong construction and operational phase mitigation and the creation of additional biodiversity features and complexity within a strong biodiversity targeted landscaping strategy.

5.0 LAND AND SOILS

5.1 INTRODUCTION

This chapter was prepared by DBFL Consulting Engineers and assesses and evaluates the effect of the proposed development on the subject site's geology, soil and land during the construction and operation of the proposed development. It also identifies the characteristics, potential effects, mitigation measures and residual effects arising from the proposed development.

This chapter was prepared by Thomas Carrigg, Civil Engineer, DBFL Consulting Engineers & John Carr, Chartered Civil Engineer [B.Eng MSc CEng], DBFL Consulting Engineers.

This report also addresses earthworks proposed on the subject site including cut and fill works required.

5.2 METHODOLOGY

5.2.1 Guidelines

The assessment of the potential effect of the activity on geology, soil and land was carried out according to best practice and the methodology specified in the available guidance documents. Various bodies including; Transport Infrastructure Ireland (TII, formally National Roads Authority); the Institute of Geologist Ireland (IGI); and the Environmental Protection Agency (EPA) provide detailed guidance to the preparation and content required for an EIAR in relation to the geological environment.

Table 5.1 – Guidance Documents

Body	Guidance
Transport Infrastructure Ireland (TII)	Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2009)
	Environmental Impact Assessment of National Road Schemes – A Practical Guide (NRA, 2008)
	Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan
	The Management of Waste from National Road Construction Projects
	Design of Earthworks Drainage, Network Drainage, Attenuation & Pollution Control (DN-DNG-03066)
Environmental Protection Agency (EPA)	Guidelines on The Information to Be Contained In Environmental Impact Assessment Reports (Draft August 2017)
	EPA Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) Sept. 2003
	Geo Portal (https://gis.epa.ie/EPAMaps/)
Construction Industry Research and Information Association (CIRIA)	The SUDS Manual (CIRIA C753)
	Control of Water Pollution from Construction Sites. Guidance for Consultants and Contractors (CIRIA C532)
	Control of Water Pollution from Linear Construction Sites (CIRIA C648)
	Environmental Good Practice on Site (C692) (2010)
South Dublin County Council (SDCC)	South Dublin County Council Planning (https://www.sdcc.ie/en/services/planning/)
Institute of Geologists of Ireland (IGI)	Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements. (2013)

Dept of the Environment Heritage and Local Government	Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects
Department for Environment, Food and Rural Affairs (UK)	Construction Code of Practice for the Sustainable Use of Soils on Construction Sites

5.2.2 Consultation

Baseline information was gathered from relevant statutory bodies as per Table 5.1.

5.2.3 Desktop Study

The desktop study involved collation and assessment of the relevant information from the following information sources.

- Acquisition and compilation of all available regional information on the geology, soil, and land aspects of the study area.
- Interrogation of the Geological Survey of Ireland's (GSI) online mapping service, including:
    - GSI Teagasc Soils mapping
    - GSI Teagasc Subsoils mapping
    - GSI Bedrock Geology mapping
    - GSI Landslide Events
    - GSI Mineral Localities
    - GSI Mineral Active Quarries
- Acquisition and examination of the Ordnance Survey of Ireland's (OSI) mapping and aerial photography.
- Examination of topographical survey of the site.
- Findings of ground investigation carried out by Ground Investigation Ireland at the proposed site. This detailed investigation included the following. The Ground Investigation Report is included In Appendix E of Volume III of the EIAR.
    - 211 No. Trial Pits to a maximum depth of 3.10m BGL
    - 32 No. Plate Bearing Test to ascertain constrained modulus and equivalent CBR
    - 10 No. Soakaways to determine a soil infiltration value to BRE digest 365
    - 215 No. Dynamic Probes to determine soil strength/density characteristics
    - 32 No. Rotary Core Boreholes to a maximum depth of 6.80m BGL
    - 12 No. Groundwater monitoring wells
    - Geotechnical & Environmental Laboratory testing

5.2.4 Application of Methodology

This chapter has been prepared in accordance with the following best practice methodology; "Guidelines On The Information To Be Contained In Environmental Impact Assessment Reports (Draft August 2017)" & the TII "Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes".

5.2.5 Study Methodology

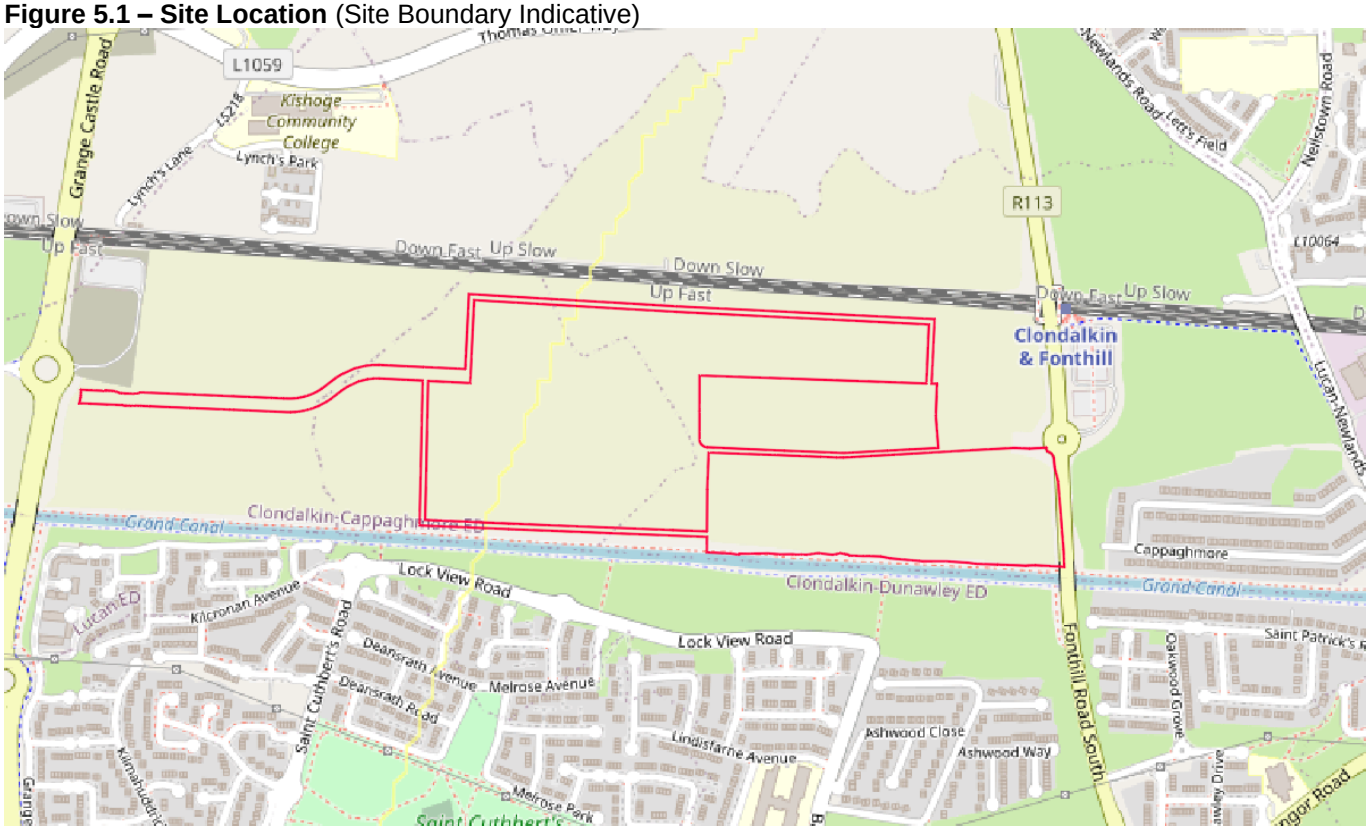
The assessment of the potential effect of the activity on geology, soil and land was carried out according to best practice and the methodology specified in the available guidance documents. Various bodies including; Transport Infrastructure Ireland (TII, formally National Roads Authority); the Institute of Geologist Ireland (IGI); and the

Environmental Protection Agency (EPA) provide detailed guidance to the preparation and content required for an EIAR in relation to the geological environment.

5.2.6 Study Area

The proposed development site is located in the adminstrative area of South Dublin County Council (SDCC) and is part of the Clonburris Strategic Development Zone (SDZ). The subject site for this development is situated in the southern area of the Clonburris SDZ lands to the south of the Kildare/Cork railway adjacent to the R113. The Grand Canal forms the southern boundary of the subject site.

Figure 5.1 – Site Location (Site Boundary Indicative)

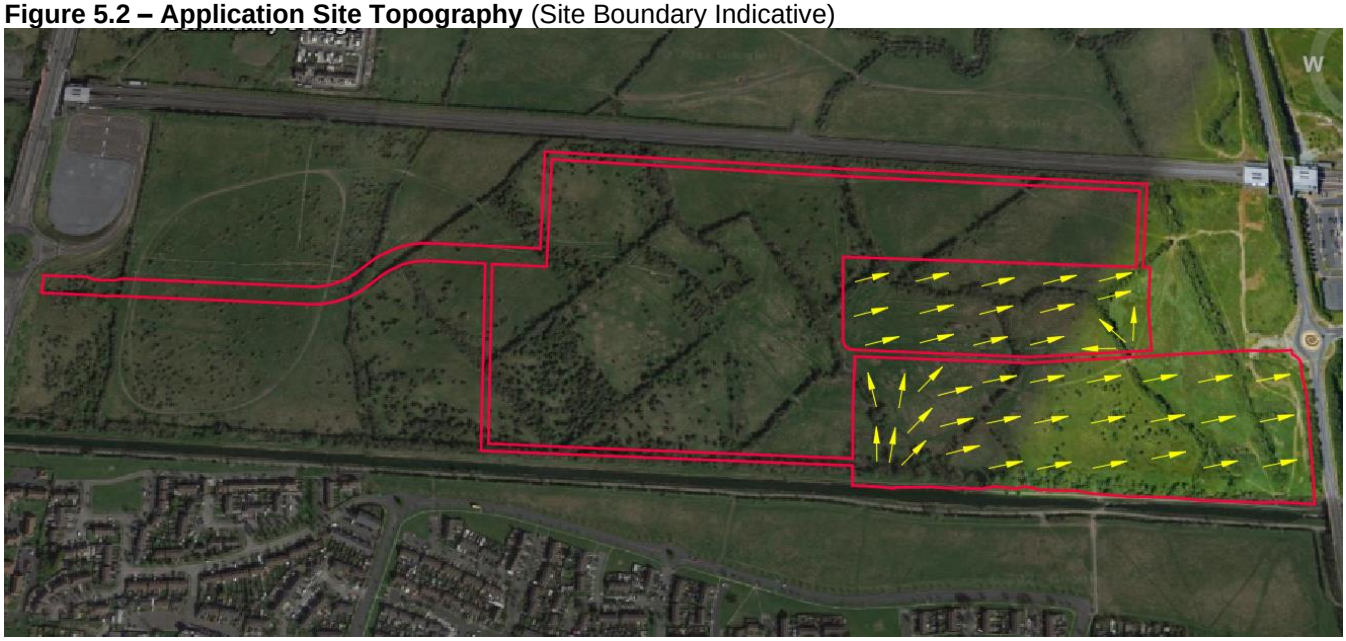


5.3 EXISTING RECEIVING ENVIRONMENT (BASELINE SCENARIO)

5.3.1 Topography and Land Use

The existing site is predominately greenfield. Overall, the topography of the subject site is relatively flat. There is a slight fall with a gradient of approximately 0.5% from east to west over the majority of the subject site. A number of drainage ditches are located throughout the subject site. There are 2no. high points on the subject site. One located to the southwest and another to the east north of the future Link Road as shown in **Error! Reference source not found.**.

Figure 5.2 – Application Site Topography (Site Boundary Indicative)



5.3.2 Topsoil

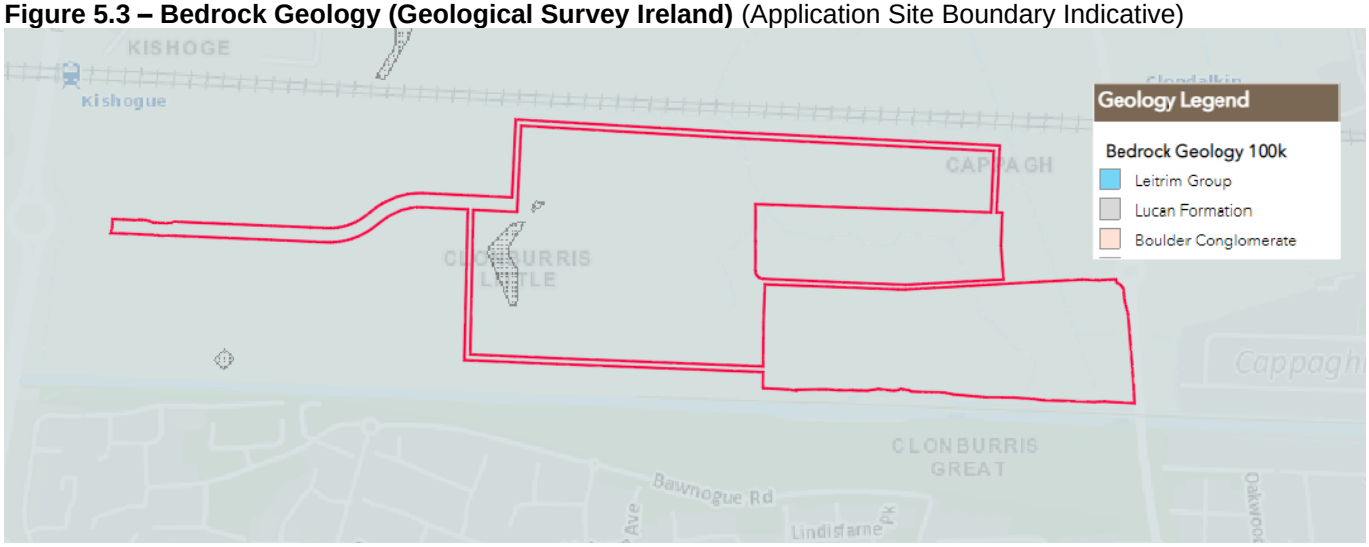
Topsoil was encountered in all the exploratory holes and was present to a maximum depth of 0.40m BGL. The results showed a brown slightly sandy gravelly topsoil.

5.3.3 Bedrock Geology

The 1:100,000 Geological Survey of Ireland bedrock Geology Map from the GSI online mapping service indicates that the subject site is underlain in its entirety by limestone. The bedrock is described in geological mapping as a dark limestone and shale and is part of a formation known as the Lucan Formation. The rock description is a dark limestone and shale. An extract from GSI mapping is presented in Figure 5.2.

No rock outcrops were visible during the site visit. The rotary core boreholes recovered weak to strong grey/dark grey fine to medium grained laminated limestone interbedded with weak black fine grained laminated Mudstone which is consistent with Geological Mapping. The depth to rock varies from 1.15m BGL to the west of the application site in RC06 to a maximum of 3.60m BGL in RC28 to the east of the application site

Figure 5.3 – Bedrock Geology (Geological Survey Ireland) (Application Site Boundary Indicative)



5.3.4 Quaternary & Soil

The Geological Survey of Ireland online mapping service indicates the quaternary deposits underlying the subject site are comprised of Tills derived from limestones. The Teagasc Soils and Subsoils Map from the online Geological Survey of Ireland mapping service shows that the majority of the site is underlain with “mineral poorly drained soils” with intermittent areas of the site underlain with “deep well drained mineral” soils. Refer to Figure 5.3 and Figure 5.4 below.

The preliminary ground investigation carried out by Ground Investigations Ireland summarises the soils as follows:

- Topsoil: Topsoil was encountered in all the exploratory holes and was present to a maximum depth of 0.40m BGL.
- Made Ground: Made Ground deposits were encountered beneath the Topsoil and were present to a relatively consistent depth of between 0.5m and 1.4m BGL. These deposits were described generally as brown slightly sandy slightly gravelly CLAY with occasional cobbles and boulders and contained occasional fragments red brick.
- Cohesive Deposits: Cohesive deposits were encountered beneath the Made Ground and were described typically as brown or grey brown slightly sandy slightly gravelly CLAY with occasional cobbles and boulders overlying a stiff dark grey slightly sandy slightly gravelly CLAY with occasional cobbles and boulders. The secondary sand and gravel constituents varied across the site and with depth, with granular lenses occasionally present in the glacial till matrix. The strength of the cohesive deposits typically increased with depth and was firm to stiff or stiff. These deposits had some, occasional or frequent cobble and boulder content where noted on the exploratory hole logs.
- Granular Deposits: The granular deposits were generally encountered below or within the cohesive deposits and were typically described as Grey brown or brown very clayey sandy sub rounded to sub angular fine to coarse GRAVEL with occasional cobbles and rare boulders or grey brown very clayey very gravelly fine to coarse SAND.
- Weathered Bedrock: In the majority of exploratory holes weathered rock was encountered which was digable with the large excavator to a depth of up to 1.0m below the top of the stratum. The trial pits were terminated upon encountering the more competent bedrock, in which further excavation became more difficult.

Figure 5.4 – Quaternary Deposits (Geological Survey Ireland)

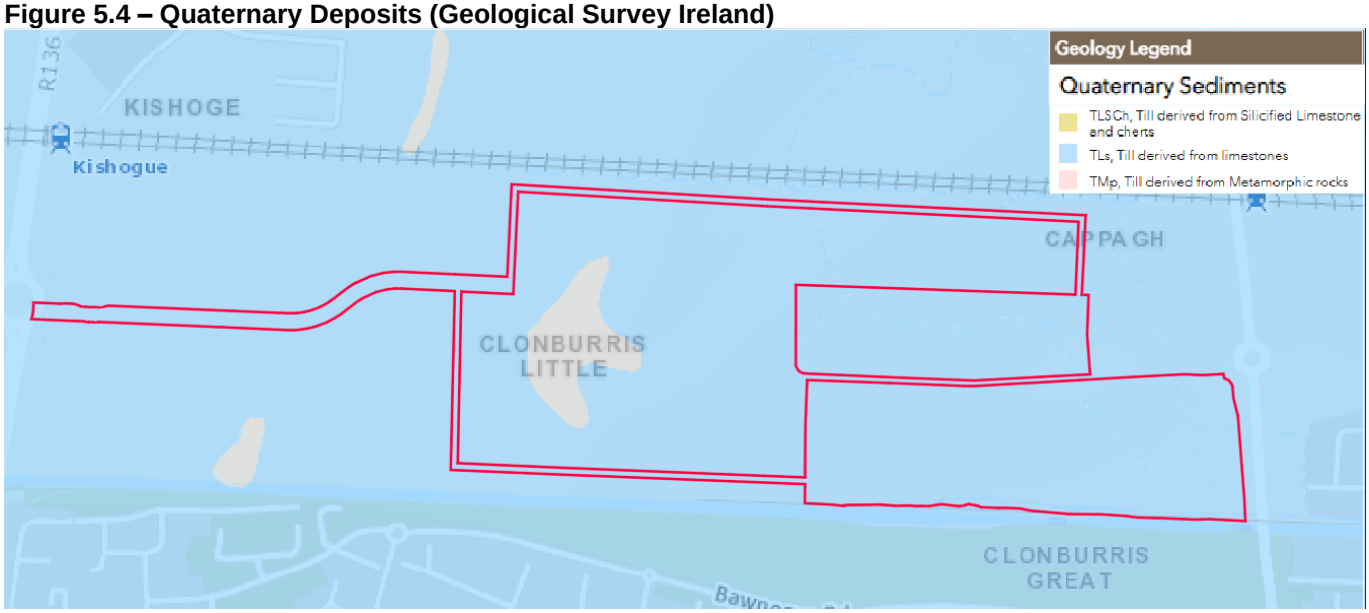
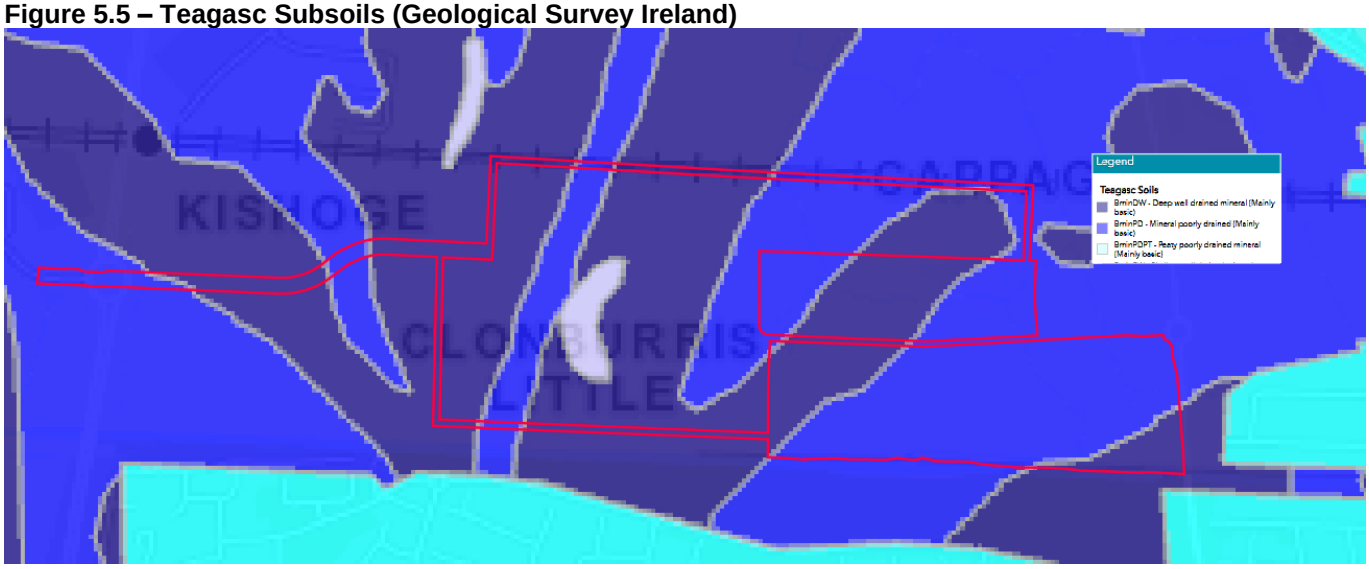


Figure 5.5 – Teagasc Subsoils (Geological Survey Ireland)

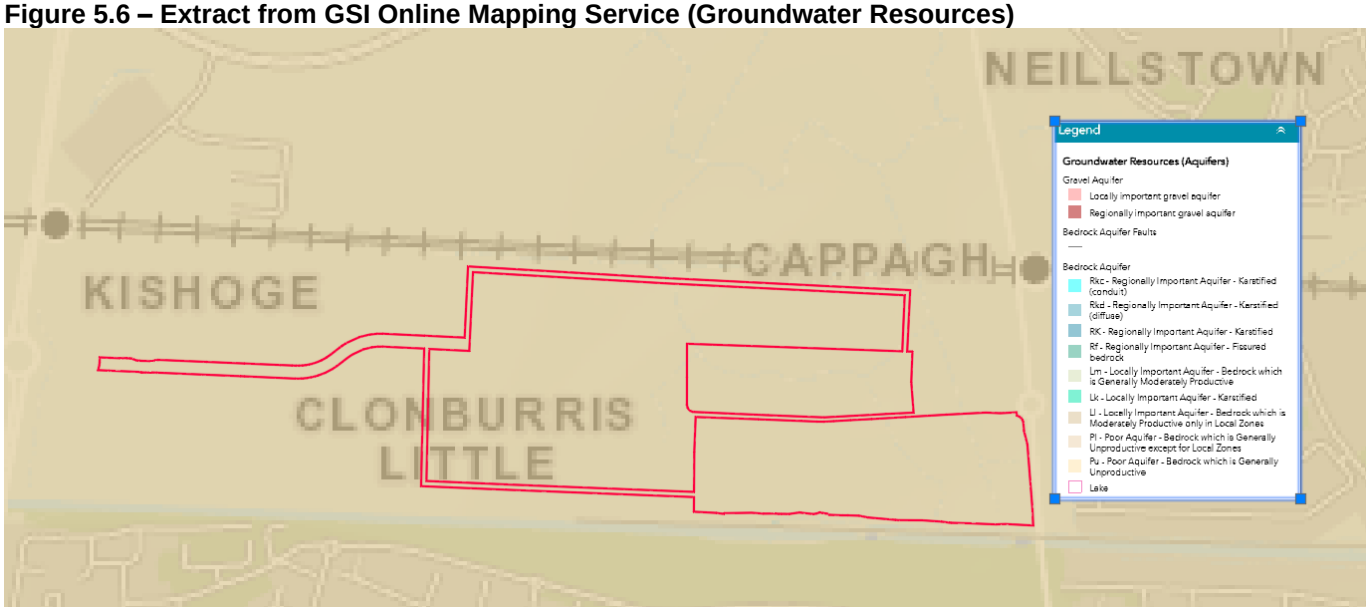


5.3.5 Hydrogeological aspects

Limestone bedrock underlies the entire site. The bedrock is described in geological mapping as a Dark Limestone & Shale and is part of a formation known as the Lucan Formation.

The bedrock aquifer underlying the entire site is classified by Geological Survey Ireland as a *"Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones".*

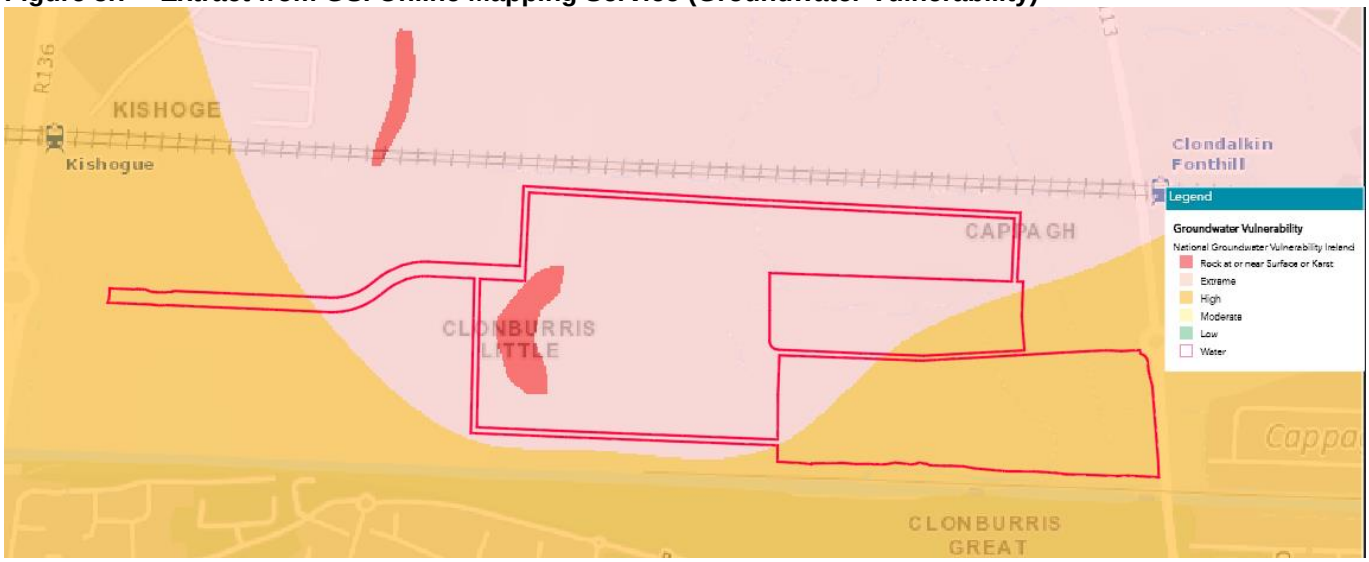
Figure 5.6 – Extract from GSI Online Mapping Service (Groundwater Resources)



Groundwater Vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities. Groundwater vulnerability is classed as “High” or greater on the proposed site due to the shallow depth to bedrock. Areas of highest vulnerability correspond to areas of near surface bedrock and thin soil depths. It is noted that the aquifer vulnerability classification does not consider the nature of the underlying ‘receiving’ aquifer with respect to resource value or significance of pollution occurring and is only a reflection on the protection afforded to the aquifer by overlying deposits.

Infiltration testing in accordance with BRE digest 365 methodologies was carried out as part of site investigations. Infiltration testing indicating that infiltration rates are typically quite low on the subject site.

Figure 5.7 – Extract from GSI Online Mapping Service (Groundwater Vulnerability)



5.3.6 Contaminated land

No existing areas of contaminated ground have been identified within the subject site. Environmental testing carried out as part of ground investigations indicate that soils would be classed as inert under the EPA Waste acceptance Criteria.

5.4 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 proposed development comprises a mixed-use residential development comprising of houses, duplexes, and apartments with a community/civic building and associated infrastructure. Haul roads are also being proposed to provide access for construction vehicles. Refer to Chapter 2 for detailed project description

It is anticipated that the main construction activities impacting soils and geology will comprise the following:

- Removal of topsoil and subsoil to allow road construction, foundation excavation, services installation.
- Construction of the main access routes into the development.
- Installation of main underground services and utilities to serve the site.
- Construction of the surface water storage systems (underground and overground).
- Construction of linear park and public open space areas.

5.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

5.5.1 Construction Phase

It is anticipated that the main construction activity impacting geology, soils and land will comprise the following:

- Stripping, storage and transportation of topsoil, storage of topsoil and removal of topsoil from site to allow the development construction to proceed.
- Excavation, storage and transportation of subsoil layers for construction of the roads, building foundations and services.

5.5.2 Stripping of Topsoil

Removal of the existing topsoil layer will be required across the site. Stripping of topsoil will result in a negative effect from the exposure of the underlying subsoil layers to the effects of weather and construction traffic which may result in subsoil erosion and generation of sediment laden runoff.

It is anticipated that topsoil will be stripped over the full development area to facilitate construction. It is anticipated topsoil strip will be to an approximate depth of 0.3m and will be phased in line with the overall development phasing. Topsoil will be stored on site in carefully managed stockpiles and will generally be reused within gardens and other landscaped areas within the site. Site levels have been designed to be slightly above existing levels in order to minimize the requirement for offsite disposal of soil and to ensure adequate drainage gradients can be applied. Therefore, it is anticipated that there is significant capacity to accommodate soil volumes within gardens and landscape areas.

Table 5.2 – Preliminary Estimated Topsoil Volumes (Approximate)

	Volume (m^3)
Topsoil Strip (0.3m Thick Layer)	31,000
Topsoil reused on-site	29,500
Topsoil disposed off-site	1,500

5.5.3 Excavation of Subsoil Layers

Excavation of existing subsoil layers will be required in order to allow foundation construction, road structure and drainage and utility installation. Excavation of sub-soil layers will result in a negative effect from the exposure of the underlying subsoil layers and rock to the effects of weather and construction traffic which may result in subsoil erosion and generation of sediment laden runoff. Foundations for houses are anticipated to be shallow strip foundations and foundations for apartment buildings are expected to consist of pad excavations for columns which would be founded

on the shallow bedrock. Based on available information subsoil is expected to be generally suitable for reuse as non-structural fill (e.g., build-up of back gardens areas or build-up of open space.
The estimated cut/fill volumes are given in Table 5.3 below. It is estimated that subsoil excavated will be reused on site

Table 5.3 – Estimated Cut/Fill Volumes (Approximate)

	Volume (m^3
Subsoil Excavation and Re-use	3,250

5.5.4 Construction Traffic

Earthwork plant (e.g., dump trucks) and vehicles delivering construction materials to site (e.g., road aggregates, concrete deliveries etc.) have potential to cause negative effects from rutting and deterioration of the topsoil layer and any exposed subsoil layers, resulting in erosion and generation of sediment laden runoff. This issue can be particularly noticeable at site access points (resulting in deposition of mud and soil on the surrounding road network). Dust generation can also occur during extended dry weather periods as a result of construction traffic.

5.5.5 Accidental Spills and Leaks

During the construction phase there is a risk of accidental pollution from the sources noted below. Accidental spills and leaks may result in negative effects from contamination of the soils underlying the site.

- Storage of oils and fuels on site.
- Oils and fuels leaking from construction machinery.
- Spillage during refuelling and maintenance of construction machinery.
- Use of cement and concrete during construction works.

5.5.6 Geological Environment

It is expected that the installation of the drainage networks and construction of the attenuation system will require excavation of bedrock in some locations. Excavations associated with development of the site have been designed as shallow as possible. Where bedrock is encountered it will be crushed, screened and tested for use within the designed works. Excavation of rock will have negative effects from the exposure of the bedrock to adverse weather conditions resulting in erosion of the rock layers.

5.5.7 Human Health

A potential risk to human health due to the associated works during construction is the direct contact, ingestion or inhalation of receptors (i.e. construction workers) with any soils which may potentially contain low level hydrocarbon concentrations from Site activities (potential minor leaks, oils and paint).

No human health risks associated with long term exposure to contaminants (via. direct contact ingestion or inhalation) resulting from the proposed development are anticipated.

Table 5.4 – Summary of Unmitigated Significance - Construction Phase

Receptor	Potential Effect	Quality of Effects	Magnitude of Effect	Significance of Effects (pre mitigation)
Soils/Subsoils	Chemical Pollution of soils/subsoils	Negative	Low – Potential for local effects to soil value and distribution	Slight
Limestone Bedrock	Chemical Pollution of bedrock	Negative	Low – Potential for local effects to rock value and distribution	Slight
Soils/Subsoils	Loss of soil value	Negative	Low – Potential for local effects to soil value and distribution	Slight

Soils/Subsoils	Material Generation	Negative	Low – Potential for local effects to soil value and distribution	Slight
Limestone Bedrock	Material Generation	Negative	Low – Potential for local effects to rock value and distribution.	Not Significant

5.5.8 "Do-Nothing" Scenario

Should no development be proposed for the site and the site remains as open undeveloped land this would remove any potential for contamination issues over the operational or post development phase. Notwithstanding this, the land is zoned for the type of development applied for. There will be no effect on geology, soil and land if the development does not proceed.

5.5.9 Operational Phase

The operational effects are those associated with the completed development including final surface treatments, conveyance of traffic flows, occupation of buildings and all operation and maintenance activities. The main effects arising from construction activities include:

- Any exposed soils or those which remain unplanted have potential to be eroded by wind and water which may result in soil erosion and generation of sediment laden runoff.
- During the operational phase there is a risk of accidental spills from development users which may result in negative effects from contamination of the soils underlying the site.

Once the development is completed the operational impacts on the land and soils would be minimal. The biggest risk item is cross contamination of ground water from the operational phase of the development from accidental oil spillages, refer to the Mitigation section below for proposed remedial issues.

Table 5.5 – Summary Significance – Operational Phase (Prior to Mitigation)

Receptor	Quality of Effects	Quality of Effects	Magnitude of Effect	Significance of Effects (pre mitigation)
Soils/Subsoils	Loss of soil value	Negative	Low – Potential for local effects to soil value and distribution	Slight
Soils/Subsoils	Pollution of soils/subsoils from spills	Negative	Low – Potential for local effects to soil value and distribution	Slight

5.6 MITIGATION MEASURES

5.6.1 Incorporated Design Mitigation

The site layout has been designed to minimise impact on the land and soil environment. The design has evolved to minimise environmental impact throughout the various design stages.

The vertical and horizontal alignment of the road and development levels have been optimized to minimize cut and fill requirements and seek to obtain a balance of cut and fill materials (within constraints of road design criteria and landscape considerations).

Sufficient space has been provided within the works area for segregated spoil storage.

Preconstruction soils testing has been carried out to determine if any contamination exists.

5.6.2 Construction Phase Mitigation

An Outline Construction Management Plan (prepared by DBFL Consulting Engineers) is included with the planning application. A Construction & Environmental Management Plan will be put in place by the Contractor to implement the mitigation measures from the EIAR. The plan will be resubmitted to the planning authority prior to construction to incorporate any conditions and/or modifications imposed by the local authority and the plan will be maintained by the contractor during the construction phase. The Outline Construction Management Plan includes a range of site-specific measures which will include the following mitigation measures in relation to geology, soils, and land:

- Stripping of topsoil will be carried out in a controlled and carefully managed way and coordinated with the proposed staging for the development.
- At any given time, the extent of topsoil strip (and consequent exposure of subsoil) will be limited to the immediate vicinity of active work areas. Topsoil stripping will not take place during inclement weather.
- Topsoil stockpiles will be protected for the duration of the works and not located in areas where sediment laden runoff may enter existing surface water drains. Topsoil stockpiles will also be located so as not to necessitate double handling.
- The design of site levels have been carried out in such a way as to minimize the interaction with rock. Rock will likely be encountered during the installation of drainage due to topography of the subject site and levels of drainage outfalls.
- The duration that rock layers are exposed to the effects of weather will be minimized by back filling excavations as soon as practicable after construction.
- Stockpiles of excavated and crushed rock will be protected for the duration of the works.
- Measures will be implemented to capture and treat sediment laden surface water runoff (e.g. sediment retention ponds, surface water inlet protection and earth bunding adjacent to water bodies).
- Earthwork's plant and vehicles exporting soil and delivering construction materials to site will be confined to predetermined haul routes around the site.
- Vehicle wheel wash facilities will be installed in the vicinity of any site entrances and road sweeping implemented as necessary in order to maintain the road network in the immediate vicinity of the site.
- Dust suppression measures (e.g. dampening down) will be implemented as necessary during dry periods.
- In order to mitigate against spillages contaminating underlying soils and geology, all oils, fuels, paints and other chemicals will be stored in a secure bunded hardstand area.
- Refueling and servicing of construction machinery will take place in a designated hardstand area which is also remote from any surface water inlets (when not possible to carry out such activities off site).
- An Emergency Response Plan detailing the procedures to be undertaken in the event of a spillage of chemical, fuel or hazardous wastes will be prepared prior to construction.
- Pouring of concrete including wash down and washout of concrete from delivery vehicles will be controlled in an appropriate facility to prevent contamination.
- Regular samples will be taken from soils affected by earthworks which shall be analysed for contamination
- All materials exported from site to be in accordance with the Waste Management Acts.
- Imported materials to be suitably separated to avoid contamination or mixing.
- For imported materials, the use of local quarries or locally available material should be prioritised.
- Any potential for use of surplus material within local sites shall be pursued at construction and detailed design stage (subject to compliance with Waste Management Acts). If any material is to be reused on another site as a by-product (and not as waste), this will be done in accordance with Article 27 of the Waste Directive Regulations.

5.6.3 Operational Phase

Once the development is completed, risks to the geology, soil and land will be from loss of soil value and pollution of soils/subsoils due to accidental spills. The following mitigation measures will be implemented:

- A detailed landscape plan will be prepared and constructed for the development to ensure all areas are planted and established.
- Earthworks will be designed and constructed in accordance with good practice and design standards to ensure slope stability.
- All new drainage on site will be pressure tested and have a CCTV survey carried out prior to being made operational to ensure it is adequately constructed.
- Oil interceptors will be installed on all surface water drainage networks.
- Vegetated Sustainable urban drainage systems will be installed to treat run-off.

5.7 PREDICTED IMPACT FOLLOWING MITIGATION (RESIDUAL IMPACT)

The proposed development will alter the current land use from vacant land to residential development. creche and public open space and landscape areas. The impact on land, soil, geology, and hydrogeology from accidental spillages of fuel and lubricants used during the construction phase of the development is predicted to be minimal when stored and used in a responsible manner. After implementation of the mitigation measures recommended above for the construction phase, the proposed development will not give rise to any significant long term adverse impact.

Implementation of the measures outlined in Section 5.6 will ensure that the potential impacts of the development on soils and the geological environment are minimised during the construction phase and that any residual impacts will be short term, and imperceptible.

Residual Impacts from earthworks haulage and the risk of contamination of groundwater are deemed to be of minor risk. The residual impacts for a residential housing development, creche and open space are deemed to be imperceptible post construction (during the operational phase).
Implementation of the mitigation measures outlined above will ensure that potential significant effects of the proposed development on land, soils and geology do not occur during the construction phase and that any residual effects will be short term and not significant.

Table 5.6 –Significance – Construction Phase Post Mitigation

Receptor	Potential Effect	Quality of Effects	Magnitude of Effect	Significance of Effects (post mitigation)
Soils/Subsoils	Chemical Pollution of soils/subsoils	Negative	Low / Negligible: Implementation of best practice measures to control hazardous substances mitigates effect. Measures include controls on use and storage of hazardous materials, controls on construction works.	Not Significant
Limestone Bedrock	Chemical Pollution of bedrock	Negative	Low / Negligible: Implementation of best practice measures to control hazardous substances mitigates effect. Measures include controls on use and storage of hazardous materials, controls on construction works.	Not Significant
Soils/Subsoils	Loss of soil value	Negative	Low / Negligible: Implementation of best practice measures to protect soil value mitigates effect. Measures include best practice soil handling and construction practices and reinstatement of affected areas.	Not Significant

Soils/Subsoils	Material Generation	Negative	Low / Negligible: Implementation of best practice measures for material generation mitigates effect. Measures include optimisation of site levels, reuse of materials and use of local quarries/waste receivers.	Not Significant
Limestone Bedrock	Material Generation	Negative	Low / Negligible: Implementation of best practice measures for material generation mitigates effect. Measures include optimisation of road levels, reuse of materials and use of local quarries/waste receivers.	Not Significant

Table 5.7 –Significance – Operational Phase Post Mitigation

Receptor	Potential Effect	Quality of Effects	Magnitude of Effect	Significance of Effects (post mitigation)
Soils/Subsoils	Loss of soil value	Negative	Low / Negligible: Implementation of best practice measures to protect soil value mitigates effect. Measures include design and constructed of detailed earthworks and landscaping proposals.	Not Significant
Soils/Subsoils	Pollution of soils/subsoils	Negative	Low / Negligible: Implementation of best practice measures to control chemical pollution mitigates effect. Measures include testing of drainage networks, oil interceptors and sustainable urban drainage systems.	Not Significant

5.8 "*WORST-CASE*" SCENARIO

5.8.1 Construction Phase

Under a 'worst case' scenario, the accidental release of fuel, oil, paints or other 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. If the materials were not recovered promptly, then the contaminants may contaminate the down gradient groundwater and surface water receptors causing a significant contamination event.

If the materials were not recovered promptly, then the contaminants may contaminate the down gradient groundwater and surface water receptors and the ground water could become poisonous, undrinkable, and unusable for general agricultural methods. The impacts from such an accident, would be negative and long-term. Given the likely small quantity in any spillage, the effects will be localised and imperceptible.

The contractor must adhere to the CEMP to ensure that all containment is kept in working order which should result in this worst case scenario being unlikely to occur.

5.8.2 Operational Phase

As noted from an operational viewpoint, the worst-case scenario would be an accidental spill of oils from cars or effluent from or a leak in the foul drainage system or damage to the oil separator serving the roads for the proposed scheme.

The worst case impact relates to the potential for oil or effluent entering the ground. There is a potential risk for local residents to come in contact with the contaminated ground. Due to the expected low volume of oil run-off, this impact would be negative, short term and imperceptible. However, the mitigation measures outlined above in section 5.6 should ensure that this does not occur.

Under a 'worst case' scenario, soil slippage due to poorly constructed earthworks site during the construction phase causes ground instability in the surrounding areas. If this were to occur the surrounding lands could become unstable adversely affecting any potential future development in the area.

5.9 MONITORING

5.9.1 Monitoring measures – construction

Proposed monitoring during the construction phase in relation to the geology, soil and land are as follows:

- Adherence to the Construction & Environmental Management Plan.
- Construction monitoring of the works (e.g. inspection of existing ground conditions on completion of cut to road sub-formation level in advance of placing capping material, stability of excavations etc.).
- Inspection of fuel / oil storage areas.
- Monitoring cleanliness of adjacent road network, implementation of dust suppression and provision of vehicle wheel wash facilities.
- Monitoring of contractor's stockpile management (e.g. protection of excavated material to be reused as fill)
- Monitoring sediment control measures (sediment retention ponds, surface water inlet protection etc.)

5.10 REINSTATEMENT

There are no reinstatement works considered to be necessary in this case.

5.10.1 Monitoring measures – operational phase

Proposed monitoring during the operational phase in relation to the geology, soil and land are as follows:

- Regular inspection and maintenance of the drainage system and oil interceptors.

5.11 DIFFICULTIES ENCOUNTERED

No particular difficulties were encountered in completing this section.

5.12 CUMULATIVE IMPACTS

Should any other developments be under construction or planned in the vicinity of the site, potential cumulative impacts are not anticipated once similar mitigation measures are implemented. A planning application for Clonburris Southern Link Street [CSLS] (ref SDZ20A/0021) is currently underway. The proposed development is adjacent to the CSLS and is intended to connect to roads and services provided as part of the CSLS development. Should this scheme be granted it is anticipated that construction phase of the Link Street may overlap with construction of the proposed development. The CSLS application included an EIAR as part of its planning application and has identified similar mitigation measures therefore no significant potential cumulative impacts are not anticipated.

Cumulative impacts to land and soil, during construction and demolition processes are associated with spillage and leakage of oils and fuels and disturbance of land. Individual impacts from the Proposed Development are generally considered to be negligible to medium impacts to a low to medium sensitivity environment and the significance of the impacts has been assessed as imperceptible to moderate. As outlined above, mitigation measures proposed to manage and control potential impacts during construction of the Proposed Development will reduce the magnitude and significance of impacts from these developments to a minimum.

Taking account of mitigation measures proposed during the construction of the Proposed Development the potential impact is considered to be a low impact to a low / medium sensitivity environment and the significance of the impacts has been assessed as slight.

6.0 WATER AND HYDROLOGY

6.1 INTRODUCTION

This chapter was prepared by DBFL Consulting Engineers and addresses all natural water bodies including surface freshwater (streams, bogs, ponds, rivers and lakes) and groundwater (shallow and deep) which may be affected by the proposed development. This chapter also addresses the issues of hydrogeology and the interaction between water bodies and the surface water drainage, foul water drainage, and water supply. This chapter of the EIAR comprises of an assessment of the likely effects of the proposed development on the surrounding surface water and hydrogeological environments, as well as identifying proposed mitigation measures to minimize any effects.

This chapter was prepared by Thomas Carrigg, Civil Engineer, DBFL Consulting Engineers & John Carr, Chartered Civil Engineer [B.Eng MSc CEng], DBFL Consulting Engineers.

6.2 METHODOLOGY

6.2.1 Guidelines

Key guidance documents considered as part of EIAR preparation are listed below.

Table 6.1 – Guidance Documents

Body	Guidance
Transport Infrastructure Ireland (TII)	Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA , 2009)
	Environmental Impact Assessment of National Road Schemes – A Practical Guide (NRA, 2008)
	Guidelines for The Crossing of Watercourses During the Construction of National Road Schemes (NRA, 2008)
	Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan (NRA 2007)
	Road Drainage and the Water Environment (DN-DNG-03065)
	Design of Earthworks Drainage, Network Drainage, Attenuation & Pollution Control (DN-DNG-03066)
	Drainage Design For National Road Schemes - Sustainable Drainage Options (RE-CPI-07001)
	Drainage Systems For National Roads [DN-DNG--03022]
Office of Public Works (OPW)	The Planning System and Flood Risk Management (OPW, 2009)
	OPW Flood Maps (http://www.floodinfo.ie/)
Environmental Protection Agency (EPA)	Guidelines On The Information To Be Contained In Environmental Impact Assessment Reports (Draft, EPA, August 2017)
	EPA Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) (EPA, Sept. 2003)
	Geo Portal (https://gis.epa.ie/EPAMaps/)
Department of Housing Planning and Local Government	River Basin Management Plan for Ireland 2018 – 2021
Inland Fisheries Ireland (IFI)	Guidelines on protection of fisheries during construction works in and adjacent to waters (Inland Fisheries Ireland 2016)
	The SUDS Manual (CIRIA C753)

Body	Guidance
Construction Industry Research and Information Association (CIRIA)	Control of Water Pollution from Construction Sites. Guidance for Consultants and Contractors (CIRIA C532)
	Control of Water Pollution from Linear Construction Sites (CIRIA C648)
	Development and Flood Risk – Guidance for the Construction Industry (CIRIA 624)
	The Control of Water Pollution from Construction Sites. Guidance for Consultants and Contractors (C532) (2001)
	Environmental Good Practice on Site Guide (C741) (2015)
Dublin City Council (DCC)	The Greater Dublin Strategic Drainage Study [GDSDS] (Dublin City Council et al., 2005)
South Dublin County Council (SDCC)	South Dublin County Council Planning (https://www.sdcc.ie/en/services/planning/)
Institute of Geologists Ireland (IGI)	Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements (2013)
Environment Agency (UK) EA	PPG1: General Guide to the Prevention of Pollution (UK Guidance Note)

6.2.2 Consultation

Baseline information was gathered from relevant statutory bodies as per Table 5.1

6.2.3 Desktop Study

In addition to the guidance documents listed in section 6.2.1 the desktop study involved collation and assessment of the relevant information from the following information sources:

- Review of existing topographical survey information.
- Review of the preliminary Ground Investigation carried out by Ground Investigations Ireland Limited between August and October 2019.
- Review of Irish Water wastewater (foul drainage) and watermain records
- Submission of a Pre-Connection Enquiry Application to Irish Water and consultation with Irish Water
- Review of South Dublin County Council surface water drainage records
- Consultation with South Dublin County Council.
- Review of information available on the Environmental Protection Agency (EPA) online mapping service.
- Review of information available on the Geological Survey of Ireland (GSI) online mapping service.
- Review of Office of Public Works (OPW) National Flood Hazard Mapping and Catchment Flood Risk Assessment and Management Studies (CFRAM Studies).
- Review of the Clonburris Strategic Development Zone (SDZ) Scheme and accompanying Strategic Flood Risk Assessment and Surface Water Strategy prepared by JBA Consulting.
- Review of Clonburris SDZ Surface Water Management Plan by DBFL Consulting Engineers
- Review of documents and drawings submitted as part of the Clonburris Southern Link Street under planning reference SDZ20A/0021 and approved on 16th August 2021

6.2.4 Assessment Methodology

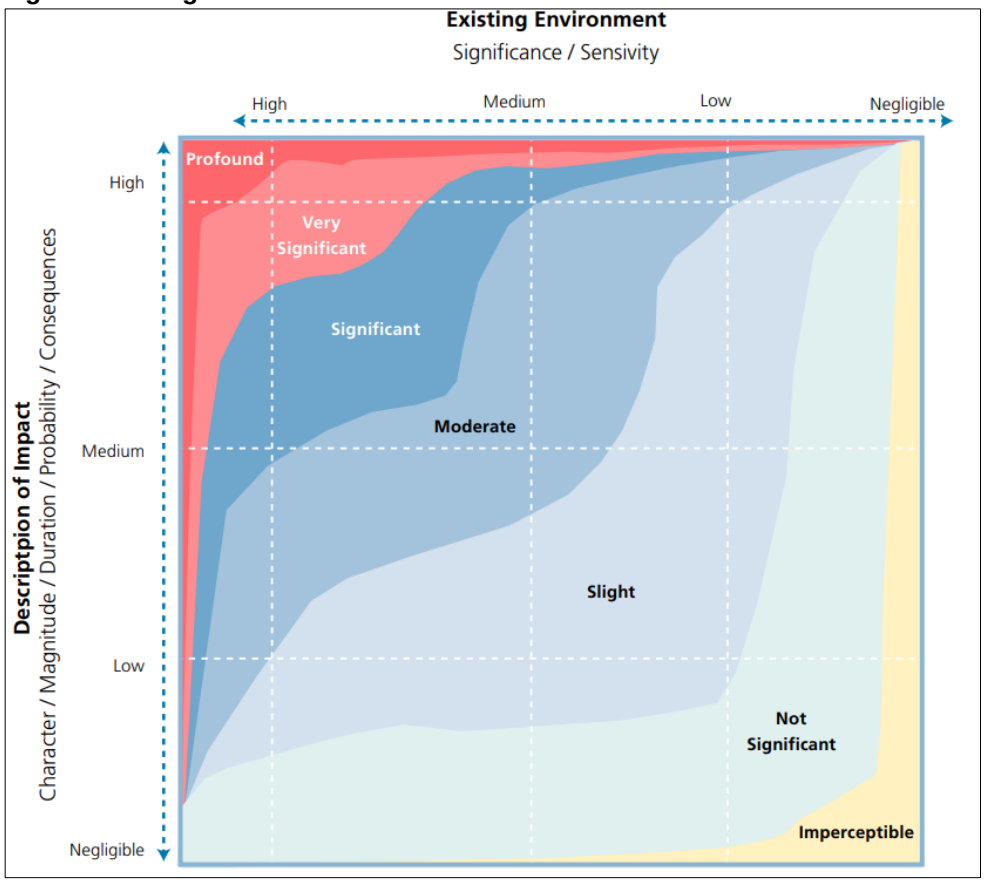
The assessment of the potential effect of the proposed development on the water environment was carried out according to best practice and the methodology specified in the available guidance documents. Various bodies including; Transport Infrastructure Ireland (TII, formally National Roads Authority); the Office of Public Works (OPW) and the Environmental Protection Agency (EPA) provide detailed guidance to the preparation and content required for an EIAR in relation to the water environment.

6.2.5 Application of Methodology

This chapter has prepared in accordance with the following best practice methodology; "Guidelines on The Information to Be Contained In Environmental Impact Assessment Reports (Draft August 2017)" & the TII "Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes".

The significance of the identified potential impacts is acknowledged by the combination of the sensitivity of the receptor and the magnitude of the potential impact. The generalised significance terms used in this assessment is in line with the EPA guidance reproduced below.

Figure 6.1 – Significant Effect Matrix



6.2.6 Study Area

The proposed development site is located in the Local Authority area of South Dublin County Council (SDCC) and is part of the Clonburris Strategic Development Zone (SDZ). The subject site for this development is situated in the southern area of the Clonburris SDZ lands to the south of the Kildare/Cork railway adjacent to the R113. The Grand Canal forms the southern boundary of the site.

The study area consists of the development site and all local and downstream hydrological/hydrogeological receptors.

6.3 RECEIVING ENVIRONMENT (BASELINE SCENARIO)

6.3.1 Topography & Land Use

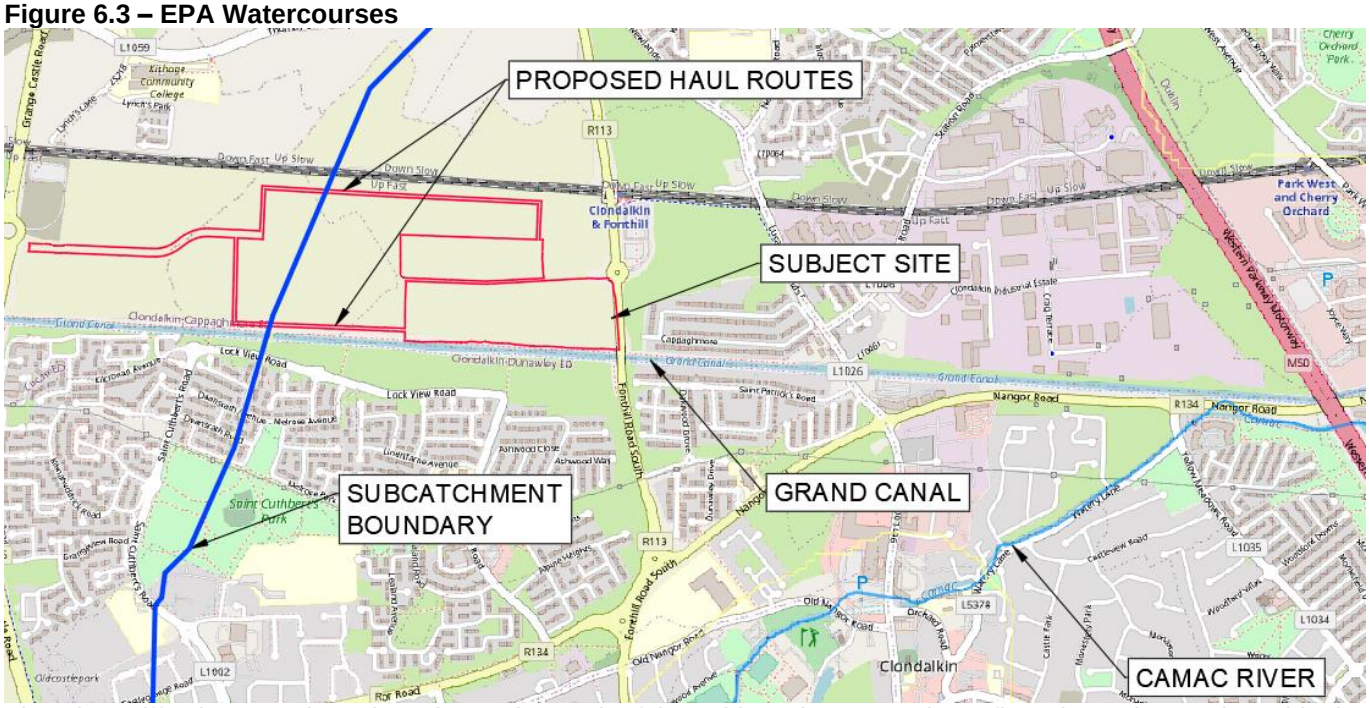
The existing site is predominately greenfield. Overall, the topography of the site is relatively flat. Much of the primary road network bounding the site is situated at a significantly higher level There is a slight fall with a gradient of approximately 0.5% from east to west over the majority of the site. A number of drainage ditches are located throughout the site. There are 2no. local high points on site. One located to the southwest and another to the east north of the future Link Road as shown in Figure 6.1.

Figure 6.2 – Site Topography

6.3.2 Existing Surface Water Features & Hydrology

The overall Clonburris SDZ is within the River Liffey Catchment. The study area affects two primary hydrological sub-catchments, the Griffeen & the Camac. The subject site for this development is located within the “Camac” sub catchment (*EPA Ref:* IE_EA_09C020500*)*. The Grand Canal is located to the south of the subject site. An extract from the EPA online mapping service with the catchment split shown is provided in Figure 6.3 below.

Figure 6.3 – EPA Watercourses

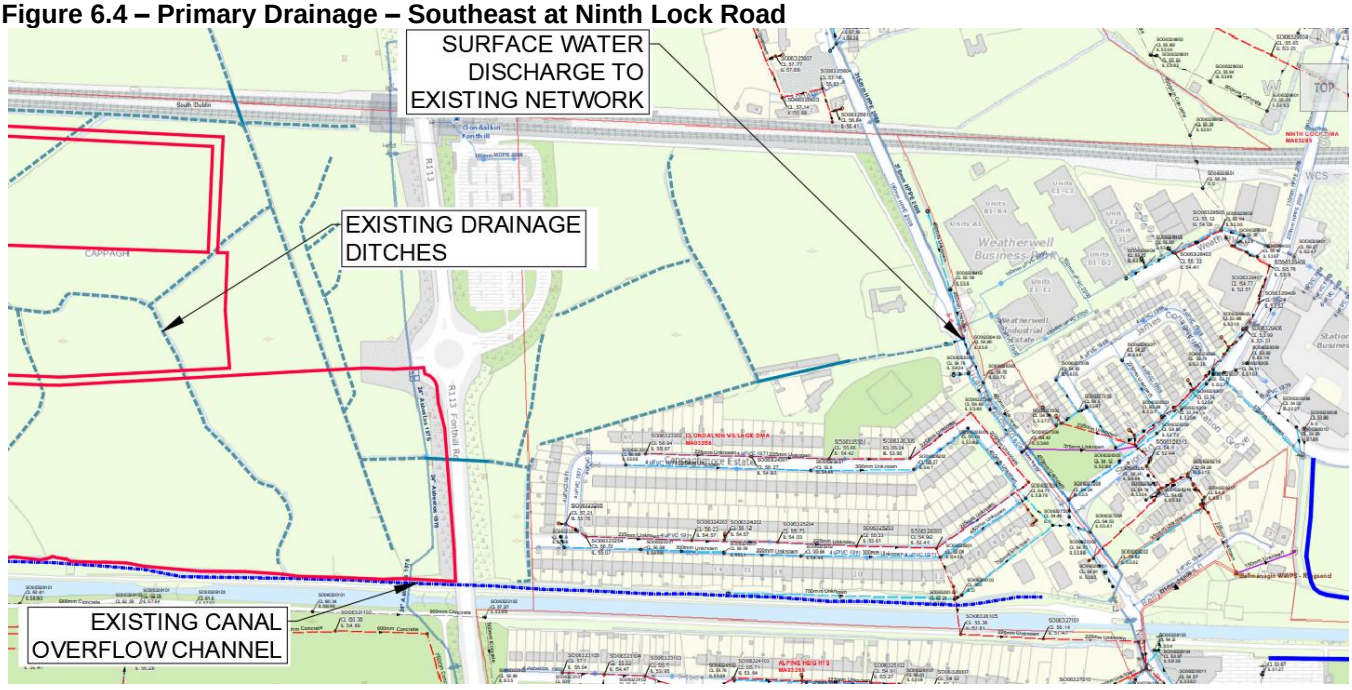


The River Liffey is approximately 3.8km to the north of the subject site. A canal overflow channel runs alongside the canal towpath north of the canal before re-entering the canal downstream, it does not appear that local drainage connects to this overflow channel.

There are a number of existing drainage ditches located throughout the site. These ditches are noted to generally have extremely flat or inconsistent gradients and are poorly maintained and appear to discharge beneath the R113 to the east.

The lands east of the R113 and south of the railway, drain to the south-east to existing stormwater networks on Ninth Lock Road, as per Figure 6.4 below. The drainage run continues south on Ninth Lock Road where it splits into parallel runs along Station Road which later merge and discharge to an open watercourse within the industrial estate and eventually discharge to the Camac River.

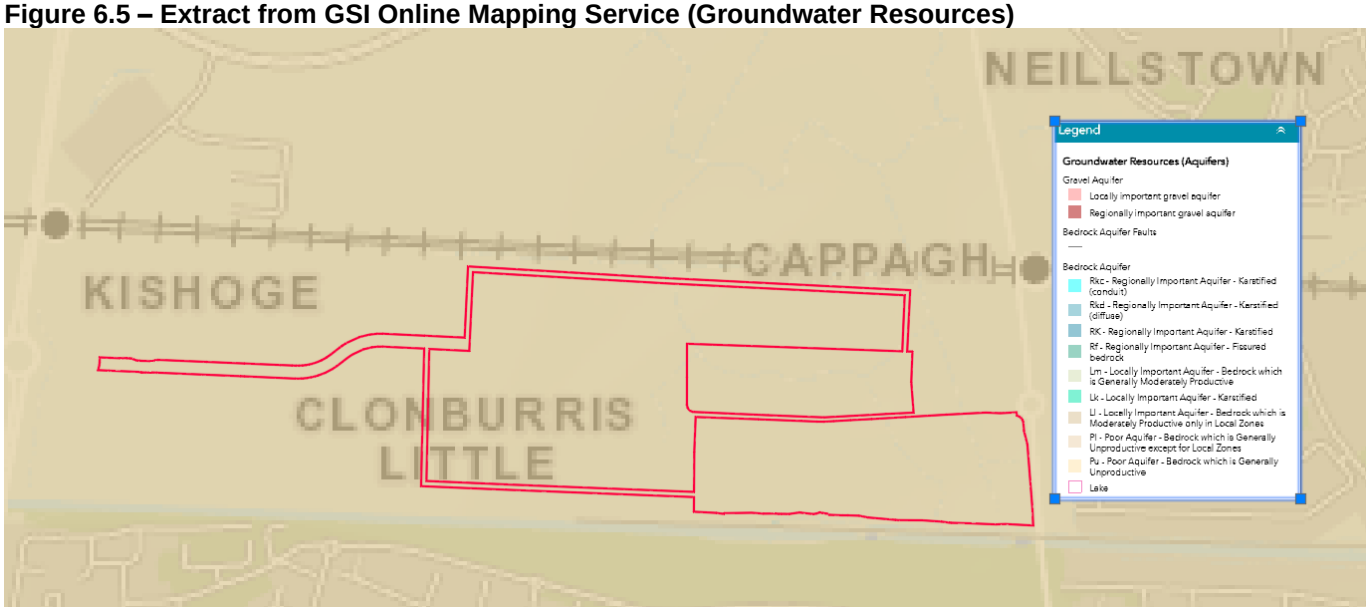
Figure 6.4 – Primary Drainage – Southeast at Ninth Lock Road



6.3.3 Regional Hydrogeology

Limestone bedrock underlies the entire site. The bedrock is described in geological mapping as a Dark Limestone & Shale and is part of a formation known as the Lucan Formation. The bedrock aquifer underlying the entire site is classified by Geological Survey Ireland as a *"Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones".*

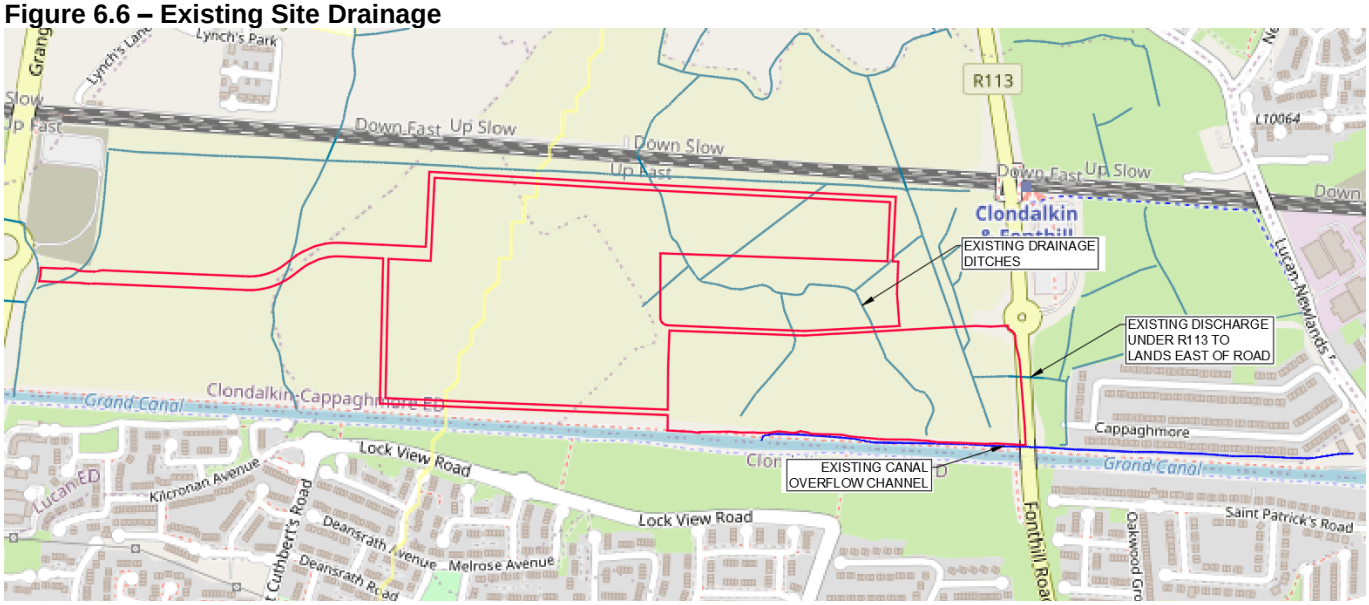
Figure 6.5 – Extract from GSI Online Mapping Service (Groundwater Resources)



6.3.4 Site Hydrology and Groundwater

The existing site is greenfield. It appears that surface water run-off drains via infiltration and to the existing drainage ditches dispersed across the site. As stated in Section 6.3.2 above, these appear to drain under the R113 to the lands east and into the drainage networks that discharge into to existing stormwater networks on Ninth Lock Road as shown in Figure 6.6.

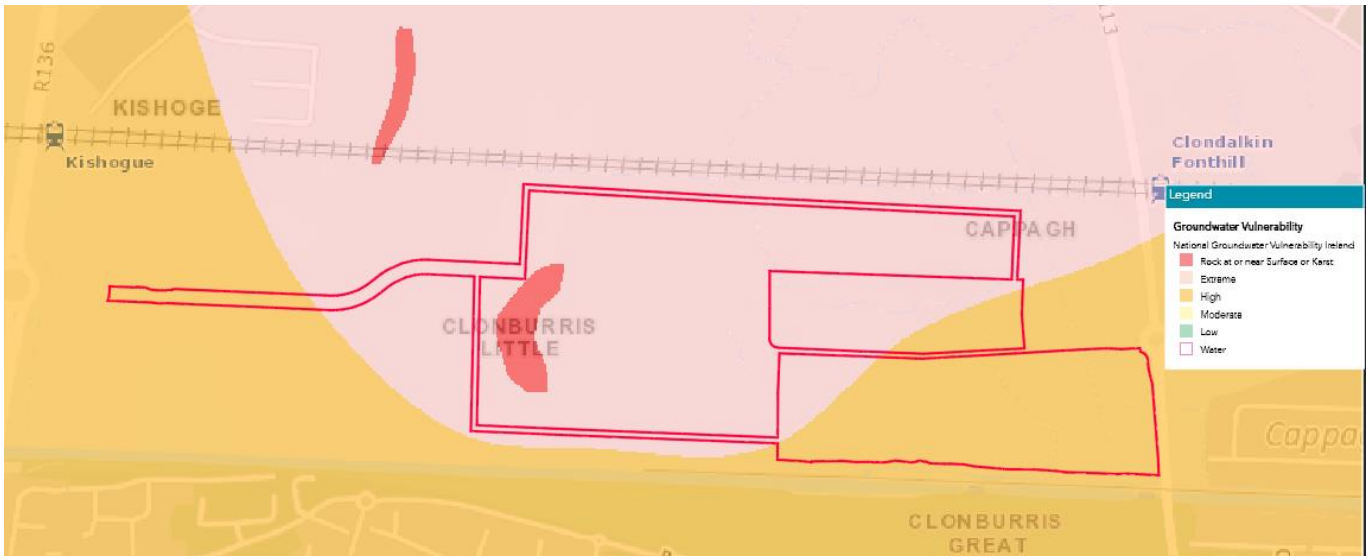
Figure 6.6 – Existing Site Drainage



Groundwater was encountered at a depth of 2m during the Preliminary Ground Investigations for the overall Clonburris SDZ. Groundwater Vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities. Groundwater vulnerability is classed as "High" or greater on the proposed site due to the shallow depth to bedrock. Areas of highest vulnerability correspond to areas of near surface bedrock and thin soil depths. It is noted that the

aquifer vulnerability classification does not consider the nature of the underlying 'receiving' aquifer with respect to resource value or significance of pollution occurring and is only a reflection on the protection afforded to the aquifer by overlying deposits.

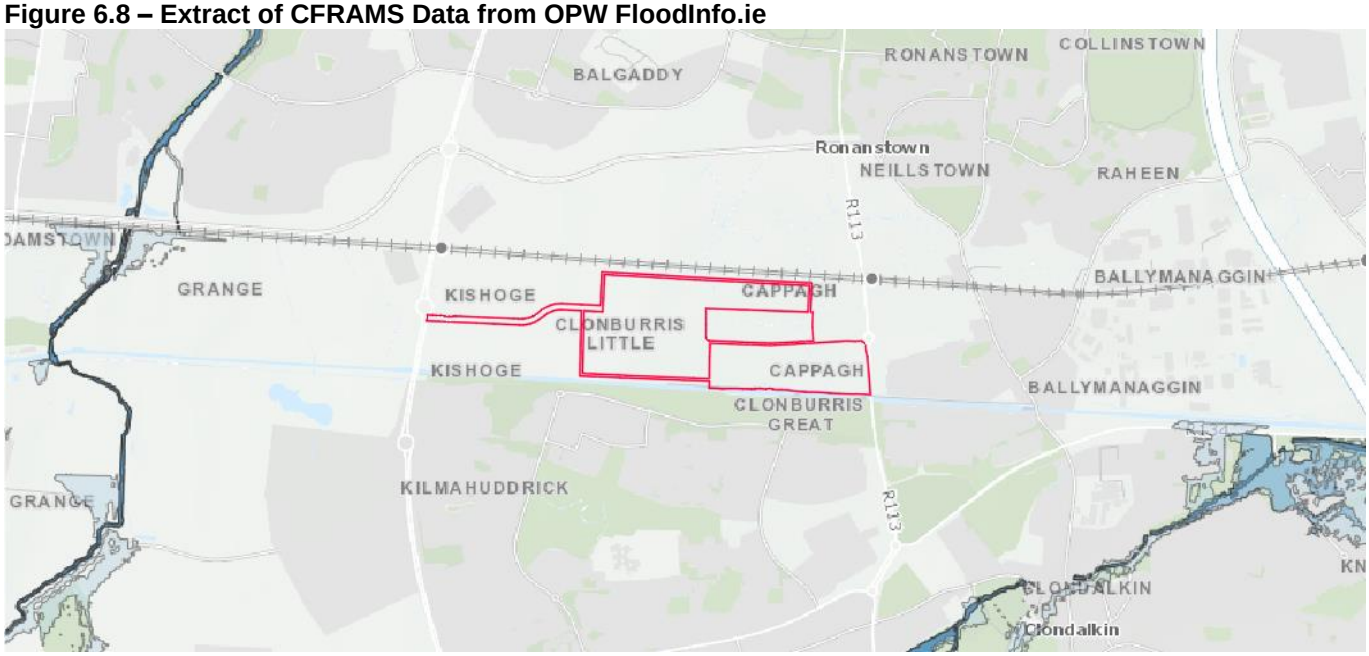
Figure 6.7 – Extract from GSI Online Mapping Service (Groundwater Vulnerability)



6.3.5 Flooding and Flood Risk

As part of the desktop study, historic and predicted flood risk mapping published by the OPW on the Flood Hazard Mapping Website http://www.floodinfo.ie/ was reviewed.

Figure 6.8 – Extract of CFRAMS Data from OPW FloodInfo.ie



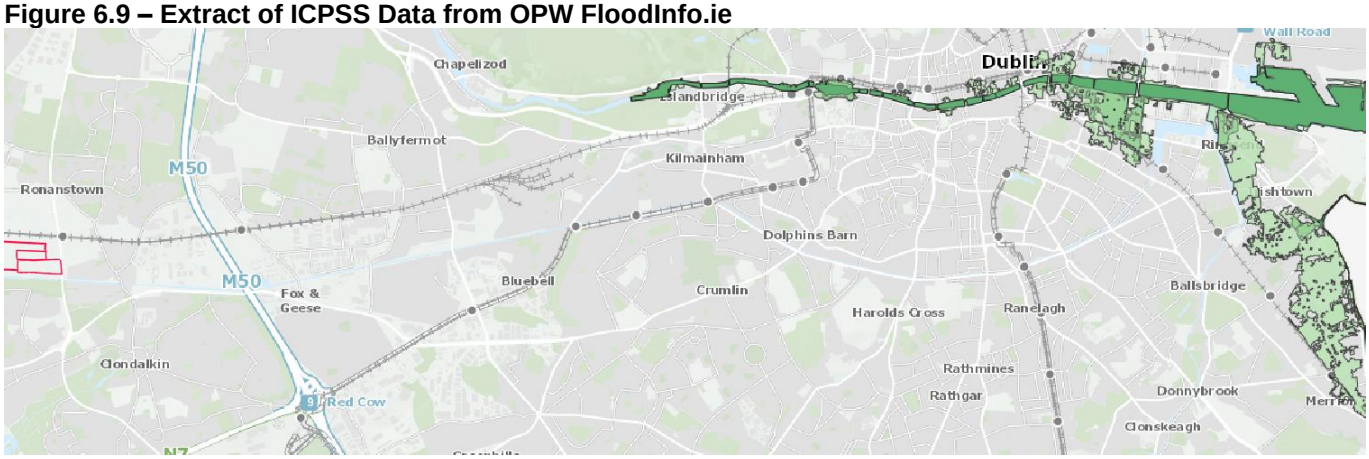
Historical flood maps/data indicate there are no recorded flood events within the proposed site boundary. There are to recorded recurring flood events within 1km of the proposed site. The first is a recurring flood event at the Cappaghmore Culvert located approximately 500m to the east of the site. The Second is located at the Beech Row Bungalows approximately 380m to the east of the site.

The Eastern CFRAM (Catchment Flood Risk Assessment and Management) study details the predicted risk for a variety of fluvial and coastal flood scenarios. The mapping does not include the watercourse reaches affected by the

proposed scheme and only maps downstream flooding. The proposed development is therefore outside of the Q100 and Q1000 flood extents and is therefore in within Flood Zone C (low risk of flooding).

The OPW undertook an Irish Coastal Protection Strategy Study (ICPSS) which produced coastal/tidal flood extents maps for the Irish coastline for a 0.5% AEP tidal flood level. This map indicates that the Site is far outside the extents of the coastal/tidal flood zone.

Figure 6.9 – Extract of ICPSS Data from OPW FloodInfo.ie



6.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

6.4.1 Topography & Land Use

The proposed development comprises a mixed-use residential development comprising of houses, duplexes, and apartments with a community/civic building and associated infrastructure. Haul roads are also being proposed to provide access for construction vehicles. Refer to Chapter 2 for detailed project description

The site layout has been designed to minimise impact on the existing topography. The vertical and horizontal alignment of the roads and footpaths has been optimized with the finished floor levels of the proposed buildings seeking to minimize cut and fill requirements and seek to obtain a balance of cut and fill materials (within constraints of road and building design criteria and landscape consideration). The finished development will allow for over ground flood routes in the event of storms exceeding the 100-year storm.

6.4.2 Existing Surface Water Features & Hydrology

Existing surface water run-off generated on site discharges towards the east via the existing drainage ditches. The function of these ditches by the new surface water network for the development. Surface water run-off from the new roads, footpaths and buildings will be collected in a new gravity network within the roads and footpaths of the new development.

The Clonburris SDZ Planning Scheme included a pre-construction requirement to prepare a Surface Water Management Plan (SWMP) to implement the SDZ Surface Water Strategy for the overall SDZ lands. DBFL prepared this SWMP to provide robust, effective and economic measures for the management of surface water quality and quantity in the SDZ. This plan has been agreed with South Dublin County Council's Drainage Department.

The proposed surface water drainage strategy for this planning application has been developed in accordance with the agreed measures in this SWMP.

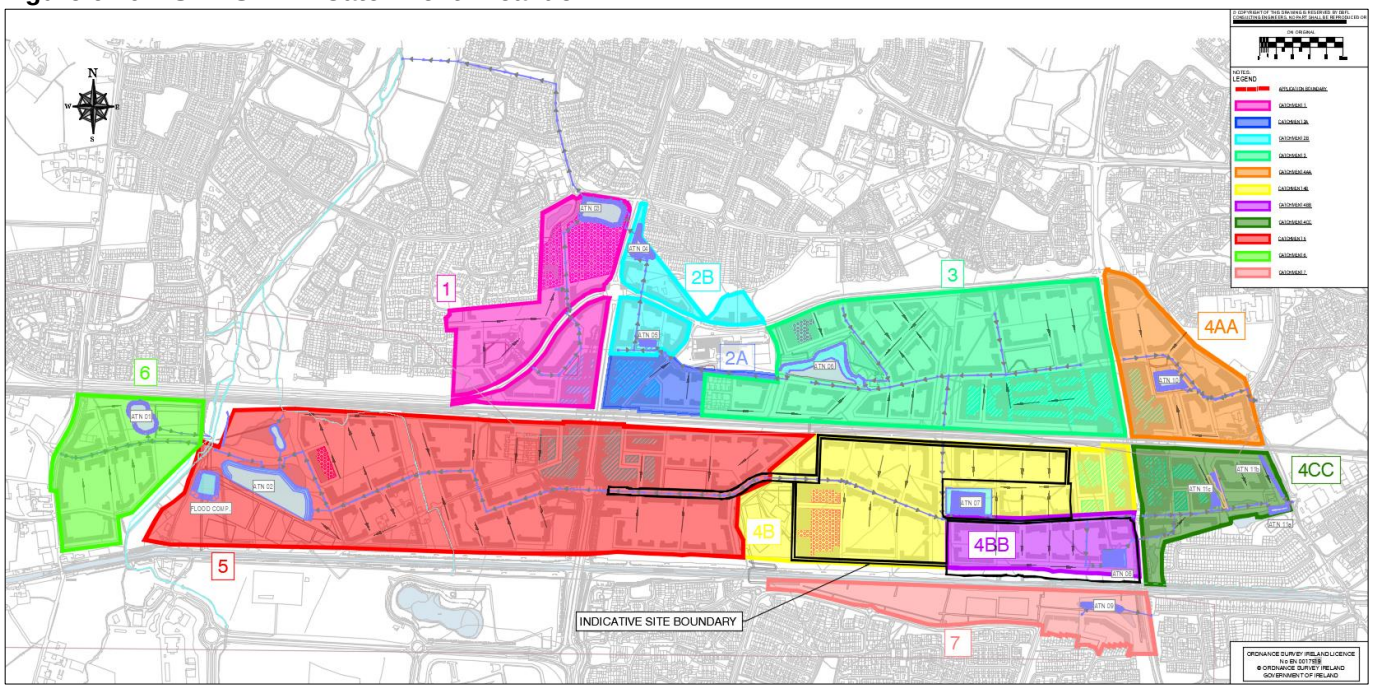
The key objectives of the drainage strategy are as follows:

- Provide adequate infrastructure to discharge surface water generated on site to the trunk surface water sewer constructed as part of the greater SDZ.
- Minimise the risk of flooding of the development and avoid a flood risk increase upstream or downstream of the site.
- Provide an allowance for the effects of climate change.

- Implement a treatment train of Sustainable Drainage Systems (SuDS) measures within the drainage network to improve water quality prior to discharge to receiving watercourses.
- Establish the key infrastructural requirements required to implement the surface water management measures set out by the SWMP.

The Surface Water Management Plan intends for the proposed development to discharge east under the R113 via a new drainage network within a new gravity sewer to be constructed as part of the Clonburris Southern Link Street (CSLS), subject to a planning application SDZ20A/0021 granted on the 16th of August 2021. Trunk surface water sewers and regional attenuation are to be constructed as part of the CSLS to serve all lands in the southern portion of the SDZ including the proposed development. The canal overflow channel to the south of the proposed site is to be maintained. No surface water run-off on site will discharge to this channel.

Figure 6.10 – SDZ SWMP Catchment Breakdown



Refer to the Infrastructure Design Report for additional details on proposed drainage.

6.4.3 Regional Hydrogeology

The Preliminary Ground Investigations carried out as part of the overall Clonburris SDZ indicates that the bedrock in the area is quite shallow. Foundations for houses are anticipated to be shallow strip foundations and foundations for apartment buildings are expected to consist of pad excavations for columns which would be founded on the shallow bedrock. It is not anticipated these works would have perceptible impact on regional Hydrogeology.

6.4.4 Site Hydrology and Groundwater

The Preliminary Ground Investigations carried out as part of the overall Clonburris SDZ indicates that the groundwater level is approximately 2m below the ground. Therefore, it is possible that there may be infiltration of groundwater into excavations on site. Short term dewatering of excavations may be required.

6.4.5 Flooding and Flood Risk

As noted in Section 6.4.2 above, the runoff rates from new infrastructure will likely exceed greenfield rates, therefore regional attenuation and site level SuDS features will be required to manage runoff rates as per the measures in the SWMP. Surface water generated from the new roads, footpaths and buildings will discharge to the trunk surface water network within the Southern Link Street. Surface water runoff from the subject site will be attenuated to greenfield runoff rates (Qbar) through the attenuation systems installed as part of the CSLS. The surface water

infrastructure for this development has been designed with an allowance for additional flows from future developments and a 20% increase in rainfall intensities due to climate change.

6.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

6.5.1 Construction Phase

This section identifies a list of potential and significant effects to the water environment within the subject site caused by the construction of the proposed development in the absence of mitigation measures.

Potential effects that may arise during the construction phase include:

- Contamination of surface water runoff to local watercourses due to weathering and erosion of the surface soils during construction activities.
- Improper discharge of foul drainage from contractor's compound to local watercourses.
- Cross contamination of potable water supply to construction compound and associated risk to human health.
- Surface water runoff to local watercourses during the construction phase may contain increased silt levels (e.g. runoff across areas stripped of topsoil) or become polluted by construction activities.
- Discharge of rainwater pumped from excavations.
- Accidental spills and leaks associated with storage of oils and fuels, leaks from construction machinery and spillage during refueling and maintenance contaminating the surrounding surface water and local hydrogeological environments.
- Concrete runoff, particularly discharge of wash water from concrete trucks.
- Discharge of vehicle wheel wash water to local watercourses.
- Infiltration of groundwater into excavations.
- Construction of culverts can disturb stream sediments and increase turbidity locally within the watercourse.
- Concrete, bentonite and other cement-based products would be used during construction activities. These materials are highly alkaline and corrosive and can have significant negative effects on local watercourses surface water quality if improperly handled. Cement based products can also be detrimental to waterbody environs by altering the waters pH.
- Changes in surfacing caused by vegetation stripping or gravel placement may also affect runoff or rates in local watercourses.
- Changes in surfacing or drainage approach may affect groundwater recharge patterns.

6.5.2 Operational Phase

Potential operational phase effects on water are listed below:

- Increased impermeable surface area may potentially increase surface water runoff to local watercourses.
- Accidental hydrocarbon leaks on the proposed road and subsequent discharge into local drainage networks.
- Contamination of surface water from foul sewer leaks.

6.5.3 Risks to Human Health

There are not understood to be any potable abstractions from surface water or groundwater downstream of the site. Therefore, there is not considered to be any significant risk to human health associated with impact to water receptors.

6.5.4 "Do-Nothing" Scenario

There are no predicted effects to the water environment should the proposed development not proceed.

6.6 AVOIDANCE, REMEDIAL & MITIGATION MEASURES

6.6.1 Incorporated Design Mitigation

The project layout has evolved in order that the design avoids conflict with the water environment. Design evolution to minimise environmental impact has been prioritised throughout the various design stages to prevent significant adverse impacts on the local water environment/hydrology. These measures will seek to avoid or minimise potential

effects in the main through the implementation of best practice construction methods and adherence to all relevant legislation.

All new foul drainage lines will be constructed in accordance with Irish Water Standards. Foul sewers will be pressure tested and will be subject to a CCTV survey in order to identify any possible defects prior to being made operational. The design of proposed site levels (roads, buildings etc.) has been carried out in such a way as to replicate existing surface gradients where possible, therefore replicating existing overland flow paths, and not concentrating additional surface water flow in a particular location.

Surface water runoff from the site will be attenuated to the greenfield runoff rate as part of the greater SDZ as outlined in the SWMP prepared for the overall Clonburris SDZ. Surface water discharge rates will be controlled by a Hydrobrake flow control device in conjunction with attenuation storage.

SuDS features such as swales and filter drains to provide additional storage and promote infiltration of and treatment of surface water run-off have been provided in landscaped areas.

All new surface water drainage on site will be pressure tested and will have a CCTV survey carried out prior to being made operational. The site is attenuated to mimic the greenfield scenario as part of the overall Clonburris SDZ.

Due to the inter-relationship between surface water and soils, hydrogeology and ecology the mitigation measures discussed will are also considered applicable to these sections and this chapter should be read in conjunction with Chapter 4 Biodiversity and Chapter 5 Land and Soils.

6.6.2 Construction Phase Mitigation

The nature of the proposed development dictates that the greatest potential impact on surface waters associated with the development will be in the construction phase. In order to prevent / minimise potential impacts, it is necessary to devise mitigation measures to be adopted as part of the construction works on site.

Erosion and Sediment Control

The following measures are proposed for erosion and sediment control:

- Measures will be implemented to capture and treat sediment laden surface water runoff (e.g. sediment retention ponds, surface water inlet protection, fencing and signage around specific exclusion zones and earth bunding adjacent to open drainage ditches) prior to discharge of surface water at a controlled rate.
- Groundwater pumped from excavations will be directed to on-site settlement ponds.
- Discharge from any vehicle wheel wash areas will be directed to on-site settlement ponds.
- On-site settlement ponds will include geotextile liners and riprapped inlets and outlets to prevent scour and erosion.
- Surface water discharge points during the construction phase will be agreed with South Dublin County Council's Environment Section prior to commencing works on site
- Weather conditions and seasonal weather variations will be taken account of when planning stripping of topsoil and excavations, with an objective of minimizing soil erosion.

Accidental Spills and Leaks

The following measures are proposed for accidental spills and leaks:

- In order to mitigate against spillages contaminating underlying soils and geology, all oils, fuels, paints and other chemicals will be stored in a secure bunded hardstand area.
- Refuelling and servicing of construction machinery will take place in a designated hardstand area which is also remote from any surface water inlets (when not possible to carry out such activities off site).
- An Emergency Response Plan detailing the procedures to be undertaken in the event of a spillage of chemical, fuel or hazardous wastes will be prepared prior to construction.
- Pouring of concrete including wash down and washout of concrete from delivery vehicles will be controlled in an appropriate facility to prevent contamination.
- Regular samples will be taken from soils affected by earthworks which shall be analysed for contamination.

Human Health

An Emergency Response Plan prepared by the contractor will contain measures to ensure that accidental spillages will be appropriately dealt with, which includes a response procedure to deal with any accidental pollution events. Spillage kits will be available and construction staff will be familiar with the emergency procedures and use of the equipment.

6.6.3 Operational Phase

The operational phase of this development is unlikely to have any significant adverse impacts on the local water environment/hydrology due to the environmental design considerations incorporated into the development. These measures will seek to avoid or minimise potential effects in the main through the implementation of best practice construction methods and adherence to all relevant legislation.

6.7 PREDICTED IMPACT FOLLOWING MITIGATION (RESIDUAL IMPACT)

6.7.1 Impact on Climate

It is considered that by implementing the proposed construction and operational phase mitigation measures above, that the significance of the identified impacts will be reduce to a “Not significant” residual impact on the identified hydrological/ hydrogeological receptors.

6.8 WORST CASE SCENARIO

6.8.1 Construction Phase

Under a ‘worst case’ scenario, the accidental release of fuel, oil, paints or other 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 groundwater or flow overland and contaminate surface water receptors.

6.8.2 Operational Phase

Worst case scenarios envisioned are extreme occurrences of the potential effects identified above in conjunction with failure of mitigation measures during the operational phase including:

- Significant contamination event
- Flood Event Flooding due to extreme event or unsuitable drainage measures

Given the scale of the site and relatively standard nature of the works involved the likelihood of a “worst case” event is extremely low.

6.9 MONITORING

6.9.1 Construction Phase

Proposed monitoring during the construction phase in relation to the water environment are as follows:

- Adherence to the Construction & Environmental Management Plan.
- Construction monitoring of the works (e.g. inspection of drainage installation etc, inspections of works adjacent to existing watercourses).
- Monitoring in relation to the surface water. Monitoring sediment control measures (sediment retention ponds, surface water inlet protection etc.).
- Monitoring of discharge from sediment retention ponds (e.g. pH, sediment content).

6.9.2 Operational Phase

Proposed monitoring during the operational phase in relation to the water environment are as follows:

- Regular inspection and maintenance of the drainage and attenuation systems.

6.10 CUMULATIVE IMPACTS

The proposed surface water drainage infrastructure has been designed in accordance with the relevant guidelines. Any other developments currently under construction or other committed development in the vicinity of the site would

have to be similarly designed in relation to permitted surface water discharge, surface water attenuation and SuDS. All proposed developments in the area are to follow the Surface Water Management Plan for the Clonburris SDZ which accounts for the wider development of the SDZ. Therefore no potential cumulative impacts are anticipated in relation to surface water drainage and flooding.

6.11 DIFFICULTIES ENCOUNTERED

No significant difficulties were encountered during the assessment.

7.0 AIR QUALITY AND CLIMATE

7.1 INTRODUCTION

Byrne Environmental Consulting Ltd have assessed the potential air quality and climatic impacts that the proposed residential development at Clonburris, County Dublin may have on the receiving environment during the construction and operational phases of the project. The assessment includes a comprehensive description of the existing air quality in the vicinity of the subject site; a description and assessment of how construction activities and the operation of the development may impact existing air quality; the mitigation measures that will be implemented to control and minimise the impact that the development may have on local ambient air quality and reduce the impact on the local micro climate; and, finally, a description as to how the development will be constructed and operated in an environmentally sustainable manner.

The development will consist of the construction of a residential development of 569 no. dwellings, located to the north and south of the permitted Clonburris Southern Link Street (under SDZ20A/0021) on an overall site of c. 17.02 hectares in a mixture of semi-detached, terraced houses, duplexes and apartments comprising (248 no. apartments, 173 no. houses and 148 no. duplex units), a creche/community facility (c. 547 sq. m), shared offices (c. 626 sq. m).

Ian Byrne MSc. Environmental Protection, Dip Environmental & Planning Law, is the Principal Environmental Consultant of Byrne Environmental Consulting Ltd and prepared all aspects of this EIAR Chapter. Ian Byrne has over 25 years-experience in the monitoring and assessment of the air quality and climatic impacts that residential, commercial and industrial developments may have on the receiving environment.

7.2 STUDY METHODOLOGY

The general assessment methodology of the potential impact of the proposed development on has been conducted in accordance with:

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (DoHPLG, August 2018).
- 2017 EPA Guidelines on information to be contained in Environmental Impact Assessment Reports.
- Guidelines on Information to be Contained in an Environmental Impact Statement (EPA 2002).
- Advice Notes on Current Practice (in preparation of Environmental Impact Statements) (EPA 2003).
- Advice Notes For Preparing Environmental Impact Statements Draft' (EPA September 2015)
- Environmental Protection Agency, 2015. Revised Guidelines on the Information to be Contained in Environmental Impact Statements.
- The European Commission's "Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment" European Commission (2013)
- Planning and Development Regulations 2001, as amended, in particular by the European Union (Planning & Development)(Environmental Impact Assessment) Regulations 2018 (SI No. 296 of 2018).
- Environmental Impact Assessment of Projects – Guidance on the preparation of the EIAR, European Commission, 2017.
- Climate Action and Low Carbon Development Act 2015
- The Climate Action Plan 2019

7.2.1 Air Quality Assessment Methodology

7.2.1.1 Receiving Environment (baseline Scenario)

The existing ambient air quality in the vicinity of the site has been characterised with information obtained from a number of sources as follows:

- Environmental Protection Agency's Annual Air Quality in Ireland 2019 Report (Published September 2020);

The ambient air quality data collected and reviewed for the purpose of this study focused on the principal substances (dust, vehicle exhaust emissions and boiler emissions) which may be released from the site during the construction and operation phases and which may exert an influence on local air quality.

7.2.2 Impact Assessment Methodology

7.2.2.1 Legislation and guidance

Air quality standards and guidelines are available from a number of sources. The guidelines and standards referenced in this report include those from Ireland and the European Union.

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 (Ref Table 7.1).

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 National Air Quality Standards Regulations 2011 (S.I No. 180 of 2011), which implement European Commission Directive 2008/50/EC which has set limit values for the pollutants SO2, NO2, PM10, benzene and CO. Council Directive 2008/50/EC replaces the previous Air Quality Framework Directive (96/62/EC) and its subsequent daughter directives (including 1999/30/EC and 2000/69/EC). Provisions are also made for the inclusion of new ambient limit values relating to $PM_{2.5.}$ The European 2008/50/EC Clean Air for Europe (CAFÉ) Directive is the current air quality directive for Europe which supersedes the European Directives 1999/30/EC and 2000/69/EC. The Directive is implemented by the Air Quality Standards Regulations 2011 which replace the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), the Ozone in Ambient Air Regulations 2004 (S.I. No. 53 of 2004) and S.I. No. 33 of 1999.

In order to assess a wider range of air pollutants in the development area it is necessary to review current air quality monitoring data from published sources such as the most recent EPA's 2019 Annual report entitled Air Quality in Ireland. This EPA report provides detailed monitoring data collected from a number of monitoring locations throughout Ireland on an annual basis to assess national compliance with National Air Quality Regulations. Given the location of the site in Dublin it is characterised as a Zone A area as defined by the EPA.

EU legislation on air quality requires that Member States divide their territory into zones for the assessment and management of air quality. The zones in place in Ireland in 2019 are as follows:

- Zone A is the Dublin conurbation,
- Zone B is the Cork conurbation
- Zone C comprising 23 large towns in Ireland with a population >15,000.
- Zone D is the remaining area of Ireland.

The air quality in each zone is assessed and classified with respect to upper and lower assessment thresholds based on measurements over the previous five years. Upper and lower assessment thresholds are prescribed in the legislation for each pollutant. The number of monitoring locations required is dependent on population size and whether ambient air quality concentrations exceed the upper assessment threshold, are between the upper and lower assessment thresholds, or are below the lower assessment threshold. A summary of the EPA's Annual report entitled Air Quality in Ireland 2019 is detailed below in Table 7.2.

Table 7.1 – Air Quality Standards Regulations 2011 (based on EU Council Directive 2008/50/EC)

Pollutant	Regulation	Limit Criteria	Tolerance	Limit Value
Nitrogen Dioxide	2008/50/EC	Hourly limit for the protection of human health – not to be exceeded more than 18 times/year Annual limit for the protection of human health Annual limit for the protection of vegetation	40% until 2003 reducing linearly to 0% by 2010 40% until 2003 reducing linearly to 0% by 2010 None	200 µg/m3 40 µg/m3 400 µg/m3 NO & NO2
Lead	2008/50/EC	Annual limit for the protection of human health	100%	0.5 µg/m3
Sulphur Dioxide	2008/50/EC	Hourly limit for protection of human health – not to be exceeded more than 24 times/year Daily limit for protection of human health – not to be exceeded more than 3 times/year Annual and Winter limit for the protection of ecosystems	150 µg/m3 None None	350 µg/m3 125 µg/m3 20 µg/m3
Particulate Matter PM10	2008/50/EC	24-hour limit for protection of human health – not to be exceeded more than 35 times/year Annual limit for the protection of human health	50% 20%	50 µg/m3 40 µg/m3
Particulate Matter PM2.5 Stage 1	2008/50/EC	Annual limit for the protection of human health	20% from June 2008. Decreasing linearly to 0% by 2015	25 µg/m3
Particulate Matter PM2.5 Stage 2	2008/50/EC	Annual limit for the protection of human health	None	20 µg/m3
Benzene	2008/50/EC	Annual limit for the protection of human health	20% until 2006. Decreasing linearly to 0% by 2010	5 µg/m3
Carbon Monoxide	2008/50/EC	8-hour limit (on a rolling basis) for protection of human health	60%	10 mg/m3
Dust Deposition	German TA Luft Air Quality Standard Note 1	30 Day Average	None	350 mg/m2/day

Note 1 Dust levels in urban atmospheres can be influenced by industrial activities and transport sources. There are currently no national or **European** Union air quality standards with which these levels of dust deposition can be compared. However, a figure of 350 mg/m^2-day (as measured using Bergerhoff type dust deposit gauges as per German Standard Method for determination of dust deposition rate, *VDI 2129*) is commonly applied to ensure that no nuisance effects will result from industrial or construction activities.

Table 7.2 – EPA 2019 Assessment Zone Classification

Pollutant	EPA 2019 Assessment Classification
NO_2	
Zone A & B	Above lower assessment threshold
Zone C & D	Below lower assessment threshold
SO_2	
Zone A & B	Below lower assessment threshold

Pollutant	EPA 2019 Assessment Classification
Zone C & D	Below lower assessment threshold
CO	
Zone A & B	Below lower assessment threshold
Zone C & D	Below lower assessment threshold
Ozone	
Zone A & B	Below long term objective
Zone C & D	Above long term objective
PM_{10}	
Zone A & B & C	Above lower assessment threshold
Zone D	Below lower assessment threshold
$PM_{2.5}$	
Zone A & B	Below lower assessment threshold
Zone C & D	Above lower assessment threshold
Benzene	
Zone A & B	Below lower assessment threshold
Zone C & D	Below lower assessment threshold
Heavy Metals (As, Ni, Cd, Pb)	
Zone A & B	Below lower assessment threshold
Zone C & D	Below lower assessment threshold
Poly Aromatic Hydrocarbons (PAH)	
Zone A & C & D	Above lower assessment threshold
Zone B	Above upper assessment threshold

7.2.3 Construction Impact Assessment Criteria

The Institute of Air Quality Management – Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2014) classifies demolition and construction sites according to the risk of impacts and to identify mitigation measures appropriate to the risk. The main air quality impacts that may arise are:

- Dust Deposition resulting in the soiling of surfaces
- Visible dust plumes, which are evidence of dust emissions
- Elevated PM_{10} concentrations as a result of dust generating activities on site
- Increase in airborne particles and NO_2 from diesel fuelled site vehicles and plant

The risk assessment considers the following site activities and their associated potential impacts:

- Earthworks;
- Construction works;
- Trackout (vehicle movements).

The risk assessment considers the following dust related impacts:

- Annoyance due to dust soiling;
- The risk to health from exposure to PM10;
- Harm to Ecological receptors.

The magnitude of the potential dust emission requires the scale of the works to be classified as Small, Medium or Large which are defined as follows:

Earthworks

Large Site Area >10,000m2

potentially dusty soil prone to suspension (eg clays)
>10 earth moving vehicles operating simultaneously

MediumSite Area 2500m2 – 10,000m2

moderately dusty soil (eg silts)
5- 10 earth moving vehicles operating simultaneously

Small Site Area <2500m2
Large grain size (eg sands)

<5 earth moving vehicles operating simultaneously

Site Area Large Volume >10,000m2

Table 7.3 – Risk of Dust Impacts Earthworks

Sensitivity of Area	Dust Emission Magnitude		
	Large	**Medium**	**Small**
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	**Medium Risk**	Low Risk
Low	Low Risk	Low Risk	Low Risk

7.2.3.1 Construction Works

Large Total Building Volume >100,000m^3
MediumTotal Building Volume 25,000m^3 - 100,000m^3
Small Total Building Volume <25,000m^3

Building Volume *Medium Volume 24,000 - 100,000m^2*

Table 7.4 – Risk of Dust Impacts - Construction

Sensitivity of Area	Dust Emission Magnitude		
	Large	**Medium**	**Small**
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	**Medium Risk**	Low Risk
Low	Low Risk	Low Risk	Low Risk

Trackout

Large >50 HGV outward movements per day
of potentially dusty clays on unsealed road >100m
Medium 10 - 50 HGV outward movements per day
of potentially dusty clays on unsealed road 50 - 100m
Small <10 HGV outward movements per day
of potentially dusty clays on unsealed road >50m

Trackout Movements *Large Volume <50 HGV/day*

Table 7.5 – Risk of Dust Impacts - Trackout

Sensitivity of Area	Dust Emission Magnitude		
	Large	**Medium**	**Small**
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	**Low Risk**	Low Risk

The dust risk assessment for soiling, health and ecology completed for each of the four aspects of dust emissions has been determined from the characteristics of the development as detailed above. Table 7.7 presents the dust risk for each aspect.

Table 7.6 – Dust Risk Assessment to Define Site-Specific Mitigation Measures

Sensitivity of Area High	Dust Emission Magnitude			
	Demolition	Earthworks	Construction	Trackout
Soiling	NA	Medium Risk	Low Risk	High Risk
Human Health	NA	Medium Risk	Low Risk	MediumRisk
Ecology	NA	Medium Risk	Low Risk	Medium Risk

The German TA-Luft standard for dust deposition (non-hazardous dust) (German VDI, 2002) sets a maximum permissible emission level for dust deposition of 350 mg/(m2*day) averaged over a one month period at any receptors outside the site boundary. Recommendations from the Department of the Environment, Health & Local Government (DOEHLG, 2004) apply the Bergerhoff limit value of 350 mg/(m2*day) to the site boundary of quarries. This limit value can also be implemented with regard to potential dust impacts from construction of the proposed development. In relation to construction related traffic, air quality significance criteria are assessed on the basis of compliance with the appropriate standards air limit values. The Air Quality Standards Regulations 2011 replace the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), the Ozone in Ambient Air Regulations 2004 (S.I. No. 53 of 2004) and S.I. No. 33 of 1999.

7.2.3.2 Ecological Assessment

For routes that pass within 2 km of a designated area of conservation (either Irish or European designation) the TII requires consultation with an Ecologist (2011). However, the TII guidance (2011) states that in practice the potential for impact to an ecological site is highest within 200 m of the proposed scheme and when significant changes in AADT (>5%) occur.

Transport Infrastructure Ireland's Guidelines for Assessment of Ecological Impacts of National Road Schemes (2009) and Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities (DEHLG, 2010) provide details regarding the legal protection of designated conservation areas.

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

- A European designated area of conservation is located within 200 m of the proposed development; and
- A significant change in AADT flows (>5%) will occur.

Further to a review of the Ecology Chapter of the EIAR, it may be concluded that the subject Clonburris development does not meet the assessment criteria, thus an ecological assessment is not required, specifically in reference to the TII criteria above.

7.2.4 Operational Impact Assessment Criteria

Once operational, the proposed residential development may impact on air quality as a result of the requirements of new buildings to be heated and with the increased traffic movements associated with the development.

Air quality significance criteria are assessed on the basis of compliance with the national air quality limit values. The Air Quality Standards Regulations 2011 replace the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), the Ozone in Ambient Air Regulations 2004 (S.I. No. 53 of 2004) and S.I. No. 33 of 1999.

7.2.5 Climate Assessment Methodology

Climate has implications for many aspects of the environment from soils to biodiversity and land use practices. The proposed development may impact on both the macro-climate and micro-climate. The macro-climate is the climate of a large geographic area such as Ireland. The micro-climate refers to the climate in the immediate area.

With respect to microclimate, green areas are considered to be sensitive to development. Development of any green area is generally associated with a reduction in the abundance of vegetation including trees and a reduction in the

amount of open, undeveloped space. The removal of vegetation or the development of man-made structures in these areas can intensify the temperature gradient.

To assess the impacts of converting vegetative surfaces to hard-standing with residential buildings and its significance, the amount of vegetative surfaces associated with the proposed development that will be converted to residential buildings and hard-standing has been considered.
The impact of the proposed scheme upon the macro-climate is assessed through the consideration of the change in CO_2 emissions that will occur due to the changes in traffic flow that occur in response to the proposed scheme.

The Conference of the Parties to the Convention (COP26) occurred in November 2021 with the following outcomes.

Emissions
One of the key aims of COP26 was to create a timetable for agreeing to more ambitious National Determined Contributions (NDCs), as the current NDCs are inadequate to limit temperature rises to 1.5C and, prior to COP26, nations were only required to set new NDCs every five years. While only one major emitter - India - produced a new NDC at COP26, the aim of the summit was not for numerous countries to produce new NDCs, but to agree to the faster roadmap. The Glasgow Climate Pact ensures that the question of revising NDCs will be discussed at COP27 in Egypt in 2022 and again for the following COP in 2023, providing a lever for more ambitious countries to ensure slower countries make the step up.

Fossil Fuels
The use of coal provided the most contentious moment of the negotiations, as India and China insisted on changing the wording of the final text from a commitment to “phase out” coal power to “phase down” coal power, which the EU and US both accepted, angering the UK and smaller island nations. However, it is notable that this is the first COP agreement that has made a direct reference to phasing down fossil fuels, including a statement that inefficient subsidies for all fossil fuels should be removed and an acknowledgement of the need for a “just transition” to a clean energy system. Nations are also “invited” to reduce methane emissions this decade, again the first-time methane has been mentioned in a COP final agreement.

Climate Finance and Adaption

In 2009, it was agreed that developing nations would receive at least $100bn a year from public and private sources to help them cut emissions and cope with the impacts of the climate crisis. However, in 2019, it was found that only $80bn had been made available, and the Glasgow Climate Pact urges developed countries to “fully deliver” the $100bn goal through to 2025. The Glasgow Climate Pact also agrees to double the proportion of climate finance going towards adaptation following pressure from developing nations who argue that too much of climate finance is spent on funding emissions-cutting projects in middle-income countries that don’t need the funding.

Loss and Damage

The EU and the US reportedly managed to veto the expansion of the loss and damage finance facility from the final agreement. The facility originated at the Paris Agreement and was designed to provide financial assistance for developing countries to deal with environmental damage incurred as a result of climate change. Going into the negotiations, nations including China and the G77, which represents 134 developing and emerging economies, expressed frustration that no further financial commitments to combatting loss and damage had been made. Despite this lack of progress, the Pact does confirm that a “technical assistance facility” will be introduced to support loss and damage in relation to climate change in developing countries and will fall under the Santiago Network from the UNFCCC.

Carbon Markets

The Glasgow Climate Pact also resolves some key issues in Article 6 of the Paris Agreement, the section pertaining to carbon markets and how emissions reductions under NDCs can and should be accounted for. The final text states that carbon offsetting should rely on “real, verified and additional” emissions removal taking place from 2021 onward and there is a requirement for co-benefits in terms of adaptation and the economy, and for nations to put at least 5% of the proceeds into adaptation. Plans for a potential two-tier system, and to transfer existing forest credits into Article 6, were deleted from drafts, in a move most green groups have praised.

Reaffirming the Paris Agreement

Prior to the summit, some nations opposed to stronger action had criticised the focus at COP26 on 1.5C as "reopening the Paris agreement", the main goal of which is to hold temperature rises "well below" 2C above pre-industrial levels while "pursuing efforts" to limit rises to 1.5C.

European Commission Directive 2001/81/EC, the National Emissions Ceiling Directive (NECD) (2014), prescribes the same emission limits as the 1999 Gothenburg Protocol. A National Programme for the progressive reduction of emissions of these four transboundary pollutants has been in place since April 2005 (DEHLG, 2007a; 2004). Data available from the EU in 2010 indicated that Ireland complied with the emissions ceilings for SO2, VOCs and NH3 but failed to comply with the ceiling for NOX (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, PM2.5 and CH4. In relation to Ireland, 2020-29 emission targets are for SO2 (65% below 2005 levels), for NO_X (49% reduction), for VOCs (25% reduction), for NH_3 (1% reduction) and for PM2.5 (18% reduction). In relation to 2030, Ireland's emission targets are for SO_2 (85% below 2005 levels), for NO_X (69% reduction), for VOCs (32% reduction), for NH_3 (5% reduction) and for PM2.5 (41% reduction).

The following guidelines and EU Directives relating to Climate Change aspects of EIA reports have been applied to this assessment in order to determine the potential impacts that the proposed development may have on climate change.

- 2017 EPA Draft Guidelines on information to be contained in Environmental Impact Assessment Reports;
- European Union (Planning & Development)(Environmental Impact Assessment) Regulations 2018 (SI No. 296 of 2018);
- European EIA Directive 2014/52/EU;
- The Irish Building Regulations Technical Guidance Document L – Conservation of Fuel & Energy – Dwellings amended in 2017 includes requirements for all residential dwellings to be "Nearly Zero Energy Buildings" (NZEB's) by 31st December 2020;
- Irelands National Energy and Climate Plan 2021 - 2030.

7.3 EXISTING RECEIVING ENVIRONMENT (BASELINE SCENARIO)

7.3.1 Description of the baseline environment

The proposed development site is located in the administrative area of South Dublin County Council (SDCC) and is part of the Clonburris Strategic Development Zone (SDZ). The subject site for this development is situated in the southern area of the Clonburris SDZ lands to the south of the Kildare/Cork railway adjacent to the R113. The Grand Canal forms the southern boundary of the site.

The development area is located within a zone which includes sources of existing transportation related air emissions principally from local road and rail infrastructure and sources of domestic building heating. The Grange Castle Business Park is located c. 2km west of the site.

The general area surrounding the subject site is currently comprised of undeveloped lands and residential estates and local transport infrastructure.

7.3.2 Description of Existing Climate

The nearest representative synoptic meteorological station to the subject site at Clonburris is at Casement Aerodrome which is located approximately 3km south of the site and as such, long-term measurements of wind speed/direction, rainfall and air temperature for this location are representative of prevailing conditions experienced at the subject site.

Rainfall
Precipitation data from the Casement Aerodrome meteorological station for the period 2018-2021(Aug) indicates a mean annual total of about 754 mm. This is within the expected range for most of the eastern half of the Ireland which has between 750 mm and 1000 mm of rainfall in the year.

Temperature
The annual mean temperature at Casement Aerodrome meteorological station for the period 2018-2021(Aug) is 9.6ºC.

Wind
Wind is of key importance for both the generation and dispersal of air pollutants. Meteorological data for Casement Aerodrome indicates that the prevailing wind direction is from the West and Southwest. The mean annual wind speed in the local area between 2015-2019 is 5.5 m/s.

7.3.3 Description of existing air quality

The existing ambient air quality at and in the vicinity of the site is typical of an urbanised location and as such, domestic and commercial heating sources and road traffic are identified as the dominant contributors of hydrocarbon, combustion gases and particulate emissions to ambient air quality.

7.3.3 Trends in air quality

Annual air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities. The most recent annual report on air quality "*Air Quality in Ireland 2019* details the range and scope of monitoring undertaken throughout Ireland. Clonburris which is in the Dublin conurbation is catagorised as Zone A.

The most recent 2019 EPA publication includes a number of Zone A monitoring locations which would be broadly comparable to the expected air quality at the subject site. The various Zone A air quality monitoring stations within Ireland provide a comprehensive range of air quality monitoring data sets which have been selected as part of this assessment to describe the existing ambient air quality at the subject site.

Nitrogen Dioxide
The Air Quality Standards Regulations 2011 specify a limit value of 40 µg/m3, for the protection of human health, over a calendar year. The standard, taken from the 2008 CAFÉ Directive 2000/69/EC, came into force in 2011.

Long term NO2 monitoring was carried out at three Zone C locations in 2019. The NO2 annual mean in 2019 for these sites ranged from 15 - 43 µg/m3 compared against the annual average limit of 40 µg/m3.

Sulphur Dioxide
The Air Quality Standards Regulations 2011 specify a daily limit value of 125 µg/m3 for the protection of human health. The standard, taken from the 2008 CAFÉ Directive 2000/69/EC, came into force in 2011.

Long term SO_2 monitoring was carried out at four Zone A locations in 2019. The daily SO2 daily means in 2019 for these sites ranged from 0.8 – 2.5 µg/m3. Therefore, long term averages were below the daily limit of 125 µg/m3.

The annual mean SO2 concentrations in Ireland have been declining since 2003. This trend is reflective in the shift in fuel choice across Ireland in both residential heating and the energy production sector.

Carbon Monoxide
The Air Quality Standards Regulations 2011 specify an 8-hour limit value (on a rolling basis) for the protection of human health of 10,000 µg/m3. The standard, taken from the 2008 CAFÉ Directive 2000/69/EC, came into force in 2011.

Long term CO monitoring was carried out at one Zone A location in 2019. The 8-hour CO concentrations was 0.2 – 0.3mg/m3 which is below the 8-hour limit value (on a rolling basis) of 10 mg/m3.

Particulate Matter PM_{10}
The Air Quality Standards Regulations 2011 specify a PM10 limit value of 40 µg/m3 over a calendar year. The standard, taken from the 2008 CAFÉ Directive 2000/69/EC, came into force in 2011.

Long term PM_{10} monitoring was carried out at thirteen Zone A locations in 2019. The PM10 annual mean in 2019 for these sites ranged from 11 - 19µg/m3. Therefore, long term averages were below the annual average limit of 40 µg/m3.

Particulate Matter $PM_{2.5}$

The Air Quality Standards Regulations 2011 specify a PM2.5 limit value of 25 µg/m3 over a calendar year.

Long term $PM_{2.5}$ monitoring was carried out at ten Zone a locations in 2019. The PM2.5 average in 2018 for these sites ranged from 8 - 11µg/m3. Therefore, long term averages were below the target value 25 µg/m3.

Table 7.7 below presents a summary of the 2019 Air Quality data obtained from the Zone D locations which may be considered to be broadly representative to that of the subject site.

Table 7.7 – Summary of the 2019 Air Quality data obtained from Zone A

Pollutant	Regulation	Limit type	Limit value	EPA monitoring data 2019
Nitrogen dioxide	2008/50/EC	Annual limit for protection of human health	40 µg/m^3	15 – 43* µg/m^3
Sulphur dioxide	2008/50/EC	Daily limit for protection of human health (not to be exceeded more than 3 times per year)	125 µg/m^3	0.8 – 2.5 µg/m^3
Carbon monoxide	2008/50/EC	8-hour limit (on a rolling basis) for protection of human health (Zone C)	10,000 µg/m^3	300 µg/m^3
Particulate matter (as PM_{10})	2008/50/EC	Annual limit for protection of human health	40 µg/m^3	11 – 19 µg/m^3
Particulate matter (as $PM_{2.5}$)	2008/50/EC	Annual limit for protection of human health	25 µg/m^3	8 - 11 µg/m^3
Benzene	2008/50/EC	Annual limit for protection of human health	5 µg/m^3	< 0.21µg/m^3

7.3.4 Significance

Based on published EPA air quality data for the Zone A area in which the subject site is located together with site specific monitoring data, it may be concluded that the existing baseline air quality at the subject site may be characterised as being good with no exceedances of the National Air Quality Standards Regulations 2011 (S.I No. 180 of 2011) limit values of individual pollutants. There is therefore currently sufficient atmospheric budget to accommodate the development without adversely impacting existing ambient air quality. The quality of existing air quality at the subject site must be maintained and improved where possible as a result of the proposed development to ensure that local human health and the ecological environment is not adversely affected.

7.3.5 Sensitivity

The subject site shall be developed by ground clearance and site preparation works and the subsequent construction of residential buildings and open landscaped areas. The principal local receptors that may be impacted by the development are the existing residential areas in the local vicinity of the site.

7.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

When considering a development of this nature, the potential impact on air quality and climate must be considered for each distinct stage. The overall construction phase will be undertaken over a c.2-3 year period. The Construction Phase will therefore be of a Short Duration (1-7years). The Operational Phase will be Long-Term Duration (15-60 years). It is important that there are no unacceptable decreases in ambient air quality levels during the construction phase and during the operational phase.

7.5 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

7.5.1 Overview

The construction phase of the development has the potential to generate short term fugitive dust emissions during ground preparation and enabling works and from general site construction activities. However, these emissions will be controlled by appropriate mitigation techniques and through the implementation of a construction phase air quality management and monitoring plan throughout the duration of the construction phase to ensure that existing adjacent residential properties and lands will not be adversely impacted by a deterioration in air quality associated with the construction phase.

The operational phase of the development will see the operation of modern, well insulated thermally efficient buildings in which energy efficiency shall be achieved by implementing sustainable features into the building design.

National air quality standards shall not be adversely affected as a result of the short-term construction phase or the operational phase, thus ensuring that the potential for adverse impacts on human health is negligible.

Road traffic and residential heating are the typical sources of greenhouse gas emissions associated with a residential or mixed-use development. EPA guidance states that a development may have an influence on global climate where it represents *"a significant proportion of the national contribution to greenhouse gases".*

7.5.2 Potential Impacts – Construction & Operational Phases

Various elements of both the construction and operational phases of the proposed development have the potential to impact on the local receiving environment, on adjacent residential properties and on human health which are considered with regard to National Air Quality Standards designed to protect human health. The likely potential impacts for both construction and operation of the proposed scheme prior to mitigation are described in this section of the EIAR.

7.5.3 Potential Construction Phase Impacts

7.5.3.1 Air quality

Construction impacts associated with these phased stages are discussed below.

7.5.3.2 Enabling works - Site Set Up and Clearance

Works activities associated with the 'Site set up' will be undertaken prior to construction works commencing in each sub-phase. The setting up of the site shall involve the construction of site security hoarding and site compounds, site offices, materials and waste storage areas and staff welfare facilities. These temporary activities will have a minimal potential to generate fugitive dust emissions or combustion gas emissions.

Site clearance and ground excavation (including enabling) works will be undertaken in separate phases and these activities have the potential to generate fugitive windblown dust emissions during dry and windy weather arising from the operation of mechanical plant such as dozers, excavators and tipper trucks and the movement of these vehicles on exposed surfaces at the site.

With regard to the volume of waste material (top and sub soils) generated during site clearance, there will be a requirement for HGV trucks to remove the material from the site. Trucks shall be loaded with material on-site by mechanical excavators and loading shovels which will generate fugitive dust emissions as a result of the transfer of the excavated materials comprised principally of soils and stones from stockpile to truck.

The movements of construction vehicles on the site will also generate windblown dust emissions. Where dusty material is loaded onto exposed open trucks, fine dusts may be released as the truck travels along public roads.

7.5.3.3 Building and Site Infrastructure Construction Works

During the construction phase there will be extensive site works, involving construction machinery, construction activities on site which have the potential to generate fugitive windblown dust emissions.

Construction equipment including generators and compressors will also give rise to diesel and petrol engine exhaust emissions.

Construction traffic to and from the site shall result in a short-term increase in the volume of diesel fuelled HGV's along the local road network which will generate additional hydrocarbon and particulate emissions from the vehicle exhausts.

Site activities during the construction phase in the absence of mitigation have the potential to impact local air quality, human health, the local ecological environment and cause the soiling of property and vegetation resulting in a short-term-transient, negative, minor impact.

7.5.3.4 Climate

During the construction phase NO_2 and CO_2 will be released into the atmosphere as a result of the movement of construction vehicles and the use of construction plant, vehicles and generators.

7.5.3.5 Human Health

With regard to the Institute of Air Quality Management – Guidance on the assessment of dust from demolition and construction, 2014, the sensitivities of local population to dust soiling and PM_{10} and $PM_{2.5}$ exposure in the local area may be classified as a High.

7.5.4 Potential Operational Phase Impacts

7.5.4.1 Air quality

The operational phase of the proposed development has the potential to result in a slight negative impact for the lifetime of the development 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.

7.5.4.2 Traffic Emissions

The Traffic and Transportation Assessment Report prepared by DBFL Consulting Engineers includes a detailed assessment of the traffic impact associated with the proposed development. As part of this assessment, detailed traffic flow information as Annual Average Daily Traffic (AADT) has been derived for the existing road network for the "No development" and the "With development" scenarios.

The percentage traffic increase associated with the development has considered existing junctions on the local road network and the entrance to the development as detailed in Table 7.9.

Table 7.8 – % Increase in traffic at junctions

Junction	Do Something Scenario Generated Traffic	Percentage Increase
	AADT 2040 AM/PM	AADT 2040 AM/PM
Ninth Lock/CSLS	1734/1740	1.6/1.5
R113 Fonthill Rd/CLCS	2599/2747	2.5/2.0
CSLS/ New link road	972/913	5.1/5.3
CNLS/New Link Road	1102/896	1.3/1.6
R113 Fonthill Rd/CNLS	2588/2354	1.2/1.2

The UK DMRB guidance (UK Highways Agency, 2020), on which the TII Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes is 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;
- HDV 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.

There will be a negligible impact on local air quality as a result of increased traffic movements associated with the proposed development as none of the above criteria will be reached or exceeded.

7.5.4.3 House Emissions

The design and construction of all buildings in accordance with National Building Regulations *(The Irish Building Regulations Technical Guidance Document L – Conservation of Fuel & Energy – Dwellings)* shall ensure that modern building materials are used and that they are designed to be thermally efficient resulting in a reduction in the volume

of fossil fuels required to heat the buildings. It is predicted that fossil fuel combustion gas emissions including Carbon Dioxide, Sulphur Dioxide, Nitrogen Oxides, Carbon Monoxide and hydrocarbon particulate emissions will be minor and ongoing for the life of the development and will not have an adverse significant impact on the existing ambient air quality in the vicinity of the proposed development site.

In order to counteract the potential impact of the development on the existing and future climate, the design of the proposed residential apartments and houses incorporates a number of sustainable heating and energy saving features.

7.5.4.4 Climate

The overall area of the development lands will include open space and landscaped areas. The overall development includes the construction of buildings and roadways which will have the effect of marginally raising localised air temperatures, especially in summer. It is predicted that the proposed development will have a negligible impact on the local micro-climate.

The development of open areas on the site will continue to contribute albeit in a minor way to the adsorption of Carbon Dioxide from the atmosphere and the release of Oxygen to the atmosphere.

The proposed development includes apartment structures which will have a minor impact on the local micro-climate by means of wind sheer effects. There will however be no long-term negative impact within or beyond the overall site.

Greenhouse gases occur naturally in the atmosphere (e.g., carbon dioxide, water vapour, methane, nitrous oxide and ozone) and in the correct balance, are responsible for keeping the lower part of the atmosphere warmer than it would otherwise be. These gases permit incoming solar radiation to pass through the Earth's atmosphere but prevent most of the outgoing infrared radiation from escaping from the surface and lower atmosphere into the upper levels. However, human activities are now contributing to an upward trend in the levels of these gases, along with other pollutants with the net result of an increase in temperature near the surface.

Motor vehicles are a major source of atmospheric emissions which contribute to climate change, however, vehicle exhaust emissions generated from vehicles associated with the development will have a negligible impact on the macro-climate given modern technological developments in cleaner and more efficient vehicle engines together with the low volume of traffic movements that will be associated with the development at local road junctions as detailed in Table 7.8 above.

To further reduce the climatic impact of the operational phase of the development, electric vehicle charging points shall be installed in dedicated parking spaces at each apartment block to facilitate residents who own electric vehicles and to encourage other residents to purchase electric vehicles.

The scheme has been designed to provide thermally efficient buildings which will reduce the consumption of fossil fuels within each individual dwelling. This will reduce the impact the operational phase of the development will have on the micro and macro climate. In particular, there will be no "*traditional*" passive air vents in the apartments which are both thermally and acoustically inefficient.

A range of heat sources and renewable energy options for the residential and non-residential building will be considered at the detailed design stage. The minimum renewable energy contributions as required by Part L 2019 of the Building Regulations is the Renewable Energy Ratio (RER) with a minimum of 20%

Individual Gas Boilers with Solar Panels
Air Source Heat Pumps
District Heating System

Ventilation Systems will either be Whole House Mechanical Heat Recovery Ventillation (MHRV) or
Mechanical Whole House Extract (MEV)

These design features will ensure the units are thermally efficient thus reducing the use of fossil fuels leading to a reduction of the impact on climate.

The thermal efficiency of the buildings will ensure that the development will be sustainable and will be protected against the impacts of future climate change which may include storm events and prolonged colder periods during

the winter season. These factors will contribute to reducing the impact the operational development has on the local and global climate which will ultimately contribute in a positive manner in reducing the impact on local and further afield human health.

7.6 AVOIDANCE, REMEDIAL AND MITIGATION MEASURES

This section provides the measures that shall be implemented during the construction and operational phase and into the design of the development to minimise the impacts on the receiving environment, local population and human health, livestock and agricultural lands, local flora and fauna, local businesses and on climate.

7.6.1 Construction Phase

In order to ensure that adverse air quality impacts are minimised during the construction phase and that the potential for soiling of property and amenity and local public roads is minimised, the following mitigation measures shall be implemented during the course of all construction activities:

AQ CONST 1: Air Quality Mitigation Measures

- Avoid unnecessary vehicle movements and manoeuvring, and limit speeds on site so as to minimise the generation of airborne dust.
- Use of rubble chutes and receptor skips during construction activities.
- During dry periods, dust emissions from heavily trafficked locations (on and off site) will be controlled by spraying surfaces with water and wetting agents.
- 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 only.
- Re-suspension in the air of spillages material from trucks entering or leaving the site will be prevented by limiting the speed of vehicles within the site to 10kmh and by use of a mechanical road sweeper.
- The overloading of tipper trucks exiting the site shall not be permitted.
- Aggregates will be transported to and from the site in covered trucks.
- Where the likelihood of windblown fugitive dust emissions is high and during dry weather conditions, dusty site surfaces will be sprayed by a mobile tanker bowser.
- Wetting agents shall be utilised to provide a more effective surface wetting procedure.
- Exhaust emissions from vehicles operating within the construction site, including trucks, excavators, diesel generators or other plant equipment, will be controlled by the contractor by ensuring that emissions from vehicles are minimised by routine servicing of vehicles and plant, rather than just following breakdowns; the positioning of exhausts at a height to ensure adequate local dispersal of emissions, the avoidance of engines running unnecessarily and the use of low emission fuels.
- All plant not in operation shall be turned off and idling engines shall not be permitted for excessive periods.
- 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.
- Material stockpiles containing fine or dusty elements including top soils shall be covered with tarpaulins.
- Where drilling or pavement cutting, grinding or similar types of stone finishing operations are taking place, measures to control dust emissions will be used to prevent unnecessary dust emissions by the erection of wind breaks or barriers. All concrete cutting equipment shall be fitted with a water dampening system.
- A programme of air quality monitoring shall be implemented at the site boundaries for the duration of construction phase activities to ensure that the air quality standards relating to dust deposition and PM_{10} are not exceeded. Where levels exceed specified air quality limit values, dust generating activities shall immediately cease and alternative working methods shall be implemented.
- A complaints log shall be maintained by the construction site manager and in the event of a complaint relating to dust nuisance, an investigation shall be initiated.
- Dust netting and site hoarding shall be installed along the north, south, east and western site boundaries to minimise fugitive windblown dust emissions falling on third party lands and existing residential areas.

7.6.2 Operational Phase

The Operational Phase of the development site will not generate air emissions that would have an adverse impact on local ambient air quality or local human health and as such there are no mitigation measures specified for the Operational Phase.

The elements of the development designed to minimise the impact of the operational phase of the development on air quality and climate are as follows:

AQ OP1: Climate Impact Mitigation Measures

- Energy Efficiency - All proposals for development shall seek to meet the highest standards of sustainable design and construction with regard to the optimum use of sustainable building design criteria such as passive solar principles and also green building materials.
- All residential units shall be designed and constructed in accordance with The Irish Building Regulations *Technical Guidance Document L – Conservation of Fuel & Energy – Dwellings* amended in 2017 includes requirements for all residential dwellings to be "Nearly Zero Energy Buildings" (NZEB's) by 31st December 2020.
- In order to reduce energy consumption, the following key design features have been considered in the design process and will be incorporated into the construction of the residential units:
  - Passive solar design including the orientation, location and sizing of windows
  - The use of green building materials: low embodied energy & recycled materials
  - Energy efficient window units and frames with certified thermal and acoustic insulation properties
  - Building envelope air tightness
  - Installation of Mechanical Ventilation & Heat Recovery systems in all apartment units which operate by extracting warm air from kitchens and bathrooms, cleaning it and distributing it to other rooms in the unit.
  - Thermal insulation of walls and roof voids of all units

AQ OP2: Air Quality Mitigation Measures

- Natural Gas heating in all units
- Inclusion of electric car charging points to encourage electric vehicle ownership
- Proximity of Irish Rail, Bus Eireann and private bus operator's commuter services
- Bicycle parking and cycle routes
- Provision of open landscaped areas, to encourage residents to avail of active lifestyle options

7.7 PREDICTED RESIDUAL IMPACTS OF THE PROPOSED DEVELOPMENT

7.7.1 Construction Phase

Various elements associated with the construction phase of the proposed development have the potential to impact local ambient air quality, human health and climate. However, the potential construction phase impacts shall be mitigated as detailed above to ensure there is no adverse impact on ambient air quality for the duration of all construction phase works. It is predicted that the construction phase of the development will not generate air emissions that would have an adverse impact on local ambient air quality or on local human health or on the local micro-climate or the wider macro-climate.

The predicted construction phase residual impacts on air quality will be negative, slight and short-term.

7.7.2 Operational Phase

The sustainable features that are incorporated into the design of all residential units will ensure that the operational phase of the development will not have an adverse impact on human health, local air quality or on local or global climate patterns. The residential units will be designed to ensure that they can withstand the potential changes in climate which may generate more extreme and prolonged meteorological events in the future.

It is predicted that fossil fuel combustion gas emissions including Carbon Dioxide, Sulphur Dioxide, Nitrogen Oxides, Carbon Monoxide and hydrocarbon particulate emissions will be slight and will not have an adverse significant impact on the existing ambient air quality in the vicinity of the proposed development site.

Motor vehicles are a major source of atmospheric emissions which contribute to climate change, however, vehicle exhaust emissions generated from vehicles associated with the development will have a negligible impact on the macro-climate given modern technological developments in cleaner and more efficient vehicle engines. Current trends suggest that vehicle manufacturers are ceasing the manufacture of large diesel engines for private cars and

instead adopting hybrid engine and all electric technologies which will contribute to the reduction of engine exhaust emissions including particulate matter, Nitrogen Oxides, Sulphur Dioxide, Carbon Dioxide and Carbon Monoxide.

To further reduce the climatic impact of the operational phase of the development, electric vehicle charging points shall be installed in dedicated parking spaces and cycle parking shall be provided to facilitate residents who own electric vehicles and to encourage other residents to purchase electric vehicles.

The scheme has been designed to provide thermally efficient buildings which will reduce the consumption of fossil fuels within each individual dwelling. This will reduce the impact the operational phase of the development will have on the micro and macro climate. In particular, there will be no “traditional” passive air vents in the apartments which are both thermally and acoustically inefficient. Exhaust Air Heat Pump systems shall be incorporated into the design of all units. These efficient energy reducing systems together with thermally rated window sets will reduce the potential future impacts that the external climate will have in terms of wind and changing temperatures on the internal environment within the residential units. These design features will ensure the units are thermally efficient thus reducing the use of fossil fuels leading to a reduction of the impact on the micro and macro climate.

The thermal efficiency of the buildings will ensure that the development will be sustainable and will be protected against the impacts of future climate change which may include storm events and prolonged colder periods during the winter season. These factors will contribute to reducing the impact the operational development has on the local and global climate which will ultimately contribute in a positive manner in reducing the impact on local and further afield human health.

The predicted residual operational phase impacts on air quality and climate will be negative, imperceptible and long-term.

7.7.3 Summary of residual impacts

The Tables below summarise the identified likely significant effects of the proposed development during the construction phase post application of mitigation measures.

Table 7.9 – Summary of Construction Phase Likely Significant Effects with Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Construction Phase Air Quality	Negative	Moderate	Local	Likely	Short-Term	Worst Case
Construction Phase Climate	Negative	Not Significant	Local	Likely	Short-Term	Worst Case

7.7.3 Operational Phase

The sustainable features that are incorporated into the design of all residential units will ensure that the operational phase of the development will not have an adverse impact on human health, local air quality or on local or global climate patterns. The residential units will be designed to ensure that they can withstand the potential changes in climate which may generate more extreme and prolonged meteorological events in the future.

It is predicted that fossil fuel combustion gas emissions including Carbon Dioxide, Sulphur Dioxide, Nitrogen Oxides, Carbon Monoxide and hydrocarbon particulate emissions will be slight and will not have an adverse significant impact on the existing ambient air quality in the vicinity of the proposed development site.

Motor vehicles are a major source of atmospheric emissions which contribute to climate change, however, vehicle exhaust emissions generated from vehicles associated with the development will have a negligible impact on the macro-climate given modern technological developments in cleaner and more efficient vehicle engines. Current trends suggest that vehicle manufacturers are ceasing the manufacture of large diesel engines for private cars and instead adopting hybrid engine and all electric technologies which will contribute to the reduction of engine exhaust emissions including particulate matter, Nitrogen Oxides, Sulphur Dioxide, Carbon Dioxide and Carbon Monoxide.

To further reduce the climatic impact of the operational phase of the development, electric vehicle charging points shall be installed in dedicated parking spaces and cycle parking shall be provided to facilitate residents who own electric vehicles and to encourage other residents to purchase electric vehicles.

The scheme has been designed to provide thermally efficient buildings which will reduce the consumption of fossil fuels within each individual dwelling. This will reduce the impact the operational phase of the development will have on the micro and macro climate. In particular, there will be no "traditional" passive air vents in the apartments which are both thermally and acoustically inefficient. Exhaust Air Heat Pump systems shall be incorporated into the design of all units. These efficient energy reducing systems together with thermally rated window sets will reduce the potential future impacts that the external climate will have in terms of wind and changing temperatures on the internal environment within the residential units. These design features will ensure the units are thermally efficient thus reducing the use of fossil fuels leading to a reduction of the impact on the micro and macro climate.

The thermal efficiency of the buildings will ensure that the development will be sustainable and will be protected against the impacts of future climate change which may include storm events and prolonged colder periods during the winter season. These factors will contribute to reducing the impact the operational development has on the local and global climate which will ultimately contribute in a positive manner in reducing the impact on local and further afield human health.

The Table below summarises the identified likely significant effects of the proposed development during the operational phase post application of mitigation measures.

Table 7.10 – Summary of Operational Phase Likely Significant Effects with Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Operational Phase Air Quality	Negative	Not Significant	Local	Likely	Long-Term	Worst Case
Operational Phase Climate	Negative	Not Significant	Local	Likely	Long-Term	Worst Case

7.7.4 Summary of residual impacts

The Tables below summarise the identified likely significant effects of the proposed development during the construction phase post application of mitigation measures.

Table 7.11 – Summary of Construction Phase Likely Significant Effects with Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Construction Phase Air Quality	Negative	Slight	Local	Likely	Short-Term	Residual
Construction Phase Climate	Neutral	Imperceptible	Local	Likely	Short-Term	Residual

The Table below summarises the identified likely significant effects of the proposed development during the operational phase post application of mitigation measures.

Table 7.12 – Summary of Operational Phase Likely Significant Effects with Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Operational Phase Air Quality	Neutral	Imperceptible	Local	Likely	Long-Term	Residual
Operational Phase Climate	Neutral	Imperceptible	Local	Likely	Long-Term	Residual

7.8 CUMULATIVE IMPACTS

In accordance with *The Planning and Development Regulations 2001 as amended*, this section has considered the cumulative impact of the proposed development in conjunction with future and current development in the vicinity of the subject site. This section relates to the cumulative impact on the subject site itself and on surrounding sites.

The proposed development at Clonburris Phase 1A is the first residential planning application in the Clonburris SDZ and there will be subsequent future applications as the Clonburris SDZ is built out. It is considered that, in the absence of mitigation measures, there will be the potential for a short term slight negative cumulative impact associated with the construction phase of the subject development and other local developments on ambient air quality and climate.

Should the construction phase of the proposed development coincide with the construction phase of other local construction developments, there is the potential for cumulative dust emissions to impact the nearby sensitive receptors during the construction phases. The dust and air quality mitigation measures outlined above will be applied throughout the construction phase of the proposed development and similar best practice mitigation measures are also required for the construction phase of other 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 predicted to be short-term and slight.

The operational phases of the subject development and other permitted residential developments in the local area will not generate cumulative air emissions that will have an adverse impact on local ambient air quality. Measured baseline air quality and National published air quality data confirm that the existing air quality is good and that the operational phases of the subject development and other local proposed developments will have a long-term imperceptible impact on existing air quality.

7.9 INTERACTIONS

The principal interactions between Air Quality and Climate, Human Beings, Biodiversity and Traffic have been addressed in this chapter.

7.9.1 Construction Phase

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.

7.9.2 Operational Phase

Operational traffic emissions as a result of the proposed development are compliant with all National and EU ambient air quality limit values which are set for the protection of human health and therefore, will not result in an adverse or harmful impact on human health.

7.10 'DO NOTHING' IMPACT

The subject site is currently comprised of undeveloped lands and if they remain undeveloped the site will continue to have no adverse impact long-term impact on existing ambient air quality or on the local micro-climate.

Based on the projected increase in traffic up to the reference year of 2040, the increase in traffic related emissions, based on projected Traffic Impact Assessment figures without the subject development would be insignificant. This increase above the existing situation would be minor and would not result in a perceptible change in the existing local air quality environment.

7.11 RISK TO HUMAN HEALTH

7.11.1 Construction Phase

Mitigation measures are proposed for the construction phase and 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.

7.11.2 Operational Phase

Operational traffic emissions as a result of the proposed development are compliant with all National and EU ambient air quality limit values which are designed for the protection of human health and therefore, will not result in an adverse or harmful impact on human health.

The impact of the proposed development during both construction and operational phases together with other proposed residential developments in the local area will not result in an adverse risk to human health in the local area

7.12 MONITORING

7.12.1 Construction Phase Monitoring

This section describes the dust monitoring methodologies that shall be implemented at the site during the construction phases to ensure that the principal pollutant, dust generated by site activities does not cause nuisance or cause adverse health effects to residential areas and other receptors located in the vicinity of the site boundaries.

7.12.2 Dust Deposition Monitoring Methodology

Dust deposition levels will be monitored at the construction site boundaries (4 locations, North, South, East and West) to assess the impact that site construction site activities may have on the local ambient air quality and to demonstrate that the environmental control measures in place at the site are effective in minimising the impact of construction site activities on the local receiving environment including existing residential developments and lands bordering the site. The following procedure shall be implemented at the site on commencement of site activities:

The dust deposition rate will be measured by positioning Bergerhoff Dust Deposit Gauges at strategic locations near the boundaries of the site for a period of 30 +-2 days. Monitoring shall be conducted on a monthly basis during the construction phase.

The selection of sampling point locations will be completed after consideration of the requirements of *Method VDI 2119* with respect to the location of the samplers relative to obstructions, height above ground and sample collection and analysis procedures. The optimum locations will be determined by a suitably qualified air quality expert to ensure that the dust gauge locations are positioned in order to best determine potential dust deposition in the vicinity of the site boundaries and existing on-site buildings.

After each (30 +-2 days) exposure period, the gauges will be removed from the sampling location, sealed and the dust deposits in each gauge will be determined gravimetrically by an accredited laboratory and expressed as a dust deposition rate in mg/m^2-day in accordance with the relevant standards.

Technical monitoring reports detailing all measurement results, methodologies and assessment of results shall be subsequently prepared and maintained by the Site Manager. Monitoring reports shall be made available to the Local Authority as requested.

A dust deposition limit value of 350 mg/m^2-day (measured as per German Standard Method VDI 2119 – Measurement of Particulate Precipitations – Determination of Dust Precipitation with Collecting Pots Made of Glass (Bergerhoff Method) or Plastic) is commonly specified by Local Authorities and by the EPA to ensure that no nuisance effects will result from specified activities and it is to this Best Practice standard method that this programme of dust monitoring and control has been prepared.

The *German Federal Government Technical Instructions on Air Quality Control - TA Luft* specifies an emission value for the protection against significant nuisances or significant disadvantages due to dustfall. This limit value is 350 mg/m^2-day and it is to this limit value that all measured dust deposition levels shall be assessed. This limit value is commonly specified by Local Authorities at construction sites.

7.12.2 Operational Phase Monitoring

Monitoring will not be required during the operational phase of the development.

7.13 REINSTATEMENT

Reinstatement issued are not relevant to this Chapter of the EIAR, with regard to the construction and operational phases.

7.14 DIFFICULTIES ENCOUNTERED IN COMPILING INFORMATION

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

8.0 NOISE AND VIBRATION

8.1 INTRODUCTION

This section of the EIAR has been prepared by Byrne Environmental Consulting Ltd to identify and assess the potential noise and vibrational impacts associated with the proposed residential development within the Clonburris SDZ, County Dublin during both the Construction and Operational Phases of the development.

The development will include the construction of 569 No. residential units in a mix of apartments, houses and duplex units, a creche, shared offices and community facilities (known as Phase 1A).

This document includes a comprehensive description of the receiving ambient noise climate in the vicinity of the subject site; a description of how the construction and operational phases may impact the existing ambient noise climate, the mitigation measures that shall be implemented to control and minimise the impact that the development may have on ambient noise levels and the proposed acoustic design features required to minimise the impact of external noise sources on the residential units.

The mitigation measures designed for the development shall demonstrate how the development shall be constructed and operated in an environmentally sustainable manner in order to ensure its minimal impact on the receiving noise climate and to provide adequate sound insulation in residential units from external sound sources and adjoining residential properties.

Ian Byrne MSc. Environmental Protection, Dip Environmental & Planning Law, Member of the Institute of Acoustics, is the Principal Environmental Consultant of Byrne Environmental Consulting Ltd and prepared all aspects of this EIAR Chapter. Ian Byrne has over 25 years experience in the monitoring and assessment of noise and vibration impacts that the construction and operation of residential, commercial and industrial developments may have on the receiving environment.

Based on academic qualifications and professional experience, Ian Byrne is defined as a "Competent Person" as defined in the EPA's 2016 Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4).

8.2 STUDY METHODOLOGY

The general assessment methodology of the potential noise and vibrational impacts that the proposed development will have on the receiving environment has been prepared in accordance with:

- *Planning and Development Act 2000 (as amended);*
- *Planning and Development Regulations 2001(as amended);*
- *Directive 2011/92/EU;*
- *Directive 2014/52/EU;*
- *Preparation of guidance documents for the implementation of EIA directive (Directive 2011/92/EU as amended by 2014/52/EU) – Annex I to the Final Report (COWI, Milieu; April 2017);*
- *Guidelines on the information to be contained in environmental impact assessment reports, EPA, 2017 (Draft);*
- *Environmental Impact Assessment – Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (2018; DoHPLG); and*
- *Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU) European Commission (2017)*

8.2.1 Noise Assessment Methodology

8.2.1.1 Baseline Environment

The baseline noise environment in the vicinity of the proposed development site has been defined by field surveys conducted during September 2021. Sound level measurements were conducted in appropriate weather conditions when there was no precipitation and when mean windspeeds were <5m/sec and when Irish Rail timetable were operating normally.

The existing ambient noise climate in the vicinity of the site has been characterised with information obtained from site specific baseline noise surveys conducted in the vicinity of the closest noise sensitive receptors to the subject site. Baseline noise surveys were conducted in accordance with *ISO 1996-1: 2017*: *Acoustics – Description,*

measurement and assessment of environmental noise and with regard to the EPA's 2016 *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4).*

8.2.2 Impact Assessment Methodology

The impact of the proposed development has been determined through prediction of future noise levels associated with the scheme using established calculation techniques.

Construction noise and vibration impacts have been assessed in accordance with Transport Infrastructure Irelands (TII) guidance document Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (March 2014). Indicative construction noise calculations have been undertaken using the methodology set out in BS 5228 Code of Practice for noise and vibration control of construction and open sites - Part 1: Noise 2009+A1 2014.

Impacts associated with road traffic movements on the development when operational have been assessed with regard to the NRA's Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (March 2014) and the UK Department of Transport (Welsh Office) - Calculation of Road Traffic Noise [CRTN] and the Highways Agency Design Manual for Roads and Bridges Part 7 HD 213/11 – Revision 1 Noise and Vibration.

The operational phase of the development has been assessed with regard the Department of the Environment, Building Regulations 2014, Technical Guidance Document E – Sound. Acoustic design of apartments refers to the 2018 Ministerial Guidelines "Sustainable Urban Housing – Design Standards for New Apartments. Paragraph 1.18 of the document refers specifically to the Building Regulations Technical Guidance Documents and states that the construction of the apartment building shall comply with all relevant requirements.

The inward noise impact that the external environment has been assessed with regard to Professional Guidance on Planning and Noise (ProPG), (IOA/ANC, 2017).

The Professional Guidance on Planning and Noise (ProPG) document May 2017 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) 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

Element 4 - Other Relevant Issues

The initial noise risk assessment is intended to provide an early indication of any acoustic issues that may be encountered. It calls for the categorisation of the site as a negligible, low, medium or high risk based on the pre-existing noise environment. Figure 8.1 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.

A site should not be considered a negligible risk if more than 10dB(A) LAFmax events exceed 60 dB during the night period and the site should be considered a high risk if the LAFmax events exceed 80 dB more than 20 times a night.

With regard to the ProPG risk assessment conducted based on the baseline noise assessment, the development site may be classified as having a low risk in terms of the existing low-noise climate at the site, that is, there are no

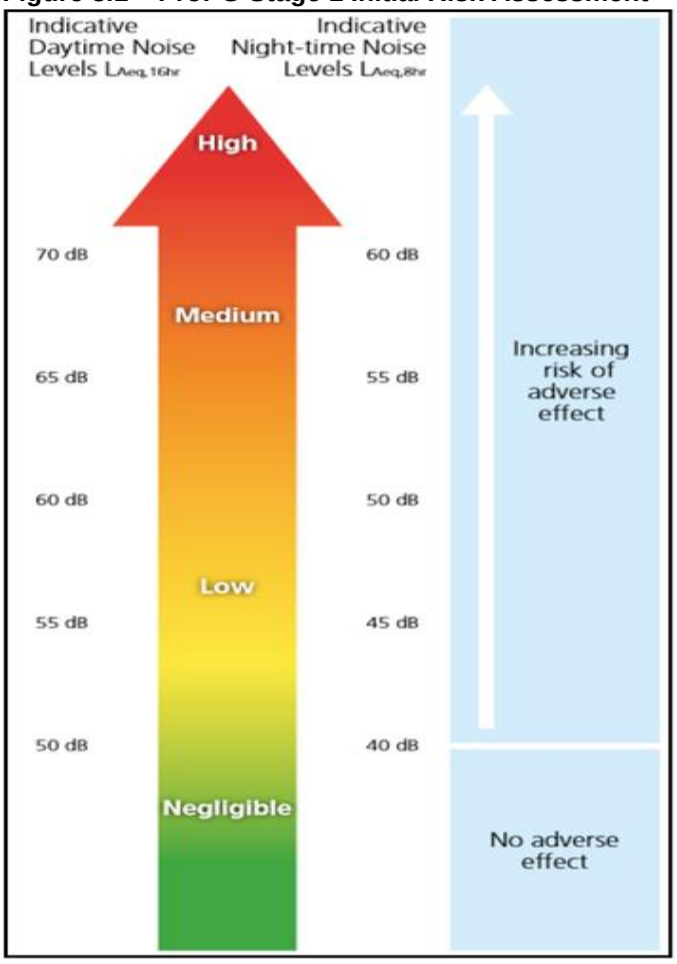
adverse pre-existing noise sources in proximity to the development site which may impact the residential units once developed and occupied by residents.

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 81 and are based on annual average data levels.

Table 8.1 – ProPG Internal Noise Levels

Activity	Location	(07:00 to 23:00hrs)	(23:00 to 07:00hrs)
Resting	Living Room	35 dB $L_{Aeq, 16hr}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq, 16hr}$	-
Sleeping (Daytime Resting)	Bedroom	35 dB $L_{Aeq, 16hr}$	30 dB $L_{Aeq, 8hr}$ 45 dB L_{AFmax}

Figure 8.1 – ProPG Stage 1 Initial Risk Assessment



8.2.3 Construction Noise Impact Assessment Criteria

This section describes the methodologies used to assess the outward noise impact that the construction and operational phases of the proposed development may have on the receiving environment including local receptors.

The construction noise limits which are presented in Table 8.2 are specified in British Standard BS 5228 – 1:2009+A1 2014 Code of practice for noise and vibration control on open sites: Part 1 Noise and are based on the noise measured at the external façade of a receptor.

BS5228 states that noise sensitive receptors (houses) are designated a category based on existing ambient noise levels. Each category is then assigned with a noise limit value.

Category A Threshold values when ambient noise levels are less than these values.

Category B Threshold values when ambient noise levels are the same as the Category A values.

Category C Threshold values when ambient noise levels are higher than the Category A values.

Table 8.2 – Threshold of Potential Significant Effect at Dwelling

Category and Threshold Value Period LAeq dB(A)	Category A	Category B	Category C
Night 23:00 – 07:00	45	50	55
Evening 19:00 - 23:00 & Weekends	55	60	65
Day 07:00 – 19:00 & Sat 07:00 – 13:00	65	70	75

8.2.4 Operational Noise Impact Assessment Criteria

A change in traffic noise of less than 2dBA is generally not noticeable to the human ear whilst a change of 3dBA is generally considered to be just perceptible. Changes in noise levels of 3 to 5 dBA would however be noticeable and, depending on the final noise level, there may be a slight or moderate noise impact. Changes in noise level in excess of 6dBA would be clearly noticeable, and depending on the final noise level, the impact may be moderate or significant. However, a significant change in traffic volumes or traffic category i.e. increase in the use of a road by HGVs, would be required to result in such increases.

The UK Design Manual for Roads and Bridges (DMRB, Volume 11, Section 3, Part 7) states that a change in noise level of 1dB $L_{A10,18h}$ is equivalent to a 25% increase or a 20% decrease in traffic flow, assuming other factors remain unchanged and a change in noise level of 3dB $L_{A10,18h}$ is equivalent to a 100% increase or a 50% decrease in traffic flow.

The relative impact assessment criteria associated with road traffic noise is set out in Table 8.3 below.

Table 8.3 – Likely impact associated with change in traffic noise level

Change in sound level (L10)	Subjective reaction	Impact
<3	Inaudible	Imperceptible
3-5	Perceptible	Slight
6-10	Up to a doubling of loudness	Moderate
11-15	Over a doubling of loudness	Significant
>15		Profound

Traffic noise levels in excess of 60dBA (L_{DEN}) are considered to be potentially intrusive. L_{DEN} is the day-evening-night composite noise indicator for assessing overall noise annoyance. For new roads projects the National Roads Authority design goal is to mitigate when predicted levels exceed 60dB L_{den}. However, for existing roads the Dublin Agglomeration, within the Noise Action Plan, have set a level of 70dB (L_{Day}) and 55dB (L_{Night}) above which mitigation measures should be considered.

The World Health Organisation (WHO) in their 2018 publication entitled *Environmental Noise Guidelines for the European Region* has proposed new guidelines for community noise. In this guidance, a L_{DEN} threshold daytime noise limit of 53dB is suggested to protect against adverse health effects. L_{NIGHT} Levels of 45dB or less are proposed at night-time to protect against adverse effects on sleep.

Professional Practice Guidance on Planning & Noise: New Residential Developments (2017)(ProPG), is considered in the assessment of the operational phase of the residential development in terms of ensuring that the development will not be adversely impacted by external transport related noise sources.

8.2.5 Construction Vibration Assessment Methodology

8.2.5.1 Impact Assessment Methodology

Vibration standards come in two varieties: those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. In both instances, it is appropriate to consider the magnitude of vibration in terms of Peak Particle Velocity (PPV).

Construction impacts have been assessed in accordance with BS 7385-2:1993 – Evaluation and Measurement for Vibration in Buildings: Part 2 – Guide to Damage Levels from Groundborne Vibration and BS 5228 Code of Practice for noise and vibration control of construction and open sites - Part 2: Vibration 2009+A1 2014.

Operational impacts have been assessed in accordance with the Transport Infrastructure Ireland, TII (formerly NRA) Guidelines for the Treatment of Noise & Vibration in National Road Schemes.

8.2.6 Construction Impact Assessment Methodology

Table 8.4 details the limits above which cosmetic damage could occur for transient vibration. Minor damage is possible at vibration magnitudes which are greater than twice those shown in Table 8.3, and major damage to a building structure would only generally occur at values greater than four times the tabulated values. These values only relate to transient vibration. If there is a continuous vibration, the guide values shown in Table 8.3 shall be reduced by up to 50%.

This guidance is reproduced from BS 5228-2:2009+A1 2014 – Code of Practice for Noise and Vibration Control on Construction and Open Sites: Part 2 – Vibration and BS 7385-2:1993 – Evaluation and Measurement for Vibration in Buildings: Part 2 – Guide to Damage Levels from Groundborne Vibration.

Table 8.4 – Transient vibration guide values for cosmetic damage

Type of building	PPV (mm/s) in frequency range of predominant pulse	
	4-15Hz	15Hz and above
Reinforced or framed structures. Industrial and heavy commercial buildings.	50mm/s at 4Hz and above.	50mm/s at 4Hz and above.
Unreinforced or light framed structures. Residential or light commercial buildings.	15mm/s at 4Hz increasing to 20mm/s at 15Hz.	20mm/s at 15Hz increasing to 50mm/s at 40Hz and above.

Table 8.5, reproduced from *BS 5228 Code of Practice for noise and vibration control of construction and open sites - Part 2: Vibration 2009+A1 2014* outlines the vibration levels (in terms of PPV) from construction activities and their likely effect on humans.

Table 8.5 – Guidance on the effect of construction vibration levels on humans

Vibration Level (PPV)	Effect
0.14mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.30mm/s	Vibration might be just perceptible in residential environments.
1.0mm/s	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
10mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

8.2.7 Operational Impact Assessment Methodology

It is acknowledged that humans are particularly sensitive to vibration stimuli and that any perception of vibration may lead to concern. In the case of road traffic, vibration is perceptible at around 0.5mm/s and may become disturbing or annoying at higher magnitudes.

Ground vibrations produced by road traffic are unlikely to cause perceptible structural vibration in properties located near to well-maintained and smooth road surfaces. Vibration impacts associated with road traffic can therefore be largely avoided by good maintenance of the road surface.

8.3 EXISTING RECEIVING ENVIRONMENT (BASELINE SCENARIO)

8.3.1 Description of the baseline environment - Environmental Noise Context

The subject site is located within the Clonburris SDZ in Co. Dublin. The subject site is currently undeveloped and is bordered to the North by the Dublin-Cork Railway Line and the Grand Canal to the South. Lands further to the south and east are comprised of residential areas. The Clondalkin/Fonthill Railway Station is located East of the site and the Fonthill Road (R113) runs along the Eastern site boundary.

The Cork-Dublin Rail Line and the Fonthill Road are the principal existing ambient noise sources that impact the subject site.

Rail traffic noise associated with the Dublin Cork Rail Line which runs along the northern site boundary has been assessed with regard to the EPA's Round 3 Rail Noise Mapping of this line. Rail noise dominates the northern site boundary during the daytime and nightime periods albeit on a non-continuous basis.

This is further confirmed by attended noise surveys conducted at the northern site boundary.

Local road traffic noise associated with the Fonthill Road which runs adjacent to the eastern site boundary has been assessed with regard to the EPA's Round 3 Road Noise Mapping of this road. Road traffic noise dominates the eastern site boundary during the daytime and nightime periods.

This is further confirmed by attended noise surveys conducted at the eastern site boundary.

8.3.2 Baseline environmental noise survey

Baseline noise data in the vicinity of the closest noise sensitive receptors to the proposed development site boundaries has been obtained from noise monitoring surveys conducted by Byrne Environmental Consulting Ltd on 6th - 7th September 2021 when normal traffic levels resumed after the School holiday period and Irish Rail Services were operating at normal capacity. The baseline monitoring locations were selected in accordance with *ISO 1996,2, 2017: Acoustics – Description, Measurement and Assessment of environmental noise* and the 2016 EPA publication, *"Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)* and included locations in proximity to existing residential dwellings adjacent to the development areas and within the site itself to assess the inward impact of road and rail traffic noise within the site.

8.3.3 Measurement location

Baseline noise measurement surveys were conducted at 3 locations (N1-N3) as shown in Figure 8.2 below located adjacent to the development site 6th -7th September 2021 during suitably dry and calm (<5mm/sec) wind conditions. The purpose of these surveys was to characterise the existing ambient noise climate at boundaries and receptors which will allow for the impact of construction noise at off-site receptors to be established and to determine the potential inward noise impact on the subject development.

Baseline surveys were conducted under free-field conditions at a height of approximately 3m above ground and approximately 3.5m away from reflecting surfaces for a period of 24 hours at site boundary locations N1 & N2 and for a 3- hour period at off-site location N3 in order to obtain detailed noise data and assess the existing noise climate at the locations accurately.

Table 8.6 – Baseline noise measurement locations

Location N1	Northern site boundary opposite Dublin-Cork train line
Location N2	Western site boundary opposite Fonthill Road and Clondalkin/Fonthill Train Station
Location N3	Lock View Road South of Site

The noise parameters used to describe the existing ambient noise climate are described as follows:

L_{Aeq}: *The equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period.*

L_{A10}: *The sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise.*

L_{A90}: *The sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.*

L_{Amax}: *The instantaneous maximum sound level measured during the sample period.*

The L_{den} parameter is a descriptor of noise level based on energy equivalent noise level (L_{eq}) over a whole day with a penalty of 10dB(A) for nightime noise (23:00 – 07:00hrs) and an additional penalty of 5dB(A) for evening noise (19:00 – 23:00hrs).

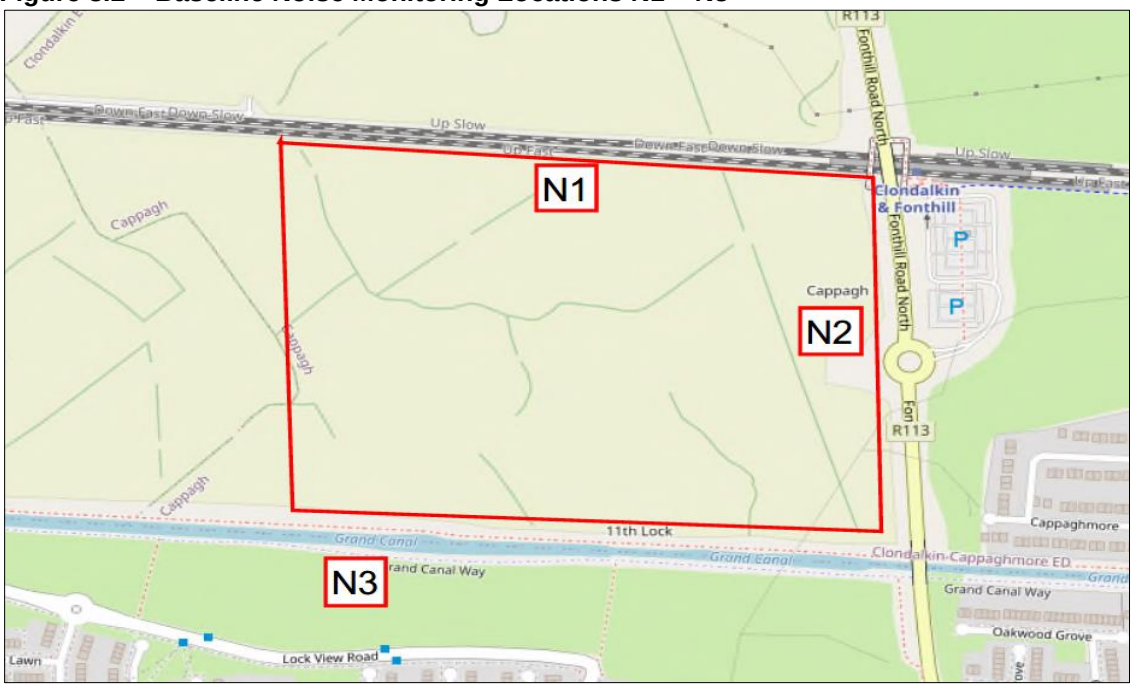
The L_{night} parameter is a descriptor of noise level based on energy equivalent noise level (L_{eq}) over an 8-hour night period between (23:00 – 07:00hrs).

LAeq, 16-hr is the equivalent continuous sound level between 07:00hrs – 23:00hrs

LAeq, 8-hr is the equivalent continuous sound level between237:00hrs – 07:00hrs

1/3 Octave band analysis The frequency analysis of a sound such that the frequency spectrum is subdivided into bands of one-third of an octave each. Used to determine tonal components of a sound source.
Noise levels are measured using a logarithmic noise scale (decibel) and are denoted dBA. The "A" indicates that a frequency weighting has been applied to allow for the variation in the sensitivity of the human ear.

Figure 8.2 – Baseline Noise Monitoring Locations N1 – N3



8.3.4 Baseline noise and vibration measurement results

Table 8.7 – Location N1 Northern Site Boundary

Date 06.09.21	**Measured sound pressure levels dBA (re 20µPa)**			
	$L_{Aeq,}$	**L_{A10}**	**L_{A90}**	**L_{AMax}**
Daytime period 08:15 – 12:15	65	64	55	89
L_{16hr}	68			
L_{8hr}	59			

The noise climate at N1 is dominated by traffic on the Dublin-Cork Rail Line the estate throughout the daytime period. Recorded vibration levels were negligible (<0..500mm/sec PPV) during the survey period at Location N1 set back 20 from the closest track.

Table 8.8 – Location N2 Eastern Site Boundary

Date 06.09.21	Measured sound pressure levels dBA (re 20µPa)			
	$L_{Aeq,}$	L_{A10}	L_{A90}	L_{AMax}
Daytime period 14:05 – 17:05	60	61	54	82
L_{16hr}	65			
L_{8hr}	58			

The noise climate at N2 is dominated by traffic on the Fonthill Road and by occasional rail traffic movements. Recorded vibration levels were negligible (<0.125mm/sec PPV) during the survey period at Location N2.

Table 8.9 – Location N3 Lock View Road South of Site

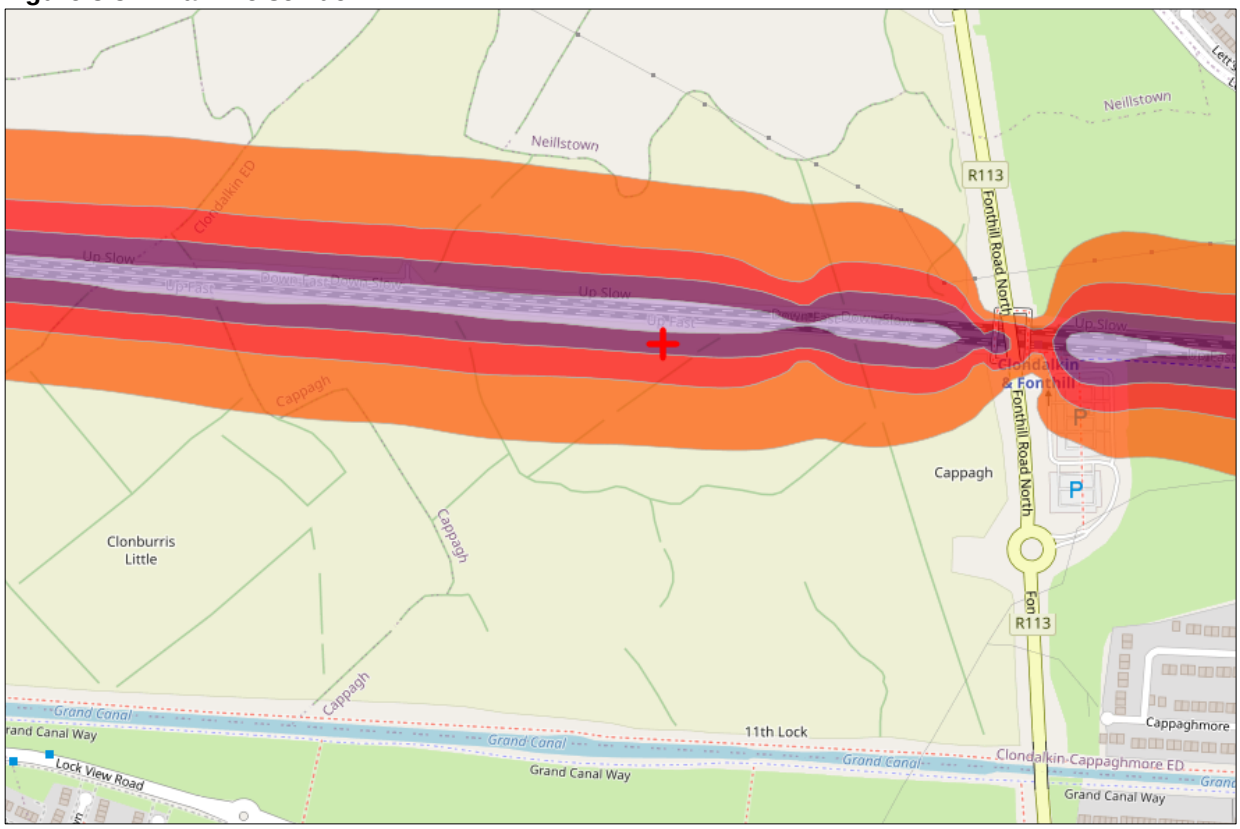
Date 07.09.21	Measured sound pressure levels dBA (re 20µPa)			
	$L_{Aeq,3hr}$	$L_{A10\ 3hr}$	$L_{A90\ 3hr}$	L_{AMax}
Daytime period 10:30 – 13:30	56	58	54	77

The noise climate at N3 is dominated by traffic on the Lock View Road and occasional traffic movements to and from the estate throughout the daytime period.
Recorded vibration levels were negligible (<0.125mm/sec PPV) during the survey period at Location N3.

The EPA Round 3 Road & Rail noise mapping provides details on the impact that both road and rail traffic will have on the development site. Noise levels are presented in colored noise contours and show how transportation noise dissipates through the site as a function of distance during the daytime and night periods.

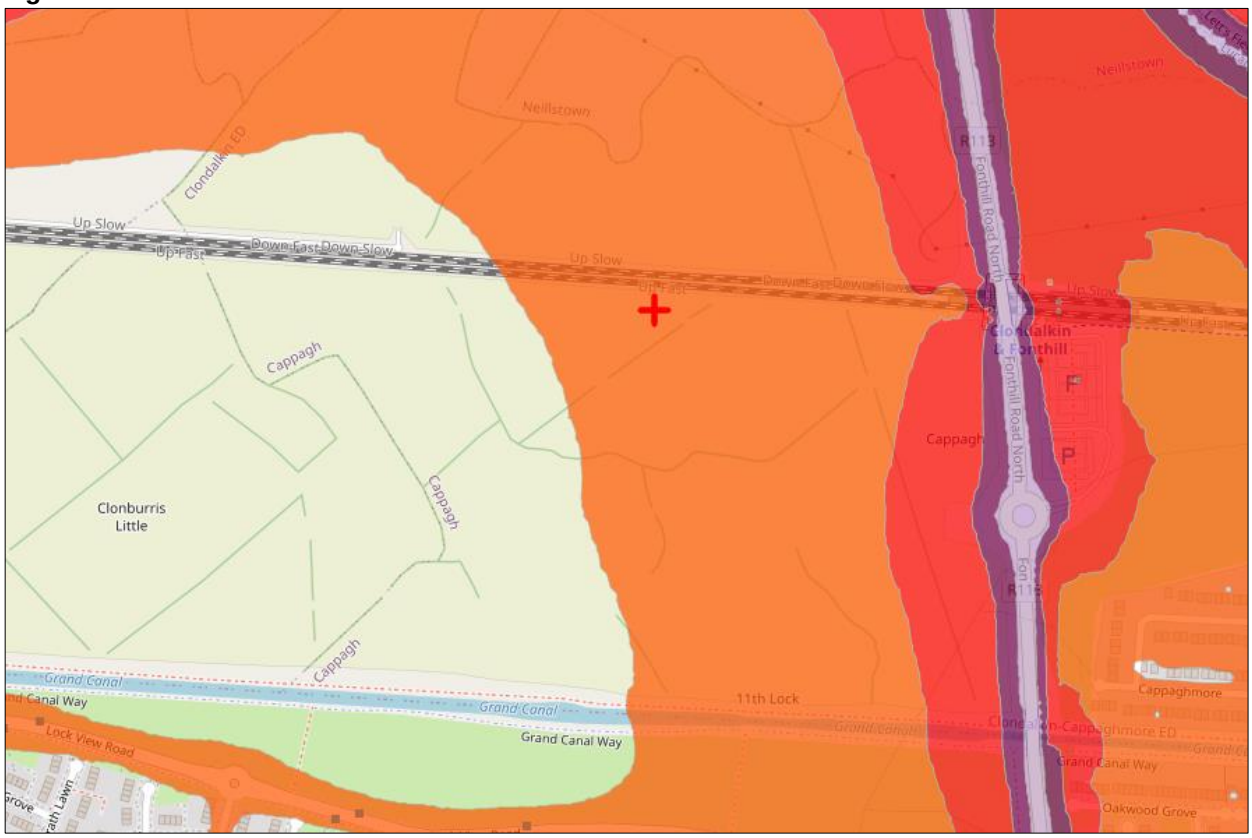
Figures 8.3 - 8.7 show the noise contours associated with the Dublin-Cork Train Line for the Lden and Lnight periods.

Figure 8.3 – Train Noise Lden



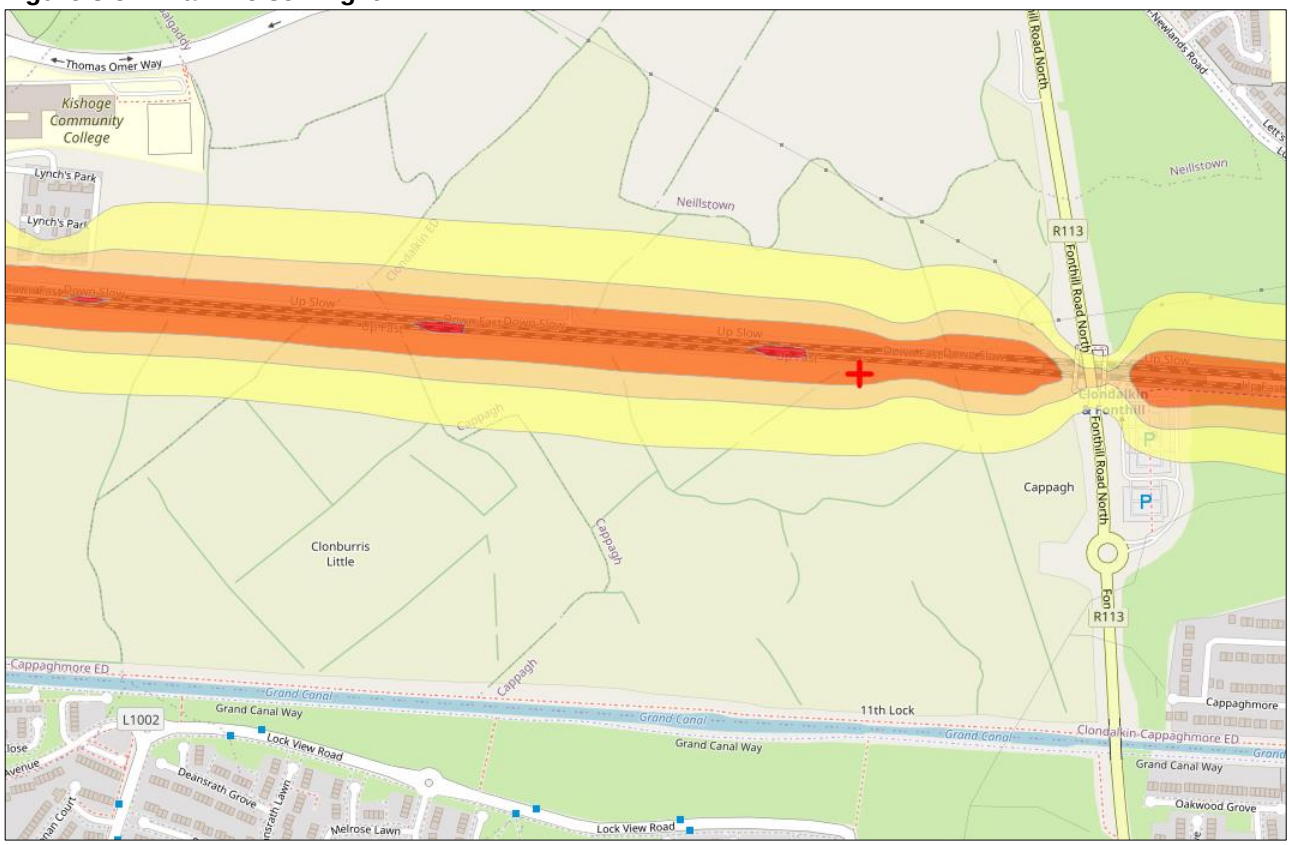
Purple 65 – 69 Lden Red 60 - 64 Lden Orange 55 - 59 Lden

Figure 8.4 – Road Noise Lden



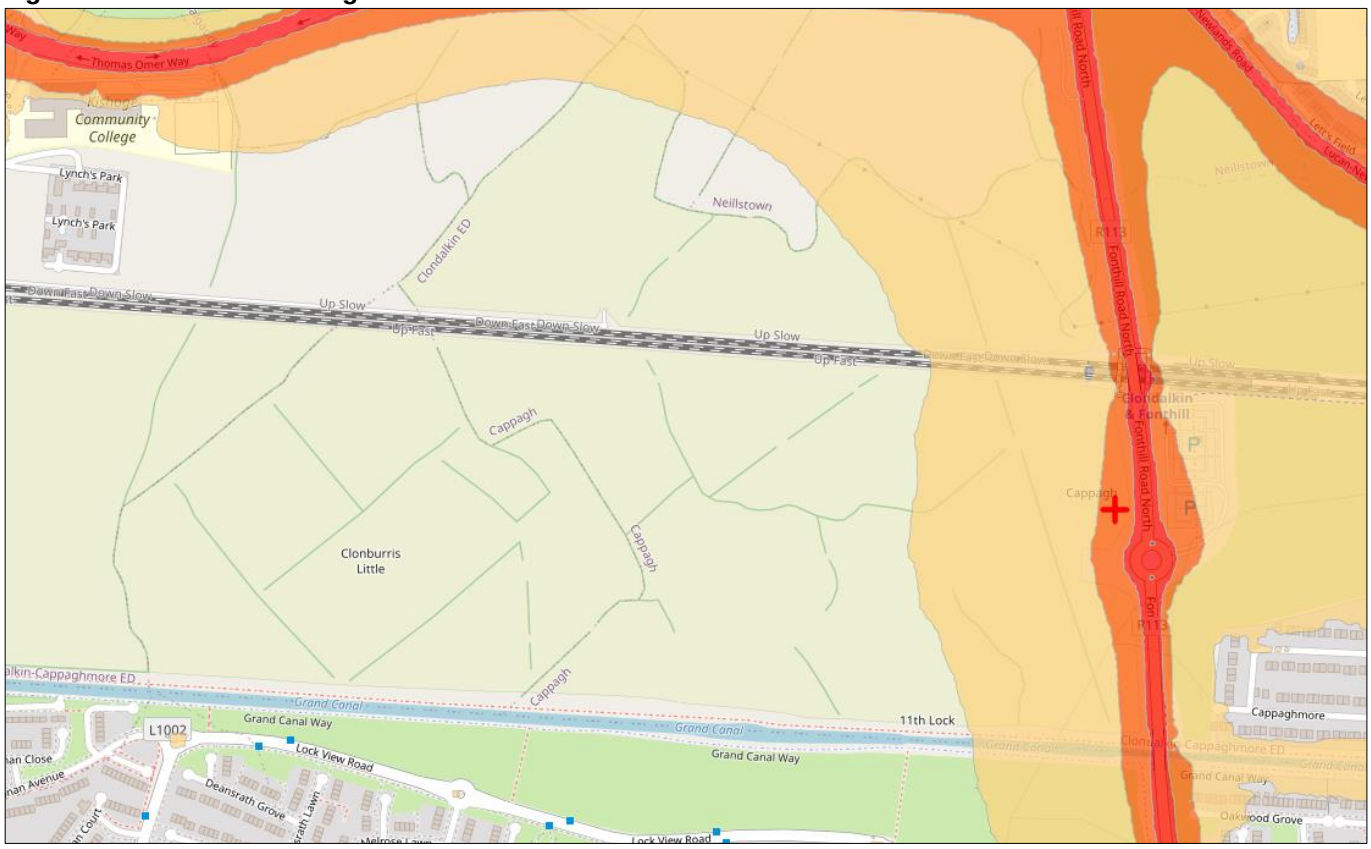
Purple 65 -69 Lden Red 60-64 Lden Orange 55-59 Lden

Figure 8.5 – Train Noise Lnight



Orange 55 - 59 Lnight Cream 50 – 54 Lnight Yellow 45 – 49 Lnight

Figure 8.6 – Road Noise Lnight



Red 60 – 64 Lnight Orange 55 - 59 Lnight Cream 50 – 54 Lnight

8.3.5 Dublin Agglomeration Noise Action Plan (2018-2023) Assessment

The Dublin Agglomeration Noise Action Plan 2019 - 2023 (DNAP) has been prepared in accordance with the requirements of the European Communities Environmental Noise Regulations 2018, S.I. No. 549 / 2018. These Regulations give effect to the EU Directive 2002/49/EC relating to the assessment and management of environmental noise.

The objectives of the Noise Action Plan are to avoid, prevent and reduce on a prioritised basis, where necessary, the harmful effects due to long term exposure to environmental noise. This can be achieved by taking a strategic approach to managing environmental noise and following a balanced approach in the context of sustainable development.

The DNAP 2019 - 2023 includes noise level thresholds as follows:

Desirable Low Sound levels
< 50 dB(A) Lnight
< 55 dB(A) Lday

Undesirable High Sound levels
> 55 dB(A) Lnight
> 70 dB(A) Lday

Table 8.10 summarises the DNAP desirable and undesirable levels against site levels

Table 8.10 – On-site Lden, Lnight compared against DNAP levels

Site Area	Measured Lden dB(A)	DNAP Limit Criteria Lden dB(A)	Measured L_{Night} dB(A)	DNAP Limit Criteria L_{Night} dB(A)
Eastern Site Road Traffic	60 - 64	<70	50- 59	<57
Northern Site Rail Traffic	65 - 69	<70	55-59	<57
Assessment	Below DNAP Lden limit		Above DNAP Lnight limit	

8.3.6 Significance

It may be concluded that the impact of road and rail traffic noise on the proposed development is below the Lden undesirable noise limit but the Lnight levels are above the undesirable noise limit specified in the *Dublin Agglomeration Noise Action Plan 2018-2023* '

With regard to the ProPG Risk Assessment, the northern and eastern site boundaries are characterised as being medium risk zones and as such the development will require good acoustic design to ensure future residents are not adversely impacted by external noise.

8.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

Short term noise exposure during the construction phase must be managed and controlled to acceptable levels. There are a number of existing residential noise sensitive receptors located in proximity to the development site boundaries. It is fundamental that the proposed development or any aspect of the proposed development must not adversely impact the existing noise levels experienced at these receptors over the long term.

The operation of the proposed development will not include any commercial or retail activities and noise associated with its operation will be limited to normal domestic activities.

8.5 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

Various elements of both the construction and operational phases of the proposed development have the potential to impact on the receiving on the local receiving noise environment, on adjacent residential properties and on human health. The potential effects of the proposed development are considered for the short-term construction phase (effects lasting between 1 -7 years) and permanent operational phase (effects lasting 15- 60+ years).

8.5.1 Potential Construction Impacts

Works activities associated with the 'Site set up' will be undertaken prior to construction works commencing. The setting up of the site shall involve the construction of site security hoarding and site compounds, site offices, materials and waste storage areas and staff welfare facilities. These short-term activities will have a minimal potential to generate excessive noise levels.

The proposed development involves the ground clearance of the existing site to facilitate the proposed development including buildings, internal roads and hard standing areas, services and landscaped areas.

Site clearance, levelling and an element of ground excavation shall also occur at this stage. A variety of items of plant will be in use during site clearance and ground excavation. These will include excavators, dump trucks, compressors and generators, pneumatic breakers and piling plant. The operation of these items of plant has the potential to generate short term elevated noise levels beyond the site boundary.

During the site clearance works and the basement bulk dig, the movement of trucks to and from the site shall result in an increase in the volume of HGV's within the immediate area and along the proposed haul routes which will generate additional noise levels.

In the absence of mitigation, the impacts arising from the enabling works in terms of noise have the potential to propagate beyond the site boundaries.

8.5.1.1 Main Construction Works

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. The construction noise levels will be of relatively short-term duration and will only occur during daytime hours which will serve to minimise the noise impacts at local existing receptors.

There is potential that the construction phases shall result in a short-term moderate increase in noise levels in the area as well as introducing tonal and impulsive noise as a result of construction activities such as pneumatic breaking, cutting, excavating, vehicle movements and general manual construction activities.

The proposed construction phase noise mitigation measures 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.

The predicted construction noise levels that will be experienced at the nearest residential receptors as a result of construction activities have been calculated using the activity LAeq method outlined in BS 5228 1:2009+A1 2014 – Code of Practice for noise and vibration control on construction and open sites – Part 1 Noise.

Table 8.10 details the assumed plant items during the key phases of construction with the associated source reference from BS 5228: 2009+A1 2014. The closest residential areas to the proposed development site are located at NSR1 Cappaghmore c. 150m southeast and the NSR2 Linsdfarne estates off Lock View Road , c. 200m south of the site.

Table 8.11 – Predicted construction noise predictions associated with building construction works

Plant Item	BS 5228 Reference	Construction Noise Level LAeq dB
Generator (enclosed)	C.4 Ref 76	61
Dumper truck	c.4 Ref 4	76
Tracked Excavator	C.2 Ref 29	79
Lorry	C.2 Ref 34	80
Telescopic handler	C.4 Ref 54	79
Cement mixer truck pumping concrete	C.4 Ref.25	82
Tower Crane	C.4 Ref.48	76
Calculated sound pressure levels LAeq dB at distances from receptors		
$L_{Aeq,1hr}$ at NSR1 @200m	41	
$L_{Aeq,1hr}$ at NSR2 @150m	45	

The results of the assessment conclude that the daytime construction noise Category B limit of 70dB LAeq, 1hr as measured at the closest houses at Cappaghmore southeast and the Linsdfarne estates off Lock View Road can be complied with during construction works. It is also important to note that the impact due to construction activities will be transient in nature and the noise levels detailed in Table 8.11 represent worst case scenarios when all items of plant are operating simultaneously at the closest point to the Cappaghmore and the Linsdfarne estates.

Construction noise impacts will be short-term, locally negative and moderate.

8.5.2 Construction Traffic Noise

The maximum volume of construction traffic will be associated with the bulk excavation which will generate up to 70 HGV movements per day on the haul routes to and from the site along public roads, the resulting average predicted traffic noise level at the closest receptors is calculated as follows:
The predicted noise levels at any receptor located within 5m of the haul route road has been calculated using a standard international acoustical formula as described below.

LAeq, T = SEL + 10log10(N) - 10log10(T) + 20log10(r1/r2) dB

where

LAeq, T	is the equivalent continuous sound level over time period (T) (3600 sec);
SEL	is the A weighted Sound Exposure Level of the noise event (77dB);
N	is the number of events over the time period T (70);
r1	is the distance at which SEL is assessed (5m)
r2	is the closest distance to the receptor from the road (10m)

The calculations are based on a 10-hour working day a maximum, a Sound Exposure Level of 77dBA for the trucks and the minimum distance between the local road passing by each of the nearest noise sensitive receptors to the public road (10m). No attenuation, above geometric spreading, has been considered within these calculations may be considered the worst-case scenario.

The maximum predicted LAeq, period values as a result of the HGV traffic movements at the nearest noise sensitive receptors located along the haul route roads is predicted to be 54dBA, LAeq, period.

It is not expected that the predicted short-term increase in HGV movements associated with the construction phase of the development will have an adverse impact on the existing noise climate of the wider area or on local receptors.

Construction traffic noise impacts will be short-term, locally negative and not significant.

8.5.3 Construction Vibration

The most significant potential sources of ground borne vibrations that may be generated during the construction phase of the development will be generated by the following practices:

- Movement of site vehicles bulldozers, tracked excavators and dump trucks on ground surfaces
- Hard core surfaces and haul road compaction with vibro-rolling vehicles
- Road construction surface vibro-rolling

Vibration impacts have been considered from any particular plant items that have the potential to generate perceptible levels of vibration.

Depending on the methods of construction, there is the possibility of construction related vibration impacts on human beings as a result of ground preparation and concrete foundation excavation activities. However, such sources of vibration shall be temporary and intermittent.

It is predicted that vibration levels associated with construction activities at the closest receptors to the site will not exceed 0.500mm/sec PPV.

Human response to groundbourne vibrations will be perceptible at levels between 0.14 to 1.0 mm/sec PPV.

Construction vibrational impacts will be short-term, neutral and imperceptible.

8.5.4 Potential Operational Phase Impacts

8.5.4.1 Outward Traffic Noise Impact

The operational noise aspects associated with the completed development can be classified as follows:

- Outward noise impacts on the receiving environment and existing receptors
- Inward noise impacts on the development from other external noise sources

The main potential for altering the noise environment once the development is operational, and thus impacting neighbouring residential receptors, will be associated with increased traffic movement in the area.

The Traffic and Transportation Assessment Report prepared by DBFL Consulting Engineers includes a detailed assessment of the traffic impact associated with the proposed development. As part of this assessment, detailed traffic flow information as Annual Average Daily Traffic (AADT) has been derived for the existing road network for the "No development" and the "With development" scenarios.

The percentage traffic increase associated with the development has considered existing junctions on the local road network and the entrance to the development as detailed in Table 8.11.

Table 8.12 – % Increase in traffic at junctions

Junction	Do Something Scenario Generated Traffic	Percentage Increase
	AADT 2040 AM/PM	AADT 2040 AM/PM
Ninth Lock/CSLS	1734/1740	1.6/1.5
R113 Fonthill Rd/CLCS	2599/2747	2.5/2.0
CSLS/ New link road	972/913	5.1/5.3
CNLS/New Link Road	1102/896	1.3/1.6
R113 Fonthill Rd/CNLS	2588/2354	1.2/1.2

The UK Design Manual for Roads and Bridges (DMRB, Volume 11, Section 3, Part 7) states that it takes a 25% increase or a 20% decrease in traffic flows in order to get a 1dBA change in traffic noise levels. On this basis, the traffic flow increases associated with the fully completed development to the design year of 2040 will result in an increase of <1dB(A) over existing traffic noise levels which will be imperceptible.

Operational Phase outward noise impacts will be long-term, neutral and imperceptible.

8.5.4.2 Inward Noise Impact

The development includes the provision of car parking spaces for the residential units. Vehicles within the residential areas will generally travel at speeds <20kmph as a result of speed limit signage and speed reducing ramps throughout the development which result in relatively low noise levels being generated by internal vehicle movements.

Neighbourhood **Noise**

Within the proposed development, sounds generated by everyday domestic activities including waste collection activities, pedestrians, children, and use of open spaces, are part of everyday living, and are not considered "noise" in the sense of a potential nuisance. These activity noises would not have any potential to cause an adverse noise impact beyond the boundaries of the site or within the site itself.

ProPG Assessment

The Professional Guidance on Planning & Noise (ProPG) document May 2017 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) has been generally considered as a best practice guidance and has been widely adopted in the absence of equivalent Irish guidance.

A site should not be considered a negligible risk if more than 10dB(A) LAFmax events exceed 60 dB during the night period and the site should be considered a high risk if the LAFmax events exceed 80 dB more than 20 times a night.

With regard to the ProPG risk assessment and the measured baseline noise levels, Element 1 of the ProPG Risk Assessment of the development site has classified the northern and eastern boundaries having a medium risk in terms of the existing ambient noise levels during the daytime period and night time periods.

ProPG states the following with respect to medium and high risks:

ProPG 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 Acoustic Design Statement 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.

Element 2 of the ProPG Risk Assessment sets out recommended internal noise targets derived from BS 8233 (2014). The recommended indoor ambient noise levels are set out in Table 8.12 and are based on annual average data levels.

Table 8.13 – ProPG Internal Noise Levels

Activity	Location	(07:00 to 23:00hrs)	(23:00 to 07:00hrs)
Resting	Living Room	35 dB $L_{Aeq, 16hr}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq, 16hr}$	-
Sleeping (Daytime Resting)	Bedroom	35 dB $L_{Aeq, 16hr}$	30 dB $L_{Aeq, 8hr}$ 45 dB L_{AFmax}

Operational Phase inward noise impacts will be long-term, neutral and slight.

8.5.5 'Do Nothing' Scenario

If the site remains undeveloped it shall continue to have no noise or vibrational impact on the receiving environment. Based on the projected increase in traffic the increase in traffic noise levels in the area without the subject development would be < 3dB. This increase above the existing situation would be minor and would not result in an perceptible change in the existing noise climate at any local receptor.

8.6 CUMULATIVE NOISE IMPACTS

In accordance with *Schedule 6, Part 2(c) of the Planning and Development Regulations 2001-2018*, this section has considered the cumulative impact of the proposed development in conjunction with existing adjacent development and future development in the vicinity of the subject site. This section relates to the cumulative impact on the subject site itself and on surrounding sites.

The potential and predicted impacts of the operational phases of the proposed development have been individually assessed. Other lands to the west of the subject site are likely to be developed in the future as part of the Clonburris SDZ and future development applications will be subject to similar impact assessment to ensure the construction and operation phases to not have an adverse impact on the receiving environment or on local noise sensitive receptors.

The noise impacts associated with future adjacent residential developments will be similar to the noise generated by the subject residential development in that the construction phases will generate short term slight to moderate impacts and the impact of the operational phase will be long-term and not significant.

It is considered that there will be short-term slight to moderate negative cumulative impacts in terms of noise associated with the construction phase of the subject development and the adjoining permitted development should construction activities at each site occur at the same time. However, it is predicted that there will be an overall long term positive cumulative impact as a result of the proposed development, due to the modern residential buildings, significant public open spaces and amenity areas and facilities that are being provided for existing and new residents of the area.

Once the subject development is completed and if the lands to the west are developed there will be no adverse residual adverse noise impact on the receiving environment associated with their operation. Increased traffic

movements associated with all developments will generate a long-term not significant impact on the local noise climate during peak hour times.

8.7 AVOIDANCE, REMEDIAL AND MITIGATION MEASURES

8.7.1 Construction Phase Noise & Vibration mitigation

The following noise management measures shall be implemented at the site from the outset of site activities to control and manage noise levels during the construction phase of the proposed development:
Noise complaints shall be investigated by site management.

N&V CONST 1 Construction Works Noise Control & Mitigation
Noise-related mitigation methods are described below and will be implemented for the project in accordance with best practice. These methods include:

- no plant used on-site will be permitted to cause an ongoing public nuisance due to noise;
- the best means practicable, including proper maintenance of plant, will be employed to minimise the noise produced by on-site operations;
- all vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the contract;
- compressors will be attenuated models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers;
- machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use;
- during construction, the appointed Contractor will manage the works to comply with noise limits outlined in *BS 5228-1:2009+A1 2014. Part 1 – Noise;*
- all items of plant will be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures;
- limiting the hours during which Site activities which are likely to create high levels of noise or vibration are permitted; and
- monitoring levels of noise and vibration during critical periods and at sensitive locations.

Furthermore, it is envisaged that a variety of practicable noise control measures will be employed. These may include:

- selection of plant with low inherent potential for generation of noise and/or vibration;
- erection of good quality site hoarding to the site perimeters which will act as a noise barrier to general construction activity at ground level;
- erection of barriers as necessary around items such as generators or high duty compressors; and situate any noisy plant as far away from sensitive properties as permitted by site constraints.
-

N&V CONST 2 Vibration Mitigation Measures
The following specific vibration mitigation and control measures shall be implemented during the construction phase:

- Choosing alternative, lower-impact equipment or methods wherever possible
- Sequencing operations so that vibration causing activities do not occur simultaneously
- Isolating the equipment causing the vibration on resilient mounts
- Keeping equipment well maintained.

8.7.2 Operational Phase Noise & Vibration Mitigation

N&V OPERA 1: External noise can enter rooms within dwellings through windows, ventilators, walls, roof and doors. In most cases, however, windows provide the main path and therefore, mitigation by design has focused on this building element to ensure that their insulation is adequate. Specific units along the northern and eastern aspects of the site shall have acoustically rated windows to prevent breakthrough of external transportation noise. In addition, Heat Recovery and Mechanical Ventilation systems will be incorporated into the design thus there will be no requirement for passive air vents.

Residential Units located fronting onto the Northern (Dublin-Cork Rail Line) and Eastern (Fonthill Road) site boundaries will require appropriately performing acoustically rated glazing with to achieve the required *BS8233* internal noise criteria. The minimum Weighted Sound Reduction Index for glazing units shall be no less than 39Rw.

Ventilation Systems

The ventilation strategy for the development will be in accordance with Part F of the Building Regulations. The apartment units shall include mechanical heat recovery ventilation systems which will negate the requirement for passive wall vents in bedrooms and living spaces which would otherwise allow the transfer of external noise into the building through the air gaps in the passive vents. However, windows may remain openable for rapid or purge ventilation, or at the occupant's choice.

The operational phase of the development is predicted not to have an adverse outward noise impact on the receiving environment or on existing residential developments adjacent to the site during the operational phase of the scheme. Therefore, no mitigation measures additional to those set out above are proposed.

8.7.3 Internal Noise Control – Residential Units

At the earliest stage during the construction phase, test apartments and houses shall be constructed to their finished level and shall be tested by a suitably qualified independent Acoustic Engineer to ensure that they comply with *Department of the Environment, Building Regulations 2014, Technical Guidance Document E – Sound.* Table 8.13 provides detail on the recommended sound insulation values that shall be achieved to ensure acoustic privacy between adjoin residential units.

Table 8.14 – Recommended sound insulation values for internal party walls / floors

Dwellings	Airborne Sound Insulation D_{nTw} (dB)	Impact Sound Insulation L_{nTw} (dB)
Floors and Stairs	53	58
Walls	53	N/A

8.7.4 'Worst-case' scenario

The worst-case scenario would arise where the mitigation measures are not implemented. Should noise mitigation measures not be implemented during the construction phase, the potential for noise nuisance will increase.

8.8 RESIDUAL IMPACT ASSESSMENT

8.8.1 Construction Phase

8.8.1.1 Residual Noise Impact

The impact of the construction phase will result in an increase in daytime noise levels at the closest receptors to the site. With mitigation measures in place, it is predicted that the guideline construction noise limit of 70dB(A) $L_{Aeq, 1\text{-hour}}$ can be complied with.

Table 8.15 – Summary of Construction Phase Likely Significant Effects without Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Construction Phase Noise	Negative	Moderate to significant	Local	Likely	Temporary to Short-Term	Worst Case
Construction Phase Vibration	Negative	Not Significant	Local	Likely	Short-Term	Worst Case

8.8.1.2 Residual Vibration Impact

Site activities, in particular ground clearance and piling works will generate perceptible vibration at the closest residential receptors located west of the site. It is predicted that vibration levels associated with construction activities at the closest receptors to the site will not exceed 15 mm/sec PPV. Human response to groundbourne vibrations will be perceptible at levels between 0.14 to 1.0 mm/sec PPV.

8.8.2 Operational Phase

8.8.2.1 Residual Noise Impact

The operational phase of the development will not adversely impact the existing noise climate at local receptors. The residual operational noise impact will be neutral, long-term and not significant.

Table 8.16 – Summary of Operational Phase Likely Significant Effects without Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Operational Phase Noise	Neutral	Not Significant	Local	Likely	Long-Term	Residual.

8.8.2.2 Residual Vibration Impact

The operational phase of the development will not generate ground borne vibration levels.
The residual operational vibration impact will be neutral, long-term and imperceptible.

8.8.3 Cumulative

The cumulative noise and vibration impacts associated with the proposed development and future local developments will not result in an increased impact on the closest receptors to the proposed development site.

8.8.4 Summary

Table 8.17 below summarises the identified likely significant effects of the proposed development during the construction phase post application of mitigation measures.

Table 8.17 – Summary of Construction Phase Likely Significant Effects with Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Construction Phase Noise	Negative	Slight	Local	Likely	Temporary to Short-Term	Residual
Construction Phase Vibration	Negative	Not Significant	Local	Likely	Short-Term	Residual

Table 8.18 below summarises the identified likely significant effects of the proposed development during the operational phase post application of mitigation measures.

Table 8.18 – Summary of Operational Phase Likely Significant Effects with Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Operational Phase Noise	Neutral	Not Significant	Local	Likely	Long-Term	Residual.

8.9 RISKS TO HUMAN HEALTH

Construction phase noise and vibration emissions will be temporary and transient and will be managed so as to minimise impact to population and human health by complying with all relevant guidance, as such the impact will be short-term and have a slight impact overall.

Operational phase noise will also be managed to achieve relevant noise limit values and is predicted to meet all such requirements. No operational phase vibration impacts are predicted. Therefore, the operational phase noise impacts will be neutral for the life of the development. It has been predicted that the exposure of humans to the cumulative noise associated with increased traffic levels from all developments will be low and the impact will be long-term and not significant with and will not result in an adverse noise impact on the existing or the future population in the local area.

8.10 INTERACTIONS

The principal interactions between Noise & Vibration impacts and Human Beings have been addressed in this chapter. The mitigation measures described shall be implemented to ensure that human health and residential amenity are not adversely impacted by any aspect of the construction or operational phases of the development.

8.11 MONITORING

8.11.1 Construction Phase Noise Monitoring

This section describes the noise and vibration monitoring methodologies that shall be implemented at the site to ensure that construction site activities do not cause excessive nuisance at local receptors and to demonstrate how live monitoring systems will assist construction management to comply with noise and vibration limit criteria.

A programme of continuous noise monitoring at the closest receptors to the site shall be undertaken to assess and manage the impact that site activities may have on ambient noise levels at local noise sensitive receptors.

These surveys will establish the noise impact of site activities at the closest noise sensitive receptors to assess compliance with the specified construction noise limit criteria and to ensure that mitigation and control measures are being implemented as required.

All noise monitoring data will be compiled into a monthly technical monitoring report which will include a full assessment of the potential noise impacts arising from site construction activities.

The environmental noise measurements will be completed in accordance with the requirements of *ISO 1996-1: 2017: Acoustics – Description, measurement and assessment of environmental noise and with regard to the EPA's 2016 Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4).* The measurement parameters to be recorded include L_{Aeq}, L_{A90}, L_{A10} and L_{Amax} , and 1/3 Octave Frequency analysis to allow tonal noise to be identified.

All live noise monitoring systems shall be programmed to include audio recording to allow construction management identify the source of high noise. The systems shall be capable of transmitting live text and email alerts to nominated construction staff should a noise limit be approached or exceeded.

Noise monitoring shall be conducted in proximity to the closest residential receptors to the site.

8.11.2 Construction Phase Vibration Monitoring

In order to ensure that site construction activities are conducted to minimise the vibration impacts on the receiving environment, it is proposed that structural vibration monitoring shall be implemented during the course construction works. It is proposed that vibration monitoring will be conducted at the closest adjacent residential properties using live data logging vibration monitors and geophones with live text and email alert functionality to ensure that if vibration levels approach or exceed the specified warning and limit values, nominated construction staff shall be instantly

alerted to cease at the earliest instance and appropriate mitigation measures may then be implemented to minimise the ongoing impact on the monitored structures.

The monitoring points chosen for locating the geophone of the vibration measuring instrument will be determined according to the guidelines in British Standard BS 7385:, Evaluation and measurement for vibration in buildings, Part1 1990 Guide for measurement of vibrations and evaluation of their effects on buildings and Part 2 1993 Guide to damage levels arising from groundborne vibration.

8.11.3 Summary of Mitigation & Monitoring

Table 8.19 below summarises the proposed construction phase mitigation and monitoring measures.

Table 8.19 – Summary of Mitigation and Monitoring

Likely Significant Effect	Mitigation	Monitoring
Site preparation, piling works, general construction works	Best Practice Noise Mitigation in accordance with BS5228 Part 1	Continuous live noise surveys for duration of construction phase
Site preparation, piling works, general construction works	Best Practice Noise Mitigation in accordance with BS5228 Part 2	Continuous live vibration surveys for duration of construction phase

8.11.4 Operational Phase Monitoring

No monitoring required during the operational phase of the development.

8.12 REINSTATEMENT

Reinstatement issues are not relevant to this Chapter of the EIAR, with reference to the construction and operational phase.

8.13 DIFFICULTIES ENCOUNTERED IN COMPILING

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

9.0 LANDSCAPE AND VISUAL IMPACT ASSESSMENT

9.1 INTRODUCTION

Murray and Associates were engaged to complete a Landscape and Visual Impact Assessment for the proposed residential developments, and associated infrastructural works, on lands located within the Clonburris Strategic Development Zone, County Dublin. The subject site is located in the south-western section of the SDZ lands, within development areas CSW-S3 and CSW-S4 as defined within the Clonburris SDZ Planning Scheme. The subject lands are located in the Clonburris South West Development Area, The subject lands comprise an undeveloped, greenfield site of c. 17.02 hectares and is situated to the north of the Grand Canal and to the west of the Fonthill Road (R113).

The report was completed by Jim Bloxam (MLArch, MILI), a Senior Associate Landscape Architect. He holds a master's degree in Landscape Architecture from University College Dublin and is a full corporate member of The Irish Landscape Institute.

The landscape and visual impact assessment of the proposed development is a means of appraising the affect the proposed development would have on the receiving environment in terms of quality of landscape – both physically and visually. The assessment aims to indicate the layout and design of the proposed development which would present the least overall landscape and visual impact.

9.2 STUDY METHODOLOGY

The assessment has operated in a stepwise refinement method with the identification of effects forming the basis for design of the proposed scheme. Therefore, the methodology has informed and assisted in the design of the proposed development as opposed to being an assessment of a predetermined development. For the purposes of impact assessment, however, the landscape planting will be described under the mitigation measures section and effects with and without this mitigation will be considered as part of the study.

The methodology employed in the landscape and visual impact assessment is as follows:

- Desktop survey of detailed maps, aerial photography and other information relevant to the study area, including the South Dublin County Council Development Plan 2016 - 2022 and the Clonburris SDZ Planning Scheme 2019.

- Site survey and photographic survey to determine landscape character of the general study area and specific landscape of the site.

Assessment of the potential significant impacts of the proposed scheme utilising the plan and elevation drawings of the scheme to determine the main impacting features and the degree to which these elements would be visible in relation to observations made during the field survey. In determining visibility, the views to the proposed development site are considered based on the heights, finishes, design and other visual characteristics of the proposed structures and setting. Verified photomontages have also been prepared to give an accurate visual representation of the proposals from a selection of viewpoints.

The proposal of a scheme of mitigation measures. These will be defined as measures which will be generally implemented and specific landscape measures which would be site-specific and address particular landscape or visual issues identified.

An evaluation of the effects of the scheme with and without amelioration. For the purposes of assessment, the predicted visual effects of the scheme (if any) are assumed at 10 years (i.e. medium term effects) following the completion of the proposed development. This is to allow a professional judgement on visual effects that is based on early mature tree planting sizes.

Landscape impacts are defined as changes in the fabric, character and quality of the landscape as a result of the development. This includes direct effects on landscape receptors and greater effects that can alter the wider distinctiveness of the landscape. Landscape receptors are the physical or natural resource, special interest or viewer group that will experience an effect. The sensitivity (of a landscape receptor) is the vulnerability to change. The extents of the landscape effects have been assessed by professional evaluation using the terminology defined as per Tables 9.1, 9.2, 9.3, 9.4, 9.5 and 9.6.

The terminology is based on the criteria set down in the *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*, published by the EPA (Draft, August 2017) and with additional guidance from *Guidelines for Landscape and Visual Impact Assessment* (3rd Edition, by The Landscape Institute / Institute of Environmental Assessment published by Routledge, 2013). This chapter also has regard to the *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning & Local Government, 2018),* and *Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017).*

Table 9.1 – The extent of Landscape Effect

Imperceptible Effects	An effect capable of measurement but without noticeable consequences. There are no noticeable changes to landscape context, character or features.
Not Significant	An effect which causes noticeable changes in the character of the landscape but without noticeable consequences. There are no appreciable changes to landscape context, character or features.
Slight Effects	An effect which causes noticeable changes in the character of the landscape without affecting its sensitivities. There are minor changes over a small proportion of the area or moderate changes in a localised area or changes that are reparable over time.
Moderate Effects	An effect that alters the character of the landscape in a manner that is consistent with existing and emerging trends. There are minor changes over some of the area (up to 30%) or moderate changes in a localised area.
Significant Effects	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the landscape. There are notable changes in landscape characteristics over a substantial area (30-50%) or an intensive change over a more limited area
Very Significant Effects	An effect which, by its character, magnitude, duration or intensity significantly alters the majority of a sensitive aspect of the environment. There are notable changes in landscape characteristics over a substantial area (50-70%) or a very intensive change over a more limited area.
Profound Effects	An effect which obliterates sensitive characteristics. There are notable changes in landscape characteristics over an extensive area (70-100%) or a very intensive change over a more limited area.

Visual effects relate solely to changes in available views of the landscape and the effects of those changes on people viewing the landscape. They include the direct effect on views of the development, the potential reaction of viewers, their location and number and the effect on visual amenity. The intensity of the visual effects is assessed by professional evaluation using the terminology defined as per Tables 9.2 – 9.6 below:

Table 9.2 – The extent of Visual Effect

Imperceptible Effects	There are no changes to views in the visual landscape.
Not Significant	An effect which causes noticeable changes in the character of the visual environment but without noticeable consequences. The proposal is adequately screened due to the existing landform, vegetation or constructed features.
Slight Effects	An effect which causes noticeable changes in the character of the visual environment without affecting its sensitivities. The affected view forms only a small element in the overall visual composition, or changes the view in a marginal manner.
Moderate Effects	An effect that alters the character of the visual environment in a manner that is consistent with existing and emerging trends. The proposal affects an appreciable segment of the overall visual composition, or there is an intrusion in the foreground of a view.
Significant Effects	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the visual environment. The proposal affects a large proportion of the overall visual composition, or views are so affected that they form a new element in the physical landscape.
Very Significant Effects	An effect which, by its character, magnitude, duration or intensity significantly alters the majority of a sensitive aspect of the visual environment. The proposal affects the majority of the overall visual composition, or views are so affected that they form a new element in the physical landscape.

Profound Effects	An effect which obliterates sensitive characteristics. The view is entirely altered, obscured or affected.

Table 9.3 – The Quality of the Landscape & Visual Effect

Neutral Effect	Neither detracts from nor enhances the landscape of the receiving environment or view
Positive Effect	Improves or enhances the landscape of the receiving environment or a particular view
Negative Effect	Detracts from the quality of the landscape or view

Table 9.4 – The Duration of the Landscape & Visual Effects

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

Please note: "Momentary" and "Brief" Effects as defined in the Draft EPA Guidelines (August 2017) are not considered relevant to landscape & visual assessment as effects of such short duration are extremely unlikely to generate appreciable effects.

Table 9.5 – The Extent and Context of Effects

Extent	Describes the size of the area, the number of sites and the proportion of a population affected by an effect
Context	Describes whether the extent, duration or frequency conforms or contrasts with established conditions

Table 9.6 – The Probability of Effects

Likely Effects	Effects that can be reasonably expected to occur if all mitigation measures are properly implemented.
Unlikely Effects	Effects that can be reasonably expected not to occur if all mitigation measures are properly implemented.

The landscape and visual assessment methodology will be utilised in conjunction with a professional evaluation of the proposed development to determine the likely significant effects of the project and the degree of effect.

The term 'study area' as used in this report refers to the site itself and its wider landscape context in the study of the physical landscape and landscape character. This may extend for approximately 1km in all directions from the site in order to achieve an understanding of the overall landscape. In terms of the visual assessment, the study of visual amenity may extend outside the study area, from areas where views of the site are available, but the majority of visual effects for a development of this nature would be most significant within 500m.

The assessment has operated in a stepwise refinement method with the identification of effects forming the basis for the design of the proposed scheme. Therefore, the methodology has informed and assisted in the design of the proposed development as opposed to being an assessment of a predetermined development.

9.3 EXISTING RECEIVING ENVIRONMENT (BASELINE SCENARIO)

9.3.1 Site Characteristics

The site consists of 17.02 hectares of historically agricultural lands with associated hedgerow and drainage features. The Dublin-Kildare rail line runs east/west is approximately 170 metres to the north of the development area. The Grand Canal is adjacent to the south of the site, also running east/west. To the east the Fonthill Road (R113) runs north/south with the Clondalkin Fonthill Railway Station approximately 300 metres to the north-east. To the west the agricultural lands are bounded by the elevated R136 roadway running north/south.

The site is relatively flat overall, with gentle undulations over the extent of the land. There is a larger level difference between the site and the raised northern bank of the Grand Canal in some areas, between two and three metres.

Within the site the existing vegetation is mainly comprised of hedgerows and associated tree lines. More recent planting is evident as a result of new infrastructural roadway development (R113 and R136).

Much of the land between the hedgerows has reverted to scrub or re-colonised bare ground following the cessation of agricultural activity or management over the recent decades.

The Grand Canal to the south has significant and established vegetated zones with matures trees on both sides of the water body.

9.3.2 Planning Context

The entire site is within the Clonburris Strategic development Zone (SDZ) Planning Scheme of 2019. The planning scheme states that SDZs are 'a robust and important mechanism in providing for growth and urban expansion in the medium to long term.'

Key underlining principles within the SDZ include:

- To protect, enhance and develop an interconnected green and blue infrastructure network of parks, open spaces, hedgerows, grasslands, protected areas, rivers and streams for amenity and recreation, biodiversity protection, flood management and adaptation to climate change;
- To retain and improve key landscape and ecological features such as hedgerows, the Grand Canal and the Griffeen River;
- To incorporate new elements of Green and Blue Infrastructure such as tree planting, parks and natural open spaces and sustainable urban drainage systems;
- To connect parks and areas of open space with ecological and recreational corridors to aid the movement of biodiversity and people and to strengthen the overall Green Infrastructure network;
- To support native plant and animal species and encourage corridors for their movement; and
- To seek to retain hedgerows, aquatic habitats and established tree lines wherever possible.
- To aid the retention and protection of existing habitat there is a required setback for all buildings from the boundary of the Proposed Natural Heritage Area associated with the Grand Canal. As stated within the SDZ Planning Scheme document,

  '*Development proposals on the SDZ lands close to the Grand Canal shall protect and incorporate high value natural heritage features including watercourses, wetlands, grasslands, woodlands, mature trees, hedgerows and ditches and include for a 50m setback for all buildings and a 30m set-back distance for development (with the exception of bridges and footpaths) from the pNHA boundary to facilitate the continuity of the Grand Canal as a corridor for protected species, biodiversity, and a fully functioning Green Infrastructure network.'*

- A Parks and Landscape Strategy (incorporating a Biodiversity Management Plan) has been prepared for the entire SDZ area that has informed the design of the Cairn Lands to the south-east.

Further planning context within South Dublin County Council development plans include:

- Views and Prospects
There are no listed or protected views within the vicinity

- Green Infrastructure
Within the County Development Plan Policy 6 (New Development in Urban Areas) has specific objectives with regards to hedgerows and associated ecological features (G6 Objective 1). Also included are objectives dealing with connections to wider green infrastructure network (G6 Objective 2) and open space provision within new developments (G6 Objective 3).

- Protected Trees
There are no tree protection orders on trees within the site.

- Protected Structures
There are no protected structures within the site. There is a visual link with the Omer Lock House (a protected structure) to the north of the Grand Canal.

- Architectural Conservation Areas
There are no Architectural Conservation Areas within the site.

9.3.3 Wider Site Context

The site sits in the Urban Character Area, as defined by the LCA (*Landscape Character Assessment, May 2015, Minogue & Associates*) of South Dublin County. This Landscape Character Area, occurring in the built-up and developed part of South Dublin, does not currently have a fine-grain townscape assessment that can further inform this report. However, the Assessment goes on to define the key characteristics of the Urban Character Area as:

- Built – up urban area with extensive housing estates and industrial /commercial parks. Variety of house styles and layouts dating from the late 19th century to late 20th century
- Major Traffic Corridors
- Corridors of natural and semi natural vegetation
- Grass open spaces in gardens, industrial parks, golf courses, school playing fields, and miscellaneous spaces in housing areas
- Street trees planting
- Recreational facilities – public parks and golf courses - provide amenities and ecological resources

Figure 9.1 – Landscape Character Map (Fig 21, pg 54, Landscape Character Assessment, May 2015)

Key Landscape Values pertaining to the site include the 19th century industrial heritage of the Grand Canal and views out to the Dublin Mountains and agricultural hinterland.

The LCA states that the forces for change in these areas are:

- West boundary is set against agricultural and mountain hinterlands. Untidy urban developments can adversely impact on the character of the hinterlands.

- Urban developments can impact on open views to the hinterlands.
- On- going urban infrastructure developments notably road improvements generate increasing volumes of traffic and detract from opportunities to create or maintain tranquil settings
- New infill or other built developments can be insensitive to remnant historical or vernacular features

9.3.4 Sensitivity

Landscape sensitivity refers to the inherent sensitivity to change of the landscape resource, and its overall ability to sustain its character in the face of change, as well as the visual sensitivity in terms of views, visibility, number and nature of viewers, and scope to mitigate visual impact. For example, a highly sensitive landscape is likely to be vulnerable to change whereas a landscape with a low sensitivity is likely to be less at risk from change.

Some further detailed assessment was undertaken within the over-arching areas of the Landscape Character Assessment, that divided the areas into Landscape Character Types and assigned associated sensitivity.

While the classification provides a general picture of the County's landscape, it should be noted that within each classification level there may be varying natural / environmental or cultural / social reasons why distinctly different lands fall within the same category.

The significance of effects can be measured as a function of the magnitude of change (i.e. the degree of change from the baseline) and the sensitivity of the receptor. Table 9.7 below acts as a guide for the assessor in combining these assessment criteria. It is important to note that the assessor's professional judgement, common sense and experience are also factors in ascribing rational judgements for the significance of effects.

Table 9.7 – Level of Impact resulting from a combination of Sensitivity Rating & Magnitude of Change

	Magnitude of Change				
Sensitivity	**Very High**	**High**	**Medium**	**Low**	**No appreciable change**
Very High (IV)	Profound	Very Significant	Significant	Moderate	Slight
High (III)	Very Significant	Significant	Significant	Moderate	Slight
Medium (II)	Significant	Significant	Moderate	Slight	Not Significant
Low (I)	Moderate	Moderate	Slight	Not Significant	Imperceptible
No sensitivity	Slight	Slight	Not Significant	Imperceptible	Imperceptible

In landscape and visual assessments, one of the key factors is the sensitivity of a landscape to change, where the proposed development will inevitably result in adding a new element to the landscape. The publication *Guidelines for Landscape and Visual Impact Assessment* (2013) defines sensitivity as: *"A term applied to specific receptors, combining judgments of the susceptibility of the receptor to the specific type of change or development proposed and the value related to that receptor."*

Sensitivity refers to the inherent sensitivity to change of the landscape resource, as well as the visual sensitivity in terms of views, visibility, number and nature of viewers and scope to mitigate visual impact.

During the initial research and evaluation, a typology was developed based on the fieldwork and research into the site. These categories will help to identify the sensitivity of the existing receptors.

For the purpose of the evaluation, four baseline evaluation categories shall be used with respect to sensitivity:

High (IV) – most important, most sensitive area;
Medium-High (III);
Medium (II); and
Low (I) – least sensitive area.

The baseline evaluations shall be based on:

- Legally-defined protected categories (e.g. European-protected sites, national monuments);
- Specific designations (such as those in Development Plans);
- Particularly sensitive and protection-worthy areas identified through the analysis of existing available data and site surveys.

As such, the proposed site sits in the Urban area, of which a sensitivity is not defined by the LCA. The Urban area can be defined as transitional lands that were largely rural, transforming into suburban or urban derived land use. Development radiates from established settlements and are close to transport links. Land use is generally built land comprising transport, retail/business parks, quarries and urban derived housing. It can be considered that sensitivity within the Urban area can be considered generally to be low.

Canal Sensitivity
However, the site is adjacent to the Grand Canal proposed Natural Heritage Area (pNHA), which is judged to have a low-to-medium landscape sensitivity. This is due to the existing SDZ zoning, and the existing abrupt edge conditions along the extent of the canal adjacent to the site. There are some historic elements such as the towpath, locks and Omer Lock House, but generally the historic landscape is no longer present, with late modern large-scale expansion represented by the urban fabric to the south in proximity to the canal.

Visual sensitivity of the adjacent canal is assessed as medium to high. This is due to portions of the canal being at elevated positions in relation to the proposed development, with views available of the Omer Lock House protected structure. The towpath is used as a recreational route from which there are views over the site to the north.

Visual receptors have greater potential sensitivity to change in the landscape, however this is reduced by the following existing adverse factors:

- There are visual barriers for many potential receptors, including walls, trees within existing residential receptor lands, existing roadways on raised embankments to the east and west, the railway line to the north and the existing trees and vegetation along the Grand Canal to the south. All these elements limit views into the development area.
- The site is zoned and planned for large scale development as set out in the approved Clonburris Planning Scheme 2019.. As set out in the South Dublin County Development Plan 2016-2022, the lands in question have been zoned "*To provide for strategic development in accordance with approved planning schemes"* and in the case for the subject lands for substantial residential development under the approved Clonburris Planning Scheme 2019, which envisages c. 1,441 dwelling target for the Clonburris South West Development Area (within which the subject lands are located). To mitigate this the Clonburris SDZ Planning Scheme requires a 50 metre setback from the boundary of the pNHA for all proposed buildings and a 30m setback for development (excluding pathways and bridges). This is to facilitate the Grand Canal strategic ecological corridor as defined in the Clonburris SDZ.

9.3.5 Summary:

Therefore, despite the presence of the Grand Canal pNHA, the landscape sensitivity of the immediate area of the site adjacent to the pNHA boundary can still be seen as low-medium, and low towards the northern boundary of the site further away from the pNHA boundary, and the visual sensitivity is medium to high adjacent to the canal, and low where the visual receptors are over 100 metres from the site.

Figure 9.2 – Map of Potentially Sensitive Visual Receptors

(NOTE: Numbering of Viewpoints references 3D Design Bureau's verified views, which are included in Appendix D (Volume III of the EIAR) , and in 3D Design Bureau's report under separate cover)

Table 9.8 – Visual Sensitivity Analysis

Ref.	Viewpoint location	Approx Distances from Developed Site	Description of View	Sensitivity Level
V1	Foxdene Drive	660m north (550m to haul road)	There are potential direct views from upper floors of residential dwellings, although due to the distance from the site these are considered to be of low sensitivity. The ground floor is screened by an embankment and concrete wall to Thomas Omer Way. Interceding vegetation to the north of the site also forms a screening element, as does the existing rail line.	Low (I)
V2	Foxdene Avenue and Meile An Ri Road	640m north (530m to haul road)	As above, there are potential direct views from upper floors of residential dwellings, although due to the distance from the site these are considered to be of low sensitivity. The ground floor is screened by a concrete wall to Thomas Omer Way. Interceding vegetation to the north of the site forms a screening element, as does the existing rail line.	Low (I)

Ref.	Viewpoint location	Approx Distances from Developed Site	Description of View	Sensitivity Level
V3	Tor An Ri Court	690m north (480m to haul road)	The view south towards the site from the residential properties are partial and oblique from upper floors, with the dwellings facing east and west. An embankment and concrete wall form a strong screening element to Thomas Omer Way. Interceding vegetation and the existing railway line form another screening element to the south.	Low (I)
V4	Tor An Ri Walk	770m north (480m to haul road)	The view south towards the site from the residential properties are partial and oblique, with the dwellings facing east and west. An embankment and concrete wall form a strong screening element to Thomas Omer Way. Interceding vegetation and the existing railway line form another screening element to the south.	Low (I)
V5	Foxborough Lawn	910m north (500m from haul road)	The view south and south-east towards the site from the residential properties are partial and oblique, with the dwellings facing east and west. An embankment and concrete wall form a strong screening element to Thomas Omer Way. Interceding vegetation and the existing railway line form another screening element to the south.	Low (I)
V6	View from R136	1100m west (220m to haul road)	Direct views are available to the east from the roadway, which is elevated approximately 7 metres above the development level. The distance and Interceding vegetation contribute to screening the development.	Low
V7	Kilcronan Crescent	770m west (250m south of haul road	Views of the development site are to the east and will be glimpsed and oblique. Due to the distance and interceding vegetation sensitivity is very low. Views north to the haul road during construction will be more direct, with construction traffic potentially visible. The haul road is 3m below the road level and there is interceding vegetation associated with the canal so views will be partial and glimpsed.	Low (I)
V8	Deansrath Grove, Deansrath Lawn, Melrose Lawn, Melrose Road	260m-450m south-west (150m – 180m south to the haul road)	Views north-east are mainly oblique from upper floor windows and are further restricted by the existing canal bank vegetation. Views to the haul road are also screened by the canal side vegetation.	Low (I)
V9	Grand Canal Towpath	Various to site (60m south of haul road)	Views of the development site are considered from the point of a prospect of views from the canal paths. Views will be glimpsed, partial and oblique, due to the amount of existing vegetation within the park and the canal banks	Medium To High
V10	Grand Grand Canal Towpath	Various to site (60m distance at closest point)	A closer prospect directly adjacent to the south of the development. This viewpoint has potential direct views north into the site from the elevated towpath, approximately 2 – 3 metres above the development ground level. Interceding canal bank vegetation screens portions of the development, allowing glimpsed views in.	Medium to High
V11	Grand Grand Canal	140m south-east	Potential views of the development to the north-west are screened by canal side vegetation, with	Medium to High

Ref.	Viewpoint location	Approx Distances from Developed Site	Description of View	Sensitivity Level
	Towpath – Lock 10		occasional glimpsed views into the site. The apartment block will be the most visible structure.	
V12	Lindisfarne Green, Lindisfarne Park	160m to site boundary, 200m – 250m south of development	Directly south of the development, these potential views are approximately 2m higher than the site, although interceding vegetation on the canal bank go some way to screening the development. Views from dwellings are oblique, with the gable ends facing north. Existing walls, street trees and hedges also contribute towards screening the site	Low
V13	Ashwood Road, Ashwood Drive	180m to site boundary, 230m – 280m south	Rear garden and upper floor views are potentially available of the site. Interceding canal-side vegetation aids screening, as do rear garden boundaries.	Low
V14	From R113 roadway bridge	45m to site boundary, 140m to development	Wide views to the west along the length of the canal from the roadway and footpath on the R113. Interceding canal-side vegetation screens partially screens the site.	Low
V15	Cappaghmore	100m east of site boundary	Views from the rear of properties are screened by the raised R113 embankment and its associated tree planting	Low
V16	View from proposed gateway junction to west	15m east of site boundary, 40m to development at the closest	Views to the west are open and elevated from the existing roadway, approximately 3m over the existing site ground floor level. Existing tree planting to the R113 embankments aids screening into the southern site area, while the northern portion of the site is visible.	Not Sensitive
V17	View from Railway Station & R113	225m to north-east of site	Although elevated by some 7m from the existing ground levels, views to the site from the station and roadway are partial and glimpsed due to existing vegetation on the roadside embankment.	Not Sensitive
V18	Ninth Lock Road	570m – 620m north-east	Views from dwellings are screened by interceding vegetation and the elevated R113 roadway embankments	Low

9.3.5.1 Magnitude and Quality of Change in the Landscape and Visual Environment

The proposed development will result in a change to the landscape, which will give rise to landscape and visual effects. The likely extent of the change within the landscape context is considered to be very significant as there will be intensive changes to landscape character within this localised area, which will be visible from several surrounding areas. The magnitude of change will vary depending on the viewpoint from which it is viewed and how visible the proposed buildings are in that view.

The proposed buildings will contrast with the existing landscape resulting in a permanent change in character.
With regard to quality of change, the proposed development is generally considered an improvement to the existing fallow landscape, as described earlier. It will also be an improvement in the landscape amenity value of the site for users. However, some of the proposed buildings will block views of the wider landscape from some receptors and in these cases, this would be considered a localised permanent negative impact. Construction stage impacts, where they occur, are considered to be of negative quality and short term, as the construction stage is expected to last less than seven years.

9.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The landscape proposals have had extensive influence from both the SDZ Planning Scheme 2019 requirements and the associated Parks and Landscape Strategy prepared by Dermot Foley Landscape Architects, submitted to South Dublin County Council on behalf of Clonburris Infrastructure Ltd.

The defining landscape characteristic of the proposed development is the Canal Park to the south adjacent to the Grand Canal. Vegetation along the canal corridor (pNHA) provides an important east-west ecological connection and the existing vegetation within the zone is to be retained, enhanced, and, where possible, extended into the open space. Within this space the majority of existing trees are being retained, with some small portions of existing understorey vegetation being removed to facilitate the creation of usable open space. An east west path runs through the entire Canal Park open space, linking in with the proposed residential roadways that extend south from the new link road. A large natural play area is proposed adjacent to the existing Omer Lock House. As per the Planning Scheme requirements, no development (apart from pathways, bridges and natural play elements are proposed within the 30 metres buffer zone from the pNHA boundary. The zone between 30 and 50 metres contains the proposed east/west residential roadway, front gardens and permeable parking areas.

Extensive areas of additional native planting are proposed within this landscape, consisting of native trees, hedgerows and meadows. A swale is also proposed to the proposed roadway. Where existing vegetation and trees are to be removed due to construction, an extensive network of new green infrastructure is proposed wherever possible to mitigate this loss.

The Canal Park links into a larger open space to the south-eastern corner, which is designated as an area of attenuation within the Planning Scheme.

To the east of the site a wide wayleave area for gas and water is designated between Fonthill Road and the apartment block. Within this space, a green link is provided for use of cycles and pedestrians, linking the Canal towpath with the new junction of the link road and Fonthill Road.

To the north-west of the development area a local park is designated within the Planning Scheme. A large portion of this park is utilized for attenuation, consisting of both an underground tank and an overground detention pond. Within this space a Multi-Use Games Area and a natural play space is proposed and wider informal grassed area for play.
The local park is screen with planting buffers of native woodland.

Elsewhere within the development areas street trees and planted areas are proposed within verges and front gardens.

9.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

The potential impacts are the effects that the development could have without consideration of landscape mitigation or amelioration – i.e. without landscape works. For the sake of clarity these shall be considered under the following headings: Landscape Impacts and Visual Impacts.

These impacts are considered under the following headings:

- temporary effects (construction phase up to one year);
- short-term impacts (construction phase up to two years);
- short-term impacts (operation phase up to seven years);
- medium-term impacts (operation phase, seven to fifteen years) and
- long-term impacts (operation phase up to fifteen years and beyond).

These effects have been compiled to identify any areas where the proposed development may be injurious to the scenic and visual character of the area and represent the potential impact rather than the eventual long-term effect.

For this section, it is assumed that no specific landscape works are carried out with the construction of the development and that the open spaces are simply grass areas. This enables recognition of potential, rather than actual, effects which facilitates the identification of suitable landscape mitigation measures.

9.5.1 Construction Phase – Potential Impacts on Landscape

9.5.1.1 Temporary and Short-Term Effects

During this phase the site will undergo a change from that of an area of previously disused open fallow land to a large construction site. Any impacts generated at this stage will be short term in duration, save for some landscape effects which will be permanent.

Most hedges show signs of once having compromised and been planted as Hawthorn alignments. In many instances, the original Hawthorns remain however many hedges are now becoming invaded by other species, most notably Blackthorn, Elder, Bramble, Ash and Wych Elm. Many of the hedges retain reasonable continuity however, such continuity is not always provided by the original Hawthorn.

There will be significantly negative effects on the existing landscape's hedgerows and associated trees due to the construction works of this development. This will be due to the site clearance, the proposed linking in of the proposed road network with the existing road network, the building processes required to build the proposed development and associated distributor roadworks, including haul roads.

It is worth noting that the proposed scheme layout of development areas and roads of the entire SDZ area is designated within the SDZ Planning Scheme of 2019. While there are some small areas of hedgerow to potentially be retained within the SDZ the majority of the hedgerows and trees within the site are to be removed to facilitate development in line with the Planning Scheme; residential areas, attenuation and road networks all impact on the existing hedgerow network. The retention of the vegetation and trees within the canal ecological corridor is proposed in line with the SDZ Planning Scheme requirements. Overall, there are approximately 1300 metres of hedgerow removed, with a proposed 500 metres of new native hedgerow within the development area.

9.5.2 Construction Phase – Potential Impacts on Views

Visual impacts during construction will affect all sensitive receptors identified in section 9.8 above and listed in Table 9.9 below. This is due to construction activities, vehicles, structures, etc.

Table 9.9 – Construction Stage Visual Impacts

View	Quality	Significance	Magnitude	Probability	Duration	Sensitivity
VP1	Negative	Imperceptible	Not appreciable	Likely	Short-Term	Low
VP2	Negative	Imperceptible	Not appreciable	Likely	Short-Term	Low
VP3	Negative	Imperceptible	Not appreciable	Likely	Short-Term	Low
VP4	Negative	Imperceptible	Not appreciable	Likely	Short-Term	Low
VP5	Negative	Imperceptible	Not appreciable	Likely	Short-Term	Low
VP6	Negative	Not Significant	Low	Likely	Short-Term	Low
VP7	Negative	Not Significant	Low	Likely	Short-Term	Low
VP8	Negative	Not Significant	Low	Likely	Short-Term	Low
VP9	Negative	Moderate	Medium	Likely	Short-Term	Medium/High
VP10	Negative	Moderate	Medium-high	Likely	Short-Term	Medium/High
VP11	Negative	Moderate	Medium-high	Likely	Short-Term	Medium/High
VP12	Negative	Slight	Medium	Likely	Short-Term	Low
VP13	Negative	Not Significant	Low	Likely	Short-Term	Low
VP14	Negative	Not Significant	Low	Likely	Short-Term	Low
VP15	Negative	Not Significant	Low	Likely	Short-Term	Low
VP16	Negative	Not Significant	Medium	Likely	Short-Term	None
VP17	Negative	Not Significant	Low	Likely	Short-Term	None
VP18	Negative	Not Significant	Low	Likely	Short-Term	Low

9.5.3 Operational Phase

9.5.3.1 Potential Landscape Impacts without Mitigation

Short-term landscape impacts after the construction works (up to seven years).
Following construction, the main landscape impacts of the proposed development are associated with the change in land use from disused fallow lands of low and medium/high sensitivity to a more intensified residential use, as required in the Clonburris SDZ Planning Scheme 2019.

This is considered to be a moderately negative impact, as the existing landscape is generally of low sensitivity. Where medium to high sensitivity exists to the southern boundary of the site, the proposed pNHA boundary buffer zone of 50 metres (as defined in the SDZ document) contributes towards giving a moderately negative impact, rather than any assessment of higher significance.
This short-term impact is likely to persist into the medium and long term in the absence of mitigation measures.

9.5.3.2 Potential Impact on Views without Mitigation

This section should be read in conjunction with the photomontages prepared by 3D Design Bureau and included under separate cover.

Table 9.10 – Viewpoint Effects

Ref.	Viewpoint location	Approx Distances from Developed Site	Description of View	Sensitivity Level
V1	Foxdene Drive	660m north (550m to haul road)	There are potential direct views from upper floors of residential dwellings, although due to the distance from the site these are considered to be of low sensitivity. The ground floor of the dwellings is screened by an embankment and concrete wall to Thomas Omer Way. Interceding vegetation to the north of the site also forms a screening element, as does the existing rail line. Due to the distance from the site and the existing wall and vegetation, the development will have an imperceptible negative impact on views.	Low (I)
V2	Foxdene Avenue and Meile An Ri Road	640m north (530m to haul road)	As above, there are potential direct views from upper floors of residential dwellings, although due to the distance from the site these are considered to be of low sensitivity. The ground floor of the dwellings is screened by a concrete wall to Thomas Omer Way. Interceding vegetation to the north of the site forms a screening element, as does the existing rail line. Due to the distance from the site and the existing wall and vegetation, the development will have an imperceptible negative impact on views.	Low (I)
V3	Tor An Ri Court	690m north (480m to haul road)	The view south towards the site from the residential properties are partial and oblique from upper floors, with the dwellings facing east and west. An embankment and concrete wall form a strong screening element to Thomas Omer Way. Interceding vegetation and the existing railway line form another screening element to the south. Due to the distance from the site and the existing wall and vegetation, the development will have an imperceptible negative impact on views.	Low (I)
V4	Tor An Ri Walk	770m north (480m to haul road)	The view south towards the site from the residential properties are partial and oblique, with the dwellings facing east and west. An embankment and concrete	Low (I)

Ref.	Viewpoint location	Approx Distances from Developed Site	Description of View	Sensitivity Level
			wall form a strong screening element to Thomas Omer Way. Interceding vegetation and the existing railway line form another screening element to the south. Due to the distance from the site and the existing wall and vegetation, the development will have an imperceptible negative impact on views.	
V5	Foxborough Lawn	910m north (500m from haul road)	The view south and south-east towards the site from the residential properties are partial and oblique, with the dwellings facing east and west. An embankment and concrete wall form a strong screening element to Thomas Omer Way. Interceding vegetation and the existing railway line form another screening element to the south. Due to the distance from the site and the existing wall and vegetation, the development will have an imperceptible negative impact on views.	Low (I)
V6	View from R136	1100m west (160m to haul road)	Direct views are available to the east from the roadway, which is elevated approximately 7 metres above the development level. The distance and Interceding vegetation contribute to screening the development. Due to the distance from the site and the interceding vegetation the effects on views will not be significant.	Low
V7	Kilcronan Crescent	770m west (100m south of haul road	Views of the development site are to the east and will be glimpsed and oblique. Due to the distance and interceding vegetation sensitivity is very low. Views north to the haul road during construction will be more direct, with construction traffic potentially visible. The haul road is 3m below the road level and there is interceding vegetation associated with the canal so views will be partial and glimpsed. Due to the distance from the site and the interceding vegetation the effects on views will not be significant.	Low (I)
V8	Deansrath Grove, Deansrath Lawn, Melrose Lawn, Melrose Road	260m-450m south-west (150m – 180m south to the haul road)	Views north-east are mainly oblique from upper floor windows and are further restricted by the existing canal bank vegetation. Views to the haul road are also screened by the canal side vegetation. Due to the distance from the site and the interceding vegetation the effects on views will not be significant.	Low (I)
V9	Grand Canal Towpath	Various to site (60m south of haul road)	Views of the development site are considered from the point of a prospect of views from the canal paths. The larger structure of Block A will form a small element within the skyline and the proposed two storey housing fronting the canal park will be visible, but views will be glimpsed, partial and oblique, due to the amount of existing vegetation within the park and the canal banks. Due to the sensitivity of the pNHA designation the effect on views will be moderate negative.	Medium To High
V10	Grand Grand Canal Towpath	Various to site (60m distance at	A closer prospect directly adjacent to the south of the development. This viewpoint has potential direct views north into the site from the elevated towpath, approximately 2 – 3 metres above the development ground level. Interceding canal bank vegetation screens portions of the development, allowing	Medium to High

Ref.	Viewpoint location	Approx Distances from Developed Site	Description of View	Sensitivity Level
		closest point)	glimpsed views in. Due to the sensitivity of the pNHA designation the effect on views will be moderate negative.	
V11	Grand Grand Canal Towpath – Lock 10	140m south-east	Potential views of the development to the north-west are screened by canal side vegetation, with occasional glimpsed views into the site. The apartment block will be the most visible structure. Due to the sensitivity of the pNHA designation the effect on views will be moderate negative.	Medium to High
V12	Lindisfarne Green, Lindisfarne Park	160m to site boundary, 200m – 250m south of development	Directly south of the development, these potential views are approximately 2m higher than the site, although interceding vegetation on the canal bank go some way to screening the development. Views from dwellings are oblique, with the gable ends facing north. Existing walls, street trees and hedges also contribute towards screening the site. The distance from the site and existing vegetation gives a not significant negative effect from the development.	Low
V13	Ashwood Road, Ashwood Drive	180m to site boundary, 230m – 280m south	Rear garden and upper floor views are potentially available of the development. Interceding canal-side vegetation aids screening, as do rear garden boundaries. The distance from the site and existing vegetation gives a not significant negative effect from the development.	Low
V14	From R113 roadway bridge	45m to site boundary, 140m to development	Wide views to the west along the length of the canal from the roadway and footpath on the R113. Interceding canal-side vegetation screens partially screens the proposed housing units. The proposed apartment block will be visible to the north-west. Views from roadways are generally considered to have no sensitivity but due to the Canal pNHA the development will have a slight negative effect on this viewpoint.	Low
V15	Cappaghmore	100m east of site boundary	Views from the rear of properties are screened by the raised R113 embankment and its associated tree planting. The distance from the site and existing vegetation gives a not significant negative effect from the development.	Low
V16	View from proposed gateway junction to west	15m east of site boundary, 40m to development at the closest	Views to the west are open and elevated from the existing roadway, approximately 3m over the existing site ground floor level. Existing tree planting to the R113 embankments aids screening into the southern site area, while the northern portion of the site is visible. The distance from the site and existing vegetation gives a not significant negative effect from the development.	Not Sensitive
V17	View from Railway Station & R113	225m to north-east of site	Although elevated by some 7m from the existing ground levels, views to the site from the station and roadway are partial and glimpsed due to existing vegetation on the roadside embankment. The distance from the site and existing vegetation gives a not significant negative effect from the development.	Not Sensitive
V18	Ninth Lock Road	570m – 620m north-east	Views from dwellings are screened by interceding vegetation and the elevated R113 roadway embankments. The distance from the site and	Low

Ref.	Viewpoint location	Approx Distances from Developed Site	Description of View	Sensitivity Level
			existing vegetation gives a not significant negative effect from the development.	

9.5.4 Summary of Visual Impacts without mitigation

Generally the distance from the proposed site of the likely affected receptors mitigates the visual impact.
As the viewpoints get closer to the site the sensitivity and impact on views increases. The most affected are users of the Grand Canal towpaths, dure to the distance from the site and the medium/high sensitivity of the views.

Table 9.11 – Summary of Visual Impacts without Mitigation

View	Quality	Significance	Magnitude	Probability	Duration	Sensitivity
VP1	Neutral	Imperceptible	Not appreciable	Likely	Long-Term	Low
VP2	Neutral	Imperceptible	Not appreciable	Likely	Long-Term	Low
VP3	Neutral	Imperceptible	Not appreciable	Likely	Long-Term	Low
VP4	Neutral	Imperceptible	Not appreciable	Likely	Long-Term	Low
VP5	Neutral	Imperceptible	Not appreciable	Likely	Short-Term	Low
VP6	Negative	Not Significant	Low	Likely	Long-Term	Low
VP7	Negative	Not Significant	Low	Likely	Long-Term	Low
VP8	Negative	Not Significant	Low	Likely	Long-Term	Low
VP9	Negative	Moderate	Medium	Likely	Long-Term	Medium/High
VP10	Negative	Moderate	Medium-high	Likely	Long-Term	Medium/High
VP11	Negative	Moderate	Medium-high	Likely	Long-Term	Medium/High
VP12	Negative	Not Significant	Low	Likely	Long-Term	Low
VP13	Negative	Not Significant	Low	Likely	Long-Term	Low
VP14	Negative	Not Significant	Low	Likely	Long-Term	Low
VP15	Neutral	Imperceptible	Low	Likely	Long-Term	Low
VP16	Negative	Not Significant	Medium	Likely	Long-Term	None
VP17	Negative	Not Significant	Low	Likely	Long-Term	None
VP18	Neutral	Imperceptible	Low	Likely	Long-Term	Low

9.5.5 'Do Nothing' Scenario

The do-nothing scenario refers to the non-implementation of the proposed development. The primary effect of this would be that the impacts and effects identified would not directly occur. The subject lands would remain unused as open fallow land and the objectives of the Planning Scheme for the Clonburris South West Area would not be realised.

9.6 AVOIDANCE, REMEDIAL & MITIGATION MEASURES

The following recommendations are put forward to mitigate against the negative impacts mentioned above and to reinforce the positive impacts of the proposed development. Mitigation measures are proposed and considered only on the lands of the subject site.

9.6.1 Construction Phase

During the construction phase, site hoarding will be erected to restrict views of the site during construction. Hours of construction activity will also be restricted in accordance with local authority guidance. Tree protection measures will be installed to the existing trees and hedges identified on site.

9.6.2 Operational Phase

The primary proposed ameliorative, remedial, or reductive measures can be seen on Murray and Associates Drawing No. 1738_PL_P_01 (and subsequent landscape plans) and are as follows:

- The retention of the trees and vegetation where possible, particularly within the 30m pNHA boundary buffer zone
- Planting of native trees, shrubs and meadow to the pNHA buffer zone enhancing and strengthening the ecological connectivity and the existing green infrastructure corridor, and reducing the visual mass of the development, softening and screening it over time.
- Native trees, shrubs and wildflowers will be used where possible, particularly in the buffer spaces surrounding the development site.
- Street Tree planting and SuDS measures within the development contribute towards biodiversity

Mitigation measures are shown on the submitted landscape drawings. At time of planting, the proposed standard trees in the landscaped buffer zones will be at least 3.0m in height. The trees will reach a mature height of at least 7 to 15 metres, dependant on species within the medium term.

9.6.3 'Worst-case' Scenario

The views selected for analysis are those from where the proposed development is most likely to be visible and so the analysis of impacts, above, represents a worst-case scenario.

9.7 PREDICTED LANDSCAPE IMPACTS (RESIDUAL IMPACTS)

9.7.1 Construction Impacts and Effects on the Landscape

Tree Protection Measures to existing trees to be retained will protect the important ecological corridor to the Grand Canal.

Screening measures implemented will not significantly change the assessment due to the distance from the site of the majority of receptors. The greatest visual impact from mitigation will be to the Grand Canal towpath, a site hoarding element. This is specified for site protection and prevention of access, and gives a small amount of amenity screening gain.

Therefore, anticipated residual effects will be as per Table 9.11 due to the short-term nature of the construction process and the proposed height and scale of the development.

9.7.2 Operational Impacts and Effects on the Landscape

9.7.2.1 Short-term landscape impacts after the construction works (up to seven years)

Following construction, the main landscape impacts of the proposed development are associated with the change in land use from agricultural lands of low sensitivity to a more intensified residential use, as specified in the Clonburris SDZ Planning Scheme. This is considered to be a slightly to moderately negative impact, as the majority of existing landscape is of low sensitivity.

Where medium to high sensitivity exists closer to the southern boundary with the Grand Canal pNHA, the new native tree and shrub planting, the increase in biodiversity and the strengthening of the existing ecological corridor will give a slightly positive impact on the landscape over the width of the pNHA buffer zone. However, as this is only a minority portion of the site area to the south, when considering the entirety of the site the assessment would remain slightly to moderately negative.

9.7.2.2 Medium-term landscape impacts (seven to fifteen years)

As the existing planting matures on site there will be a slight negative impact upon the subject site.

9.7.2.3 Long-term landscape impacts (over fifteen years)

Maturing trees and hedgerows will further integrate the proposed development into the existing landscape, resulting in a long term not-significantly negative impact on the landscape.

9.7.3 Summary of Effects on the Landscape

The landscape impacts due to the proposed development would overall be not-significantly negative, particularly considering the low sensitivity of the landscape and the overall cumulative effects of the Clonburris SDZ Planning Scheme being built out over time.

Landscape works are proposed to reduce and offset any impacts generated due to the proposed development, where possible. The planting of substantial numbers of new native trees and other planting will enhance the overall appearance of the new development.

The impact is primarily mitigated by the potential quality of the proposed public realm, the cohesive land use and pattern that would result, and the new spaces, landscape features and distinctiveness introduced by the proposed development and its associated landscape spaces and planting interventions. The proposed planting would substantially increase the tree resource and tree quality in the area overall.

9.8 PREDICTED VISUAL EFFECTS (RESIDUAL IMPACTS)

In the longer term, the assessment concludes that there will be some not significant negative visual impacts to receptors to the south-west and south of the site with some imperceptibly negative visual impacts to the remaining residential receptors to the north and east.

The visual impact to the users of the R113 and R136 will be not significant negative in the medium to long term. The mitigation measures will have only a small effect on the residual impacts on viewpoints that are further away from the site (over 100m).

The development has a moderately negative effect on views from the Canal towpaths due to the proximity and scale of the adjacent development and the medium to high visual sensitivity assigned to this pNHA area. The residual impacts on views from the canal are impacted by the proposed removal of portions of the existing hedgerow and vegetation to create usable public open space, as defined within the Clonburris SDZ Planning Scheme and the associated Parks and Landscape Strategy (by Dermot Foley Landscape Architects, submitted to South Dublin County Council) and facilitate pedestrian links with the development from the canal towpath. This removal is mitigated by the inclusion of additional tree planting, hedgerow planting, woodland planting, resulting in a slight improvement in screening measures to the towpath, though not significantly enough to change the assessment.

Table 9.12 – Predicted Visual Effects

View	Quality	Significance	Magnitude	Probability	Duration	Sensitivity
VP1	Neutral	Imperceptible	Not appreciable	Likely	Long-Term	Low
VP2	Neutral	Imperceptible	Not appreciable	Likely	Long-Term	Low
VP3	Neutral	Imperceptible	Not appreciable	Likely	Long-Term	Low
VP4	Neutral	Imperceptible	Not appreciable	Likely	Long-Term	Low
VP5	Neutral	Imperceptible	Not appreciable	Likely	Short-Term	Low
VP6	Negative	Not Significant	Low	Likely	Long-Term	Low
VP7	Negative	Not Significant	Low	Likely	Long-Term	Low
VP8	Negative	Not Significant	Low	Likely	Long-Term	Low
VP9	Negative	Moderate	Medium	Likely	Long-Term	Medium/High
VP10	Negative	Moderate	Medium-high	Likely	Long-Term	Medium/High
VP11	Negative	Moderate	Medium-high	Likely	Long-Term	Medium/High
VP12	Negative	Not Significant	Low	Likely	Long-Term	Low
VP13	Negative	Not Significant	Low	Likely	Long-Term	Low

VP14	Negative	Not Significant	Low	Likely	Long-Term	Low
VP15	Neutral	Imperceptible	Low	Likely	Long-Term	Low
VP16	Negative	Not Significant	Medium	Likely	Long-Term	None
VP17	Negative	Not Significant	Low	Likely	Long-Term	None
VP18	Neutral	Imperceptible	Low	Likely	Long-Term	Low

9.9 MONITORING

9.9.1 Construction Phase

Landscape tender drawings and specifications will be produced to ensure that the landscape work is implemented in accordance with best practice. This document will include tree work procedures, soil handling, planting and maintenance. The contract works will be supervised by a suitably qualified landscape architect.

The planting works will be undertaken in the planting season after completion of the main civil engineering and building work.

9.9.2 Operational Phase

This will consist of weed control, replacement planting, pruning etc. All landscape works will be in an establishment phase for the initial three years from planting. A landscape management plan accompanies the planning application. Prior to completion of the landscape works, a competent landscape contractor should be engaged and a detailed maintenance plan, scope of operation and methodology be in place.

9.9.3 Summary of Mitigation & Monitoring

The Table below summarises the Construction Phase mitigation and monitoring measures.

Table 9.13 – Construction: Mitigation & Monitoring Measures

Likely Significant Effect	Mitigation	Monitoring
Visual: - Construction Traffic/Cranes	Site Hoarding	Regular site visits as per the Inspection Plan
Landscape: Site Clearance, Change from agricultural landscape to light industrial	Mitigation measures for landscape only applicable in operational phase	Inspection of tree and hedge protection measures to southern boundary

The Table below summarises the Operational Phase mitigation and monitoring measures.

Table 9.14 – Operation: Mitigation & Monitoring Measures

Likely Significant Effect	Mitigation	Monitoring
Visual: Negative effect on adjacent visual receptors	Proposed tree planting will mature over time, contributing to the visual softening of the development.	Initial Defects period applicable as per regular planning grant. Landscape Management plan detailing maintenance of trees etc included as part of planning application.
Landscape: Change in landscape character	Retention of existing boundary hedgerows. Proposed planting within development of new native standard trees, native woodland, native wildflower meadow.	Regular maintenance regime by experienced landscape contractor

9.10 INTERACTIONS

The assessment of the landscape impacts associated with the proposed development has a number of interactions with other parameters of the assessment. In summary, these are as follows:

- Population and Human Health
- Biodiversity

The interactions of landscape with these parameters were as follows:

9.10.1 Population & Human Health

The landscape and visual impact associated with human beings focuses on the effects to dwellings. The proposed development generates visual effects; the effects and associated amelioration of these effects is discussed in the impact section of the chapter.

9.10.2 Biodiversity

The long-term effects of the proposed development will have a positive effect on the tree cover associated with the development. Extensive native wildflower meadow areas are proposed that further add to the diversity of native flora. Further consultation with the Ecological Consultant will take place at detailed design, implementation and monitoring stages to ensure adherence to best practice and sound ecological principles.

9.10.3 Accidents and Disasters

The proposed managed mitigation measures do not contribute to any potential risk with regards to relevant accidents or disasters.

9.11 CUMULATIVE IMPACTS

The lands on which the proposed development is to take place have been zoned under the South Dublin County Council Development Plan 2016 "*To provide for strategic development in accordance with approved planning schemes"* and in the case for the subject lands for substantial residential development under the approved Clonburris Planning Scheme 2019, which envisages c. 1,441 dwelling target for the Clonburris South West Development Area (within which the subject lands are located). This zoning and the associated approved Planning Scheme within the entire SDZ lands will see more development to the north, and a portion of residential development to the southern part of the Canal. The cumulative effect of the impact of this future development associated with these zoned lands will contribute towards lessening the magnitude of the impact of the proposed residential development. However, these future developments will have further impact on the named receptors above that cannot at this stage be quantified, but would be subject to their own assessment. The future development of the lands has been deemed acceptable by the Strategic Environmental Assessment (SEA), undertaken in respect of the approved Planning Scheme. It is noted the SEA states "The preparation of a Parks and Landscape Strategy in the early phasing of the Planning Scheme is a positive effect on the landscape SEOs; again to promote and strengthen environmental protection and ensure biodiversity considerations are aligned with such a strategy, additional mitigation measures are recommended for this proposal." In this regard, a Parks and Landscaping Strategy has been prepared by Dermot Foley Landscape Architects and has been submitted to South Dublin County Council.

9.12 CONCLUSION

During construction there will be a change to the landscape and there will be short-term negative visual effects for residents and visitors to the areas adjacent to the site associated with construction activity.

Landscape works are proposed to reduce and partly offset any effects generated due to the proposed development, where possible. The mitigating effect planting substantial numbers of new native trees and other shrub and hedge planting, allied with the high-quality accessible public realm will enhance the overall appearance of the new development and partly compensate for the removal of existing hedgerows where needed for the construction works.

In the long term, the landscape effects due to the completed development would overall be not-significantly negative, considering the existing residential zoning designation within the Clonburris SDZ Planning Scheme (2019) against the change in character of the site and the removal of existing vegetation. The high-quality landscape treatments within the development and the additional ameliorative native planting to the canal buffer zone goes some way towards mitigating the negative effect.

In the longer term, the assessment concludes that there will be some moderately negative visual effects to users of the Canal towpath immediately adjacent to the south of the site, with not significantly negative visual effects to the remaining residential receptors to the south. The development will have a neutral effect on receptors to the north.

10.0 TRAFFIC AND TRANSPORTATION

10.1 INTRODUCTION

This chapter of the EIAR assesses the likely effects of the proposed development in terms of vehicular, pedestrian and cycle access during the construction and operational phases of the proposed development.

This Chapter of the EIAR has been prepared by Danny Pio Murphy, Senior Transportation Engineer, from DBFL Consulting Engineers. An overall commentary on the predicted changes in traffic, public transport, pedestrian, and cyclist environmental conditions are all discussed in this chapter and provide a setting for all the other assessments undertaken in this EIAR.

10.2 BACKGROUND

10.2.1 Trip Generation

Historic traffic counts were obtained via the planning application for the Clonburris Southern Link Street; the historic baseline data was made available under National Transport Authority / South Dublin County Council's South West Dublin Local Area - Model Development Report. This report was analysed with the objective of establishing local traffic characteristics in the immediate area of the proposed development.

A review of trip generation factors contained within the TRICS database was carried out. TRICS data is primarily UK based, although a number of Irish sites have recently been included and the number of Irish sites continues to expand. Nevertheless, we consider that TRICS will provide a reasonable indication of traffic generation from the proposed development.

Data supplied for inclusion in TRICS undergoes a procedure of validation testing, and there is no evidence from this procedure suggesting that data from Ireland bears any significant fundamental differences to that from the other countries included. Consequently, we consider that TRICS will provide a reasonable indication of traffic generation from the proposed development.

Table 10.1 below includes the predicted vehicle trip rates of the potential unrestrained traffic flows in and out of the proposed development during the morning and evening peak hour periods using data from TRICS. Trip generation will be discussed in more detail in Section 10.6.2**.**

Table 10.1 – Proposed Development Trip Rates (TRICS)

Land Use	AM Peak Hour			PM Peak Hour		
	Arr	Dep	Two-Way	Arr	Dep	Two-Way
Houses	0.074	0.208	0.282	0.150	0.080	0.230
Apartments / Duplexes	0.021	0.085	0.106	0.079	0.043	0.122
Creche	2.775	2.423	5.198	2.511	2.731	5.242

10.2.2 Impact on junctions

The Institution of Highways and Transportation document 'Guidelines for Traffic Impact Assessments' states that the impact of a proposed development upon the local road network is considered material when the level of traffic it generates surpasses 10% and 5% on normal and congested networks respectively. When such levels of impact are generated a more detailed assessment should be undertaken to ascertain the specific impact upon the network's operational performance. These same thresholds are reproduced in the NRA/TII document entitled Traffic and Transport Assessment Guidelines (2014). A detailed analysis of the impact the development will have on the key local junctions is given in Section 10.6.2.

10.2.3 Car Parking

Reference has been made to the Transport Assessment & Transport Strategy section of the *Clonburris Strategic Development Zone (SDZ) Planning Scheme*, as published in 2019.

The subject development site is located within SDCC Zone 2 Parking and therefore the quantum of car parking provision should be minimised. The car parking standards as set out in the *South Dublin County Council Development Plan 2016 – 2022* are illustrated in **Table 10.2** below.

Table 10.2 – SDCC County Development Plan 2016 – 2022 Maximum Parking Rates (Residential)

Dwelling Type	Number of Bedrooms	Zone 2
Apartment / Duplex	1	0.75 Space
	2	1 Space
	3+	1.25 Space
House	1	1 Space
	2	1.25 Space
	3+	1.5 Space

In addition, as per the SDCC Parking Standards, 10% of the total car parking provision will be allocated as electric vehicle charging stations while the remainder of the parking spaces should be constructed to be capable of accommodating future charging points, as required. Car parking will be discussed in more detail in Section 10.5**.**

10.3 METHODOLOGY

The purpose of this assessment is to quantify the existing transport environment and to detail the results of assessment work undertaken to identify the potential level of transport impact generated as a result of the proposed development. The scope of the assessment covers transport and sustainability issues including pedestrian, cyclist, and public transport connectivity. Recommendations contained within this chapter are based on existing and proposed road layout plans, site visits, traffic observations and historic junction vehicle turning count data. Our methodology incorporated a number of key inter-related stages, including;

- Site Audit: A site audit was undertaken to quantify existing road network issues and identify local infrastructure characteristics, in addition to establishing the level of accessibility to the site in terms of walking, cycling and public transport. An inventory of the local road network was also developed during this stage of the assessment.
- Traffic Counts: Historic traffic counts were obtained via the planning application for the Clonburris Southern Link Street; the historic baseline data was made available under National Transport Authority / South Dublin County Council's South West Dublin Local Area - Model Development Report. This report was analysed with the objective of establishing local traffic characteristics in the immediate area of the proposed development.
- Trip Generation: A trip generation exercise has been carried out to establish the potential level of future vehicle trips using the proposed development.
- Trip Distribution: Based upon both the existing traffic characteristics and the network layout in addition to the spatial / land use configuration and density of the urban structure across the catchments area of the development, a distribution exercise has been undertaken to assign site generated vehicle trips across the local road network.
- Network Impact: The specific level of influence generated by the proposed development upon the local road network was ascertained.
- Network Analysis: Detailed computer simulations were used to assess the operational performance of key junctions in the post development 2025 and 2040 development scenarios in accordance with the NRA/TII document 'Traffic and Transport Assessment Guidelines' (2014).

The assessment of effects of the proposed development on material assets are assessed in terms of quality (positive, neutral or negative effects), significance (imperceptible, not significant, slight, moderate, significant, very significant or profound effects), extent, context, probability (likely, unlikely effects) and duration (temporary, short term, long term or permanent effects) in line with the criteria set out in **Table 3.3** 'Description of Effects' of the Guidelines on the Information to be Contained in Environmental Impact Assessment Reports – Draft (EPA, August 2017).

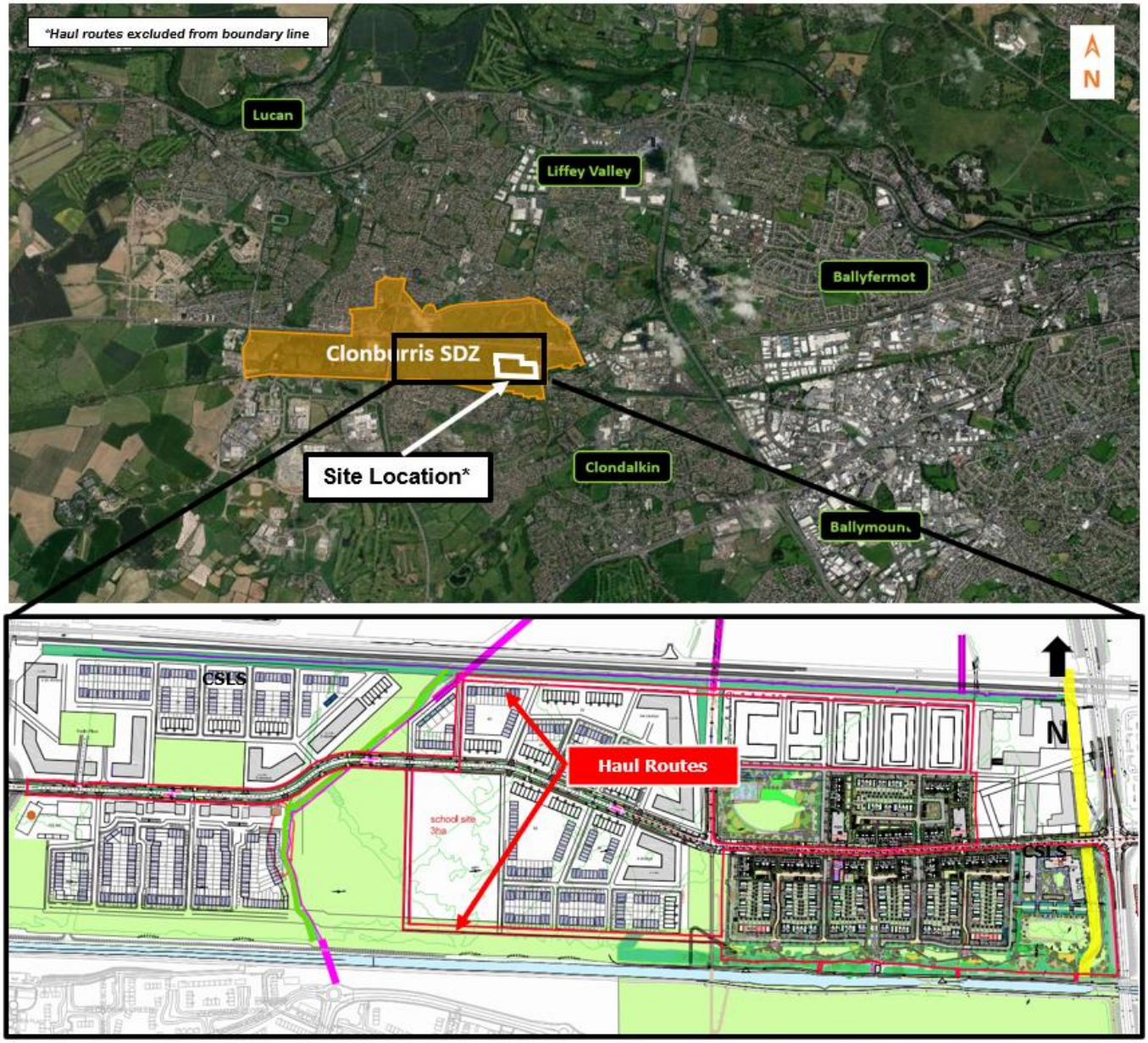
10.4 RECEIVING ENVIRONMENT

10.4.1 Site location

The subject site is located within the Clonburris Strategic Development Zone lands. The subject site is bounded to the east by the R113 Fonthill Road North and to the south by the Grand Canal. The site is bounded by the Dublin Cork Railway Line to the north, and greenfield sites to the west.

The SDZ is located to the west of Dublin City Centre and the M50. It is conveniently positioned between Lucan to the north-west, Clondalkin to the south-east and Liffey Valley to the north-east. The lands are intersected in an east-west orientation by the Kildare railway line and by the Grand Canal to the south. The general location of the subject scheme in relation to the surrounding region and road network is illustrated in **Figure 10.1**.

Figure 10.1 – Site Location (Source: ArcGIS Maps)

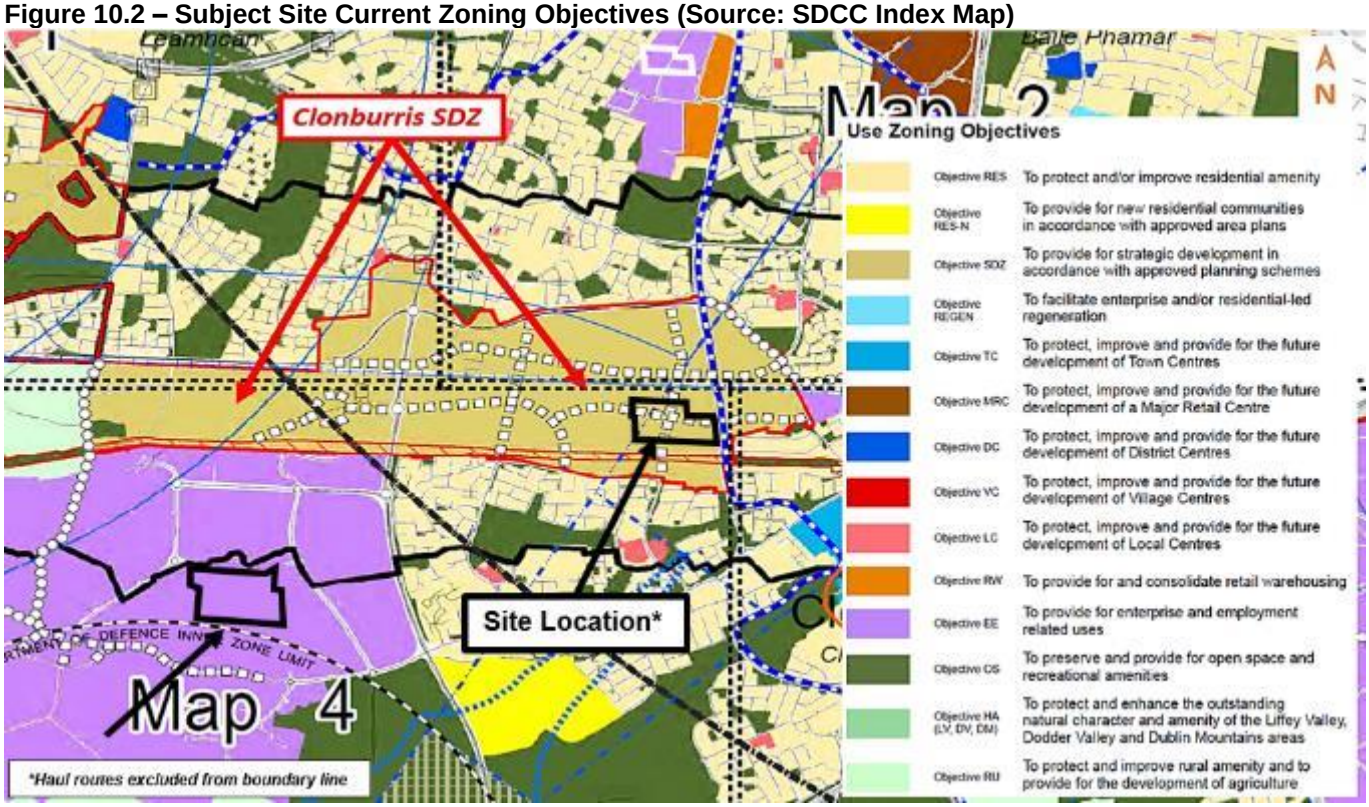


10.4.2 Land Use

The subject site is a greenfield site located within the Clonburris Strategic Development Zone lands. The Clonburris SDZ lands have an approximate land area of 280 hectares and is predominately agricultural in nature or greenfield sites. In recent years, Lucan East Educate Together National School and two secondary school; Griffeen Community College and Kishoge Community College, have been constructed on the lands. The lands also contain a number of private residences, together with traveller accommodation which has been provided by South Dublin County Council. There are two train stations constructed within the SDZ; the Clondalkin-Fonthill station which is currently operational whilst the Kishoge station is constructed but has not been operational to date.

The subject lands are zoned under zoning class Objectives SDZ and is described within the South Dublin County Development Plan (2016-2022) as "To provide for strategic development in accordance with approved planning schemes" as shown in **Figure 10.2**.

Figure 10.2 – Subject Site Current Zoning Objectives (Source: SDCC Index Map)



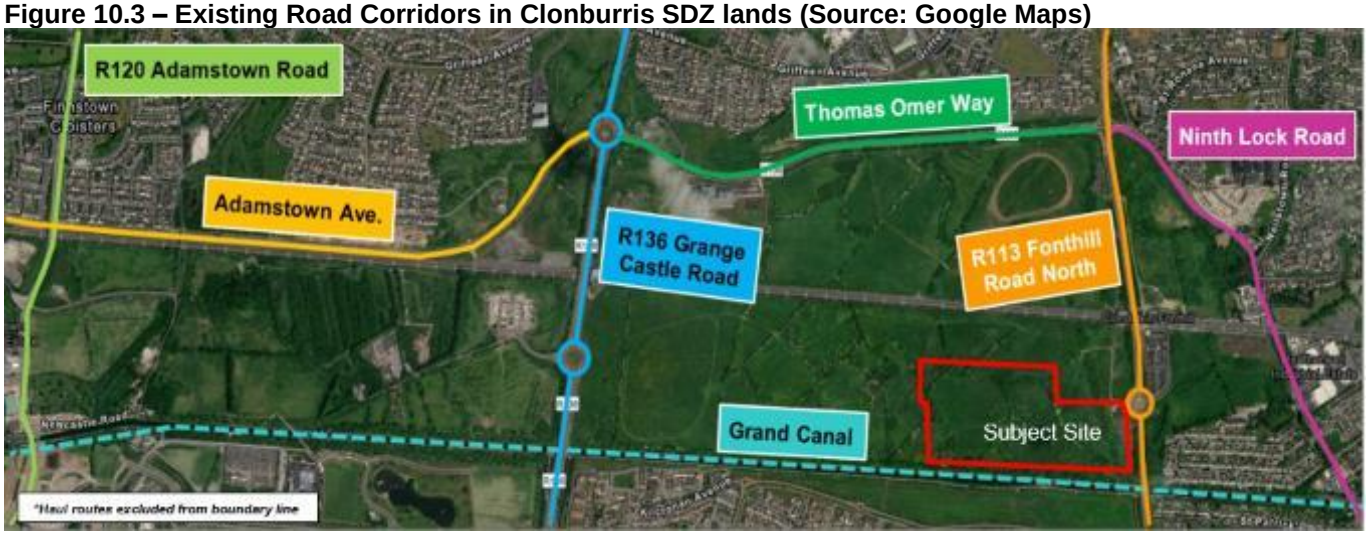
10.4.3 Existing road network

Clonburris is located to the west of Dublin City Centre and is well connected to the National Road Network, served by several key strategic routes. The Clonburris SDZ boundary is broadly bounded by the Arterial corridors of Adamstown Avenue and Thomas Omer Way to the north, Ninth Lock Road to the east, the Arterial corridor of Newcastle Road to the west, the Grand Canal to the south, as illustrated in **Figure 10.3**. The key north-south arterial corridors through Clonburris include:

- the R113 Fonthill Road North which crosses through the eastern portion of Clonburris;
- the R136 Grange Castle Road which crosses through the centre of the SDZ lands; and
- the R120 Newcastle Road which passes along the western boundary of the SDZ.

The key east-west corridors through the area include Adamstown Avenue and Thomas Omer Way to the immediate north, where these roads provide a connection between Fonthill Road North and Grange Castle Road. Coldcut Road, also to the north of the site provides an east-west connection from Fonthill Road North to Palmerston and Ballyfermot.

Figure 10.3 – Existing Road Corridors in Clonburris SDZ lands (Source: Google Maps)



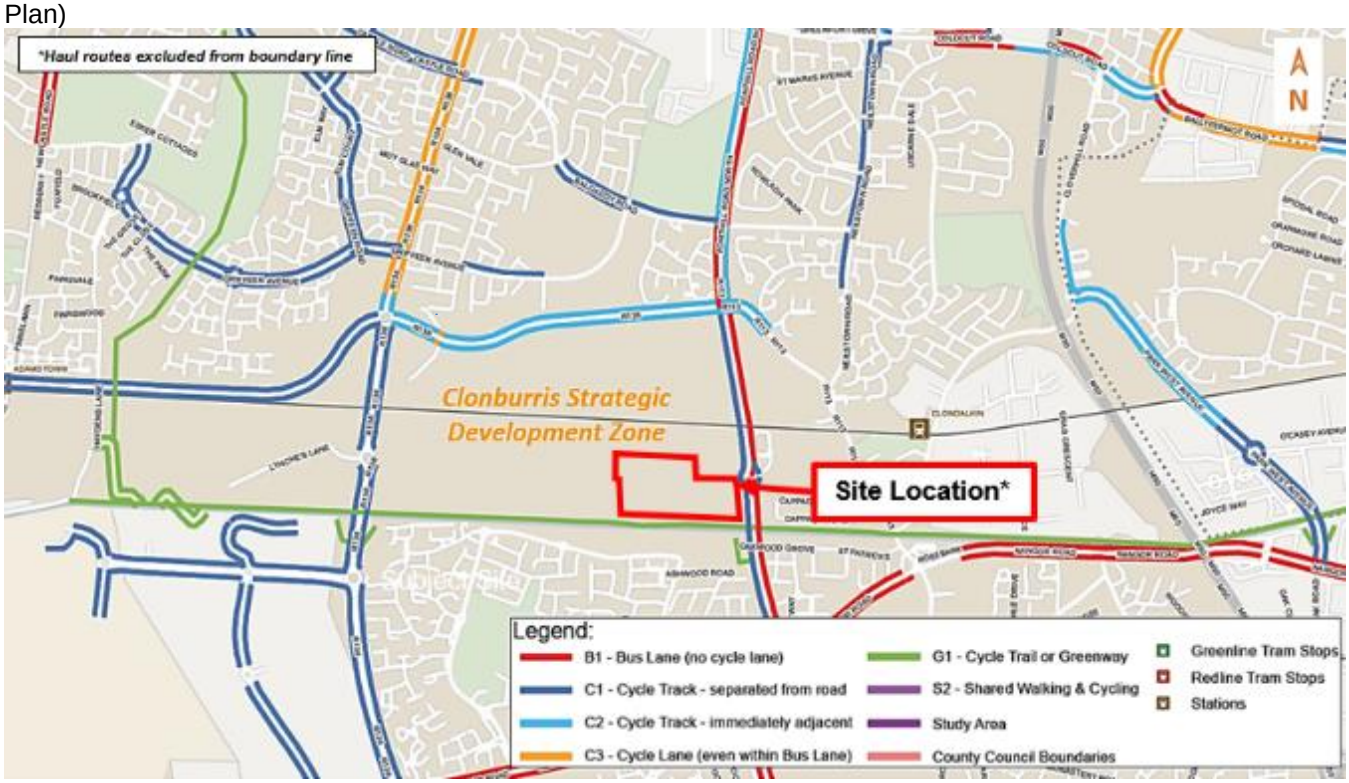
10.4.4 Existing Cycling Facilities

At present, the Clonburris SDZ lands are largely a greenfield site and as such there is limited cycle network within the lands. However, the Grand Canal Greenway, which links Adamstown to the City Centre, passes through the area along the Grand Canal as shown in **Figure 10.4.**

The SDZ lands are dissected by the Fonthill and Grange Castle Roads on a north south axis both of which include segregated cycle facilities offering links to Lucan Village, Liffey Valley and the N4, which also features segregated cycle facilities and a cycle link to the City Centre. To the South, there are indirect cycle links to the Grange Castle Business Park and further south, Clondalkin Village and Tallaght.

Thomas Omer Way is orientated along the northern boundary of the Clonburris SDZ lands and has segregated cycle tracks on both sides of the road. The Lucan-Newlands Road runs along the eastern boundary of the site and does not currently have any cycle facilities.

Figure 10.4 – Existing Facilities GDA Cycle Network Plan (Source: Sheet E5 – Dublin Mid-West – GDA Cycle Network Plan)



10.4.5 Existing Pedestrian Facilities

The Ninth Lock Road located along the eastern boundary and Thomas Omer Way on the northern boundary of the Clonburris SDZ lands includes footpaths on either side along most of its length. The paths surfaces are generally of a high-quality, whilst sections of the path are on Ninth Lock Rd narrow in places and the path is immediately adjacent the carriageway as shown in **Figure 10.5**.

Figure 10.5 – Fonthill Road (R113) Northbound

The Fonthill Road features footpaths on either side, segregated from the carriageway by way of a grass margin (**Figure 10.6**). The paths are generally in good condition and are of a consistent width throughout. Fonthill Road offers walking connections to the Fonthill Retail Park and Liffey Valley Shopping Centre to the north, and Clondalkin village and the Nangor Road to the south.

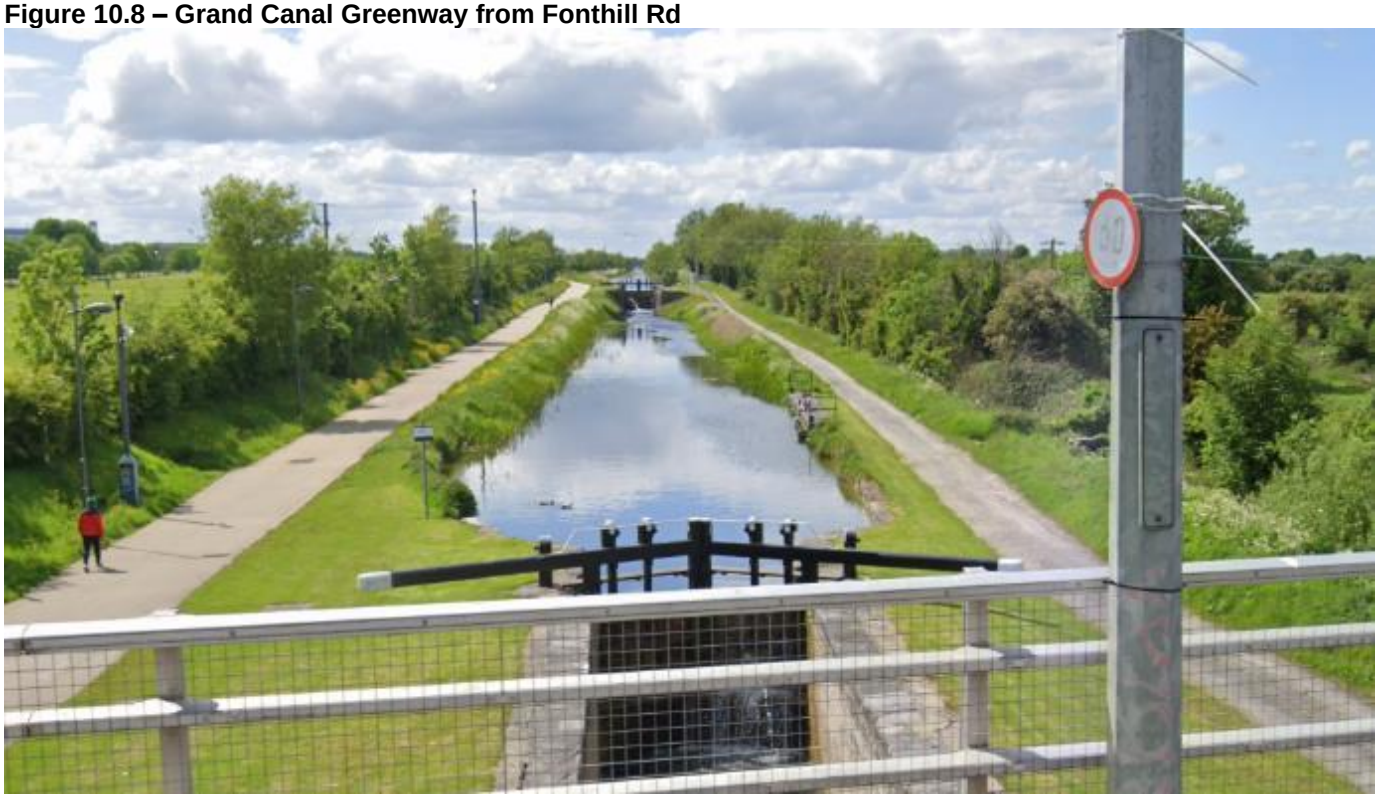
Figure 10.6 – Fonthill Road (R113) Northbound

The Grange Castle Road also features footpaths on either side segregated from the carriageway by way of a grass margin (**Figure 10.7**). The paths are generally in good condition and are of a consistent width throughout. The Grange Castle Road offers walking links to Lucan Village in the north, Adamstown to the west via its intersection with Adamstown Avenue, and to the south walking links to Grange Castle Business Park and Corkagh Park.

Figure 10.7 – Grange Castle Road Northbound (R136)

The Grand Canal Greenway, which follows an east west axis, offers a leisure walk links towards Dublin City Centre and Adamstown to the west. A new canal bridge has just been completed by SDCC. It features a shared space on the southern side and a pedestrian space on the southern side (**Figure 10.8**).

Figure 10.8 – Grand Canal Greenway from Fonthill Rd



10.4.6 Existing Bus Network

There are a number of roads in the immediate area that have bus priority in the form of Quality Bus Corridors (QBC's). These include the following and are shown in **Figure 10.9**:

- New Nangor Road to the south which features QBC's in both directions (Bus no. 13, 68 and 151),
- Grange Castle Road features QBC's in both directions (Bus no. 151),
- Adamstown Avenue (Adamstown Link Road) QBC in both directions (Bus no. 25b and 25d),
- Ninth Lock Road (Bus no. 40), and

- Fonthill Road features a southbound QBC (Bus no. 40 and 239).

Figure 10.9 – Existing Bus Route Network around Clonburris SDZ

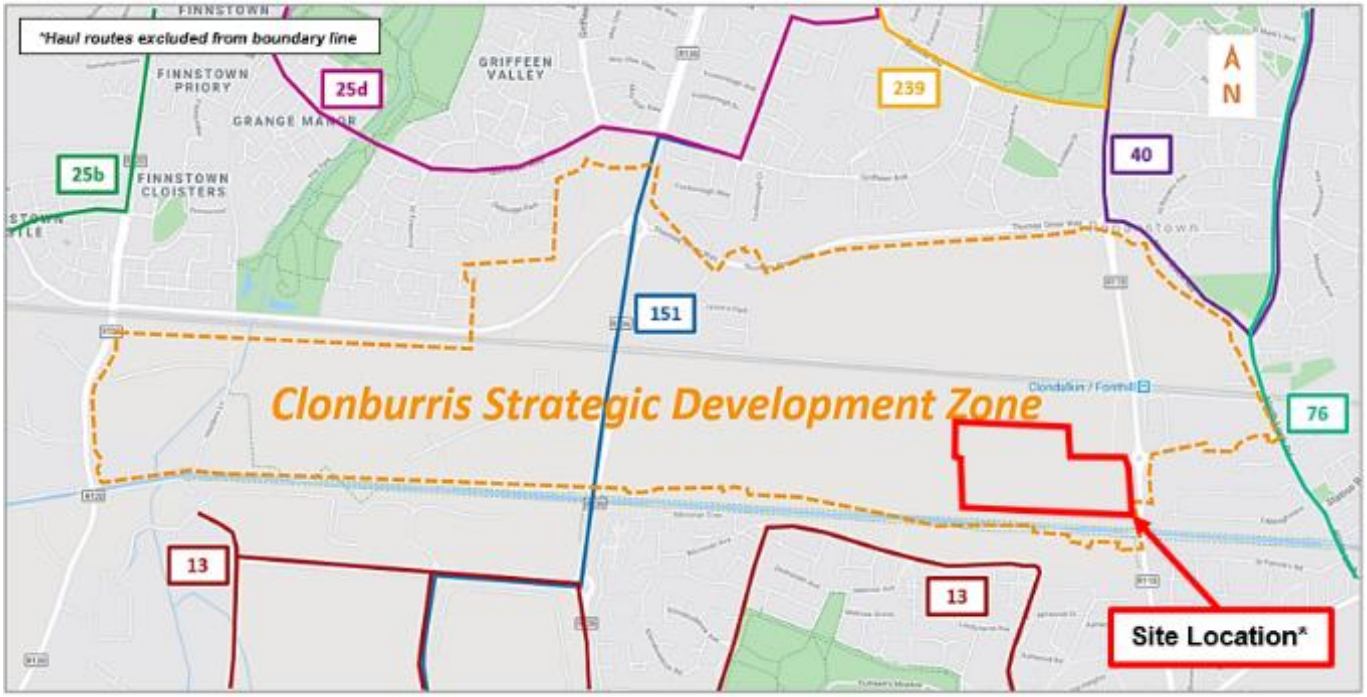


Table 10.3 below show the frequency of services for these bus routes.

Table 10.3 – Number of Daily Outbound Services from Clondalkin-Fonthill Station

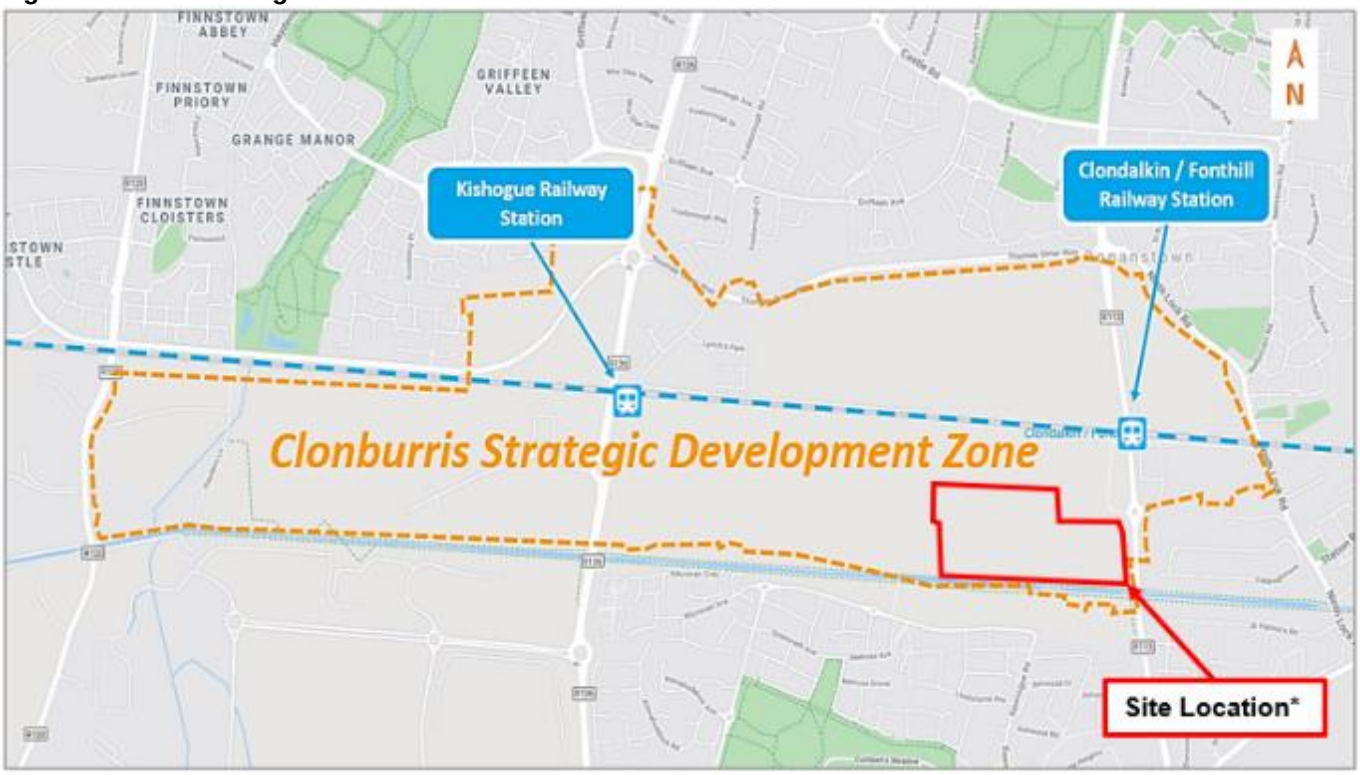
Line	Direction	Mon-Fri	Sat	Sun
13	From Grange Castle To Harristown	87	68	59
13	From Harristown To Grange Castle	85	68	59
68	From Newcastle / Greenogue Business Park To Hawkins St.	20	19	13
68	From Hawkins St. To Newcastle / Greenogue Business Park	17	17	13
151	From Foxborough (Balgaddy Rd.) To Docklands (East Rd.)	51	48	34
151	From Docklands (East Rd.) To Foxborough (Balgaddy Rd.)	48	46	31
25b	From Adamstown Rail Station Towards Merrion Sq.	*50**	46	31
25b	From Merrion Sq. Towards Adamstown Rail Station	49	44	29
25d	From Adamstown Rail Station Towards Merrion Sq.	5	0	0
25d	From Merrion Sq. Towards Adamstown Rail Station	4	0	0
40	From Liffey Valley Shopping Centre Towards Charlestown Shopping Centre	*96**	*74**	*52**
40	From Charlestown Shopping Centre Towards Liffey Valley Shopping Centre	*95**	*83**	*53**
239	From Blanchardstown Shopping Centre to Liffey Valley Shopping Centre	18	18	15
239	From Liffey Valley Shopping Centre to Blanchardstown Shopping Centre	17	17	15
**Approximate number of expeditions*				

10.4.7 Existing Rail Network

The proposed development is situated on the Kildare railway line. At its intersection with the Fonthill Road North lies the Clondalkin-Fonthill station (**Figure 10.10**). This station is served by commuter services to Heuston Station. Intercity trains do not serve this station. Following the recent upgrading of the Phoenix Park Tunnel, services calling at Clondalkin-Fonthill Station now offer connections to Drumcondra, Connolly, Tara Street, Pearse and Grand Canal Dock.

A bit further to the west lies Kishogue Railway Station, located on Grange Castle Road. Whilst the platform and station has been built, this station is not operational at present.

Figure 10.10 – Existing Rail Network around Clonburris SDZ



Eastbound services calling at Clondalkin-Fonthill offer good connections to Heuston station, which is the busiest station on the intercity train network offering strong connections to the regional cities and towns. **Table 10.4** below outlines the stations that are served by outbound trains from Clondalkin Fonthill station and the number of services these stations are served by outbound trains daily:

Table 10.4 – Number of Daily Outbound Services from Clondalkin-Fonthill Station

Station	No. of services from Clondalkin-Fonthill
Hazelhatch and Celbridge	22
Sallins and Naas	22
Newbridge	22
Dublin Heuston	21
Adamstown	20
Kildare	20
Portarlington	18
Portlaoise	18
Monasterevin	17

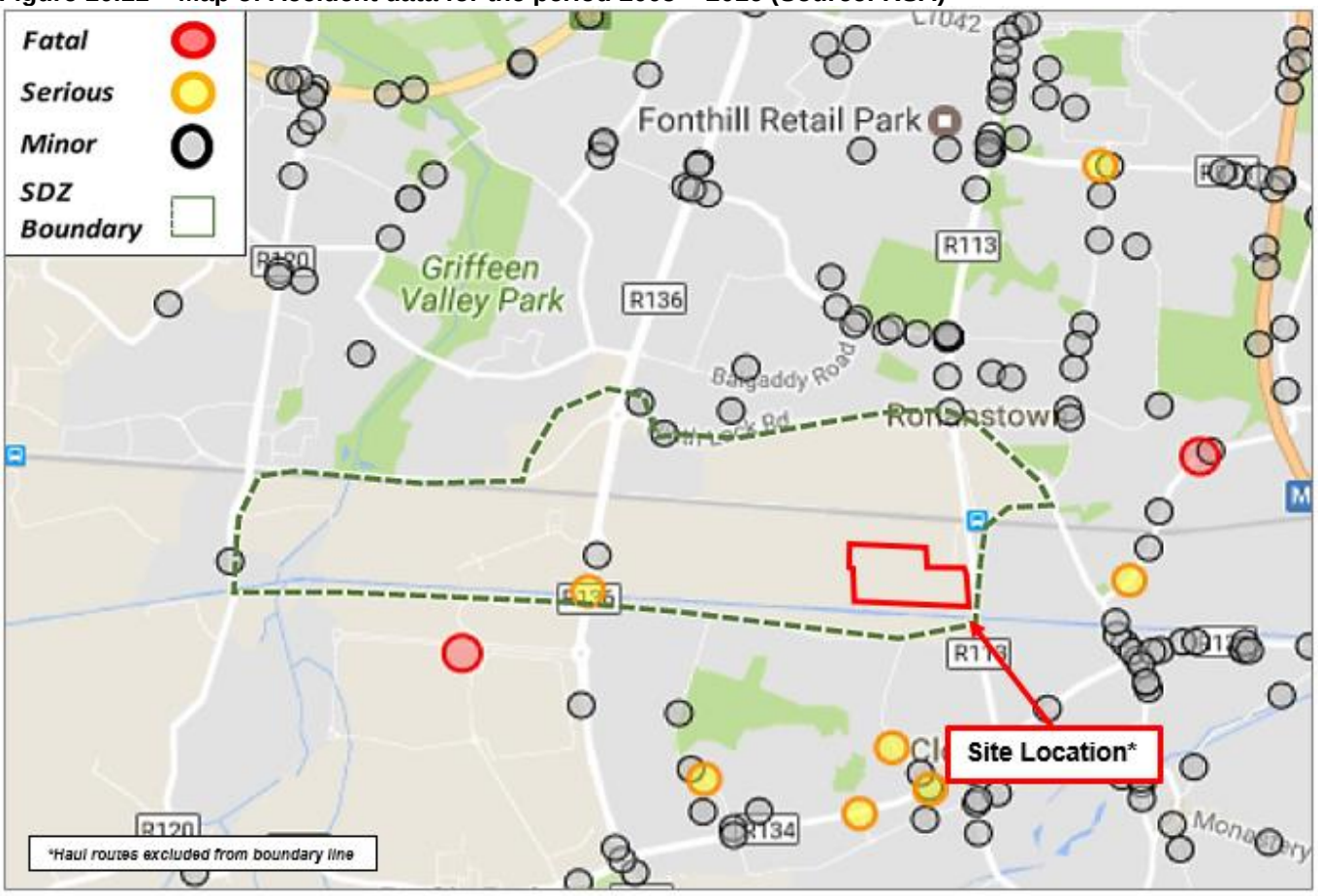
Athy	1
Carlow	1

10.4.8 Accident Data

Accident data was obtained for the area within and surrounding the Clonburris SDZ lands from the Road Safety Authorities Collision Statistics database. **Figure 10.1** below shows the location and severity of all road traffic accidents recorded in the Clonburris area in the period 2005 – 2016. As can be seen from the map, there was no collisions in the immediate vicinity of the subject site. In terms of the wider Clonburris SDZ Area, there was one fatal accident near Clonburris, which occurred in the Grange Castle Business Park.

A cluster of minor accidents was recorded to the south of the site on the New Nangor Road, Fonthill Road South and Lucan Newlands Road. Less dense clusters of minor accidents have also been recorded on the Balgaddy Road and Fonthill Road North.

Figure 10.11 – Map of Accident data for the period 2005 – 2016 (Source: RSA)



10.4.9 Proposed Road improvements

10.4.9.1 Overview

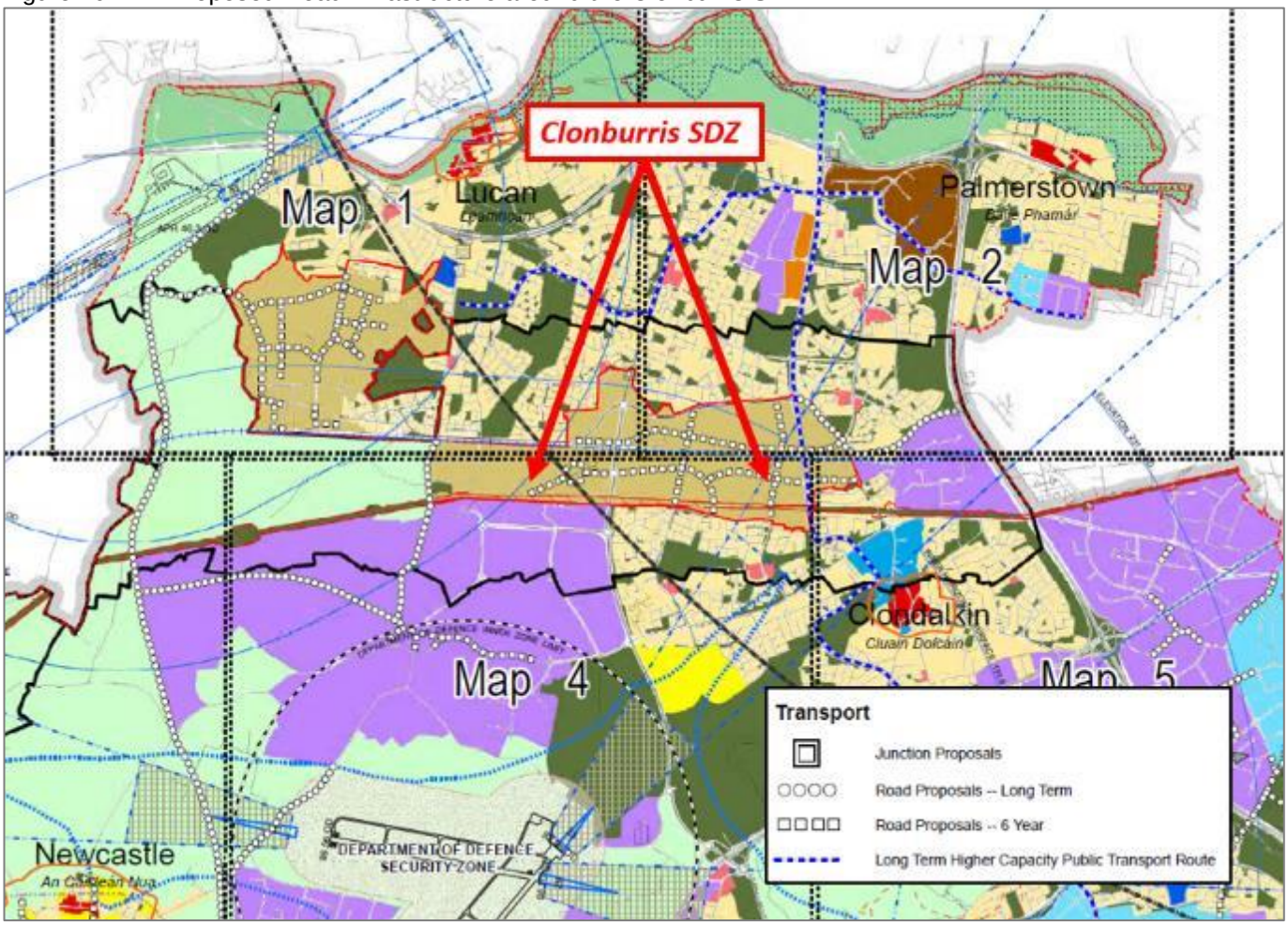
The following road infrastructure upgrades as outlined within the Clonburris SDZ Planning Scheme (May 2019) and the South Dublin County Council Development Plan (2016 – 2022) that are proposed within/close to the Clonburris SDZ scheme include the following and are shown in **Figure 10.12**:

- Clonburris/Kishogue Street Network: Various streets proposed within the Clonburris SDZ lands (which includes the subject scheme – the Clonburris 'Southern Link' Street; as well as the proposed 'Northern Link' Street),
- Celbridge Link Road: A new road between the Adamstown SDZ lands and Celbridge Road (R403),

- Upgrade and realignment of R120 Lock Road,
- Griffeen Avenue: Improvements at junctions with Griffeen Road, Outer Ring Road and the link between them,
- New Nangor Road/ R134 Upgrade: Upgrade/realignment of existing road between Nangor and Ballybane,
- Junction upgrade at Fonthill Road/N4,
- Adamstown South Road: New link road from Adamstown SDZ lands (via the existing railway bridge) to the Grange Castle employment lands,
- Cloverhill Road/Ninth Lock Road Upgrade and Link Road: Upgrade of Cloverhill Road from the M50 and upgrade of Ninth Lock Road from Fonthill Road to a new link road adjacent to the Dublin-Kildare railway Line,
- New Nangor Road Extension: A new road between Ballybane and Brownstown,
- Western Dublin Orbital Route (North): New high-capacity road from Tootenhill to the Leixlip Interchange (with a provision to make a further connection to the N3) and
- Western Dublin Orbital Route (South): A new road from Boherboy to Tootenhill.

The aforementioned upgrades at Ninth Lock Road and Griffeen Avenue will be in line with the Clonburris SDZ Scheme. These existing roads will be designated as 'Link Streets' under this scheme and shall be upgraded as traffic calmed streets. The scheme also proposes a number of key junction improvements through and along the proposed 'Arterial Streets' within the subject lands to improve the connectivity. These improvements are proposed on Fonthill Road and Grange Castle Road. Furthermore, the proposed Adamstown South Road west of the SDZ will connect towards the proposed Western Dublin Orbital Route and would provide additional connections towards Rathcoole, Saggart and Tallaght.

Figure 10.12 – Proposed Road Infrastructure around the Clonburris SDZ



10.4.9.2 Clonburris Southern Link Street

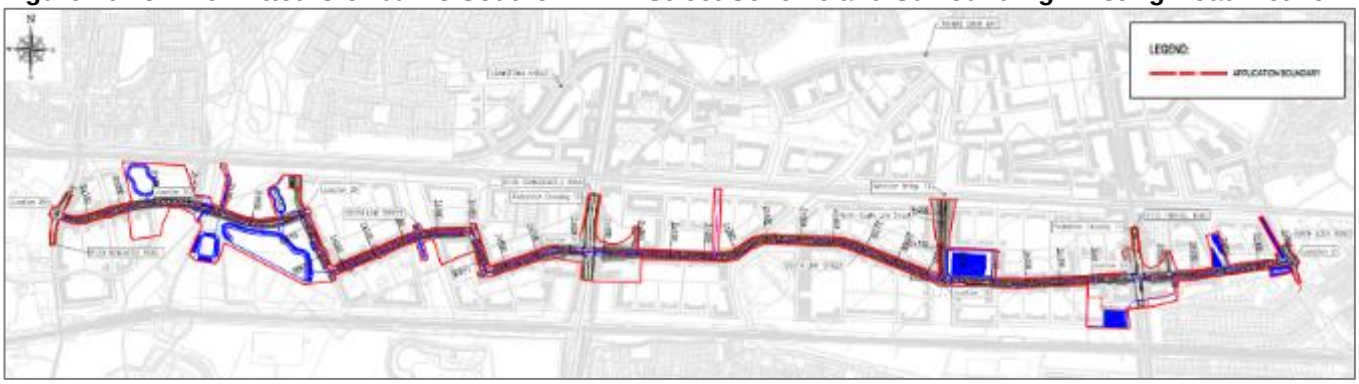
The Clonburris Southern Link Street Scheme is a cited objective of the South Dublin County Council Development Plan 2016-2022 under the Plan's 'Strategic Road and Street Network' and the proposed scheme forms part of the Clonburris SDZ Planning Scheme (2019) as road infrastructure to support the development of SDZ lands in conjunction with the Clonburris Northern Link Street. The Clonburris Southern Link Street has recently been granted planning permission allowing the southern lands of the SDZ to be opened up for development and allowing access for the road network for future residents. The Link Street will transverse through the subject development.

The Clonburris Infrastructure Development consists of the Clonburris Southern Link Street (CSLS) (**Figure 10.13**) and associated trunk infrastructure to serve the Clonburris Strategic Development Zone lands to the south of the Kildare/Cork Railway Line. The new CSLS will connect from the R120 Newcastle Road to the Ninth Lock Road with proposed intersections with the R136 Grange Castle Road and the R113 Font Hill Road. The proposed street will provide access for vehicular traffic, pedestrians, cyclists, and public transport to the Clonburris SDZ lands to the South of the Kildare/Cork Railway Line and provide linkages to the surrounding arterial road network.

The CSLS will consist of 4.0km of new road generally in the form of a 7m wide single carriageway with 1.75m wide off-road cycle tracks, 2m wide footpaths and public lighting. The CSLS includes the provision of 288 no. on-street car parking spaces (including 26 no. disabled parking spaces) as well as a number of pedestrian crossings and bus stop locations. It will include 8 no. new junctions and alterations to 4 no. existing junctions, in addition it will provide a number of vehicular access spurs to facilitate future development of adjoining lands.

As mentioned, the CSLS will run in an east-west direction through the subject site and provide the site with access to the surrounding road network in the form of the R113 Fonthill Road North and Ninth Lock Road to the east and the R136 Grange Castle Road and R120Adamstown Road to the west. It is anticipated that the CSLS planning application, a construction period of 24 months is expected in the best-case scenario where no obstacles arise and funding is available for the entirety of the project, but it would be operational by the design year 2025.

Figure 10.13 – Permitted Clonburris Southern Link Street Scheme and Surrounding Existing Road Network



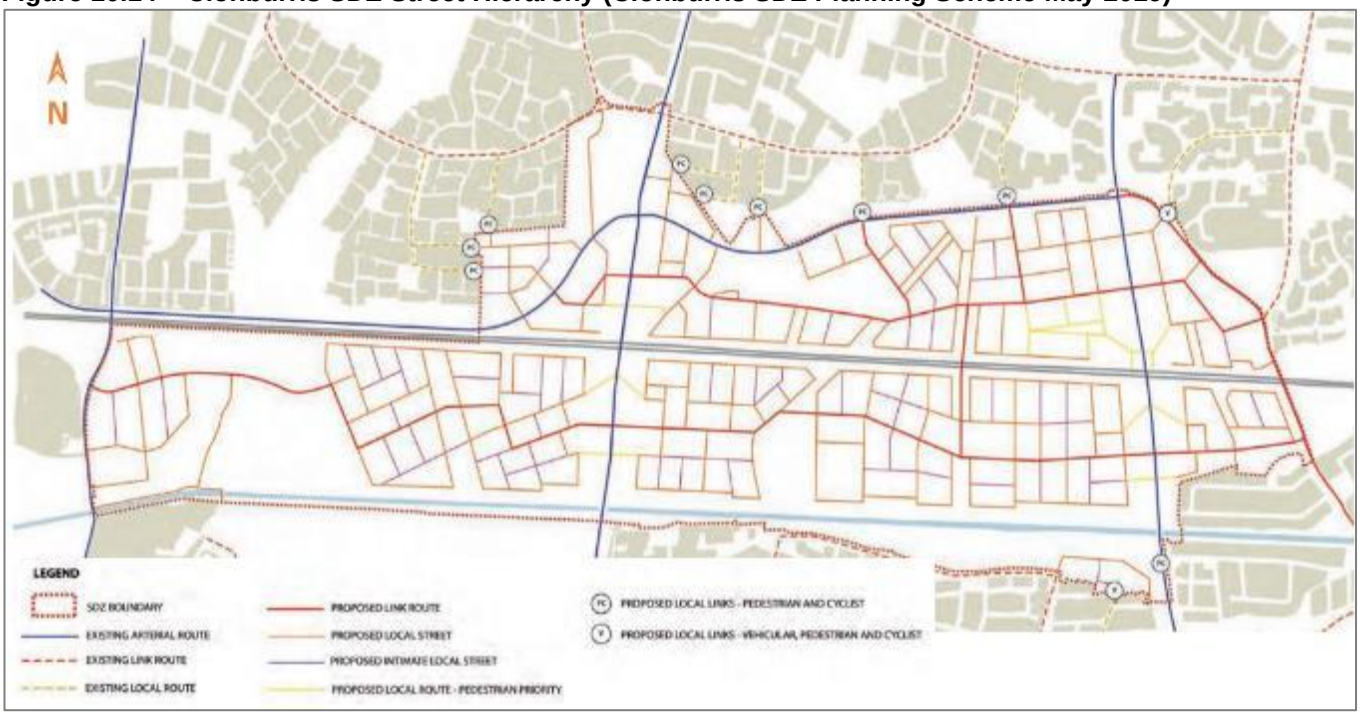
10.4.10 Proposed Pedestrian and Cycle Infrastructure

10.4.10.1 GDA Cycle Network Plan

The design approach for pedestrian and cyclist infrastructure will be to apply uniform design widths along the streets that are under consideration and will consider the existing greenway network and pedestrian priority routes to interact with the proposed 'Arterial' and 'Link' corridors under the Clonburris SDZ planning scheme.

Local pedestrian priority streets/routes shall also be provided in designated areas in and around the vicinity of the proposed Kishoge and Clonburris Urban Centres. These local routes within the SDZ lands will create an opportunity to link with the Grand Canal Green which runs through and along the entire southern boundary of the SDZ lands and links with Dublin City Centre in the form of a dedicated pedestrian and cycle route (**Figure 10.14**). Local Streets that provide through routes for strategic pedestrian and cycle routes should be filtered to prioritise pedestrian and cyclist through access where junctions intersect with the link or arterial streets only.

Figure 10.14 – Clonburris SDZ Street Hierarchy (Clonburris SDZ Planning Scheme May 2019)



Five dedicated pedestrian crossings on Arterial Streets have been incorporated in the designs of the road infrastructure proposals. These are located as follows:

- Three along the R136 Grange Castle Road:
- Two north and south of Kishoge train station where pedestrian priority route converges on either side of the arterial road corridor; and
- One on the bridge over the railway line, adjacent to the train station to cater for pedestrian desire crossing movements to/from either side of the road.
- Two along the R113 Fonthill Road North, north and south of Clondalkin and Fonthill train station where pedestrian priority route converges on either side of the arterial road corridor.

A number of bridges are required to enable north-south movement across the Grand Canal and Kildare Railway for different modes. A total of five new bridges are proposed in addition to the upgrade of an existing pedestrian and cycle bridge to a 'green bridge' at Hayden's Lane. Within the SDZ lands, the Railway Line splits the lands including Griffeen Valley Park and the lands to the south.

In order to mitigate the disintegration of the green infrastructure, in particular the Griffeen Valley Park and the Griffeen River, a green bridge shall be provided over the railway line. The Clonburris scheme aims to retrofit or replace the existing pedestrian bridge over the railway line to provide a green bridge connecting the Griffeen Valley Park and the proposed extension of the park to the south to enhance pedestrian and cyclist accessibility.

10.4.10.2 GDA Cycle Network Plan

The subject road site is located within the "Dublin West Sector" as outlined within the Greater Dublin Area Cycle Network Plan (2013). The Sector "extends southward from the N4 and River Liffey, to a line south of the N7 and the Ballymount and Walkinstown areas."

In the vicinity of the subject road scheme the Plan proposes the following route additions as indicated on **Figure 10.15** below:

- Route SO5/SO5a: "from Liffey Valley Shopping Centre southward Fonthill Road and Ninth Lock Road to Clondalkin Village and Tallaght (with a parallel variant SO5a along Neilstown Road and Fonthill Road west of Clondalkin Village). A northward link will extend across the River Liffey to Blanchardstown",
- Route SO6: "Lucan (Esker) - Grange Castle - Kingswood - Jobstown along the R136",

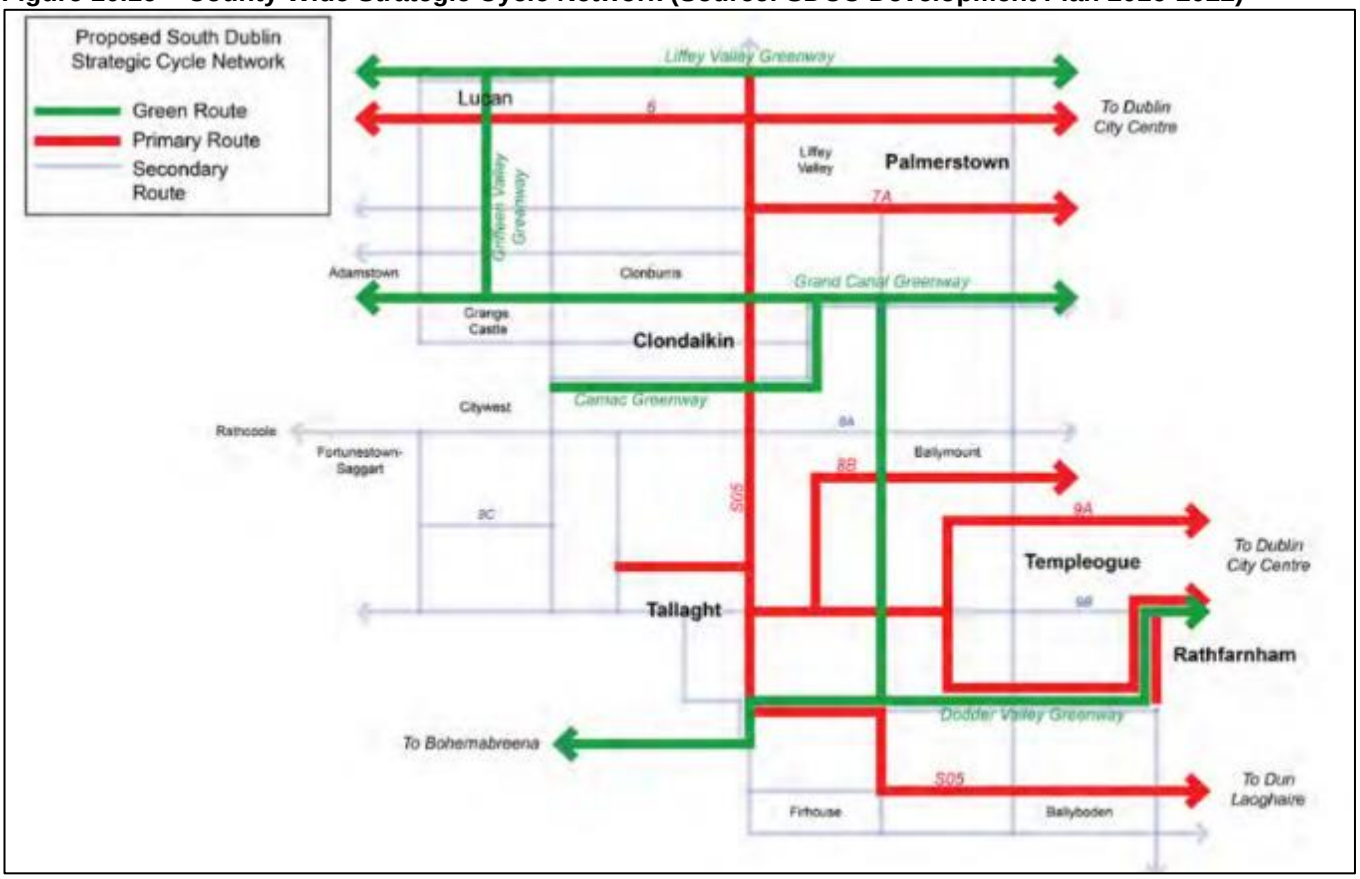
- Route SO7: “Lucan - Newcastle Road to Grange Castle and Nangor Road. (Continuation to Newcastle along rural route D6.)”,
- Route SO8: Proposed on Adamstown Avenue and Thomas Omer Way,
- Route 7B/N10 Grand Canal Greenway: “Pimlico to Rialto, Clondalkin, Adamstown via Grand Canal” and
- Western Canals Loop Link: “greenway route linking the Grand Canal at Adamstown to the Royal Canal at Leixlip via Griffeen Valley Park”.

Figure 10.15 – Proposed Cycle Routes (Extract: Sheet N5 GDA Cycle Network Plan 2013)

10.4.10.3 Proposed Cycling Networks

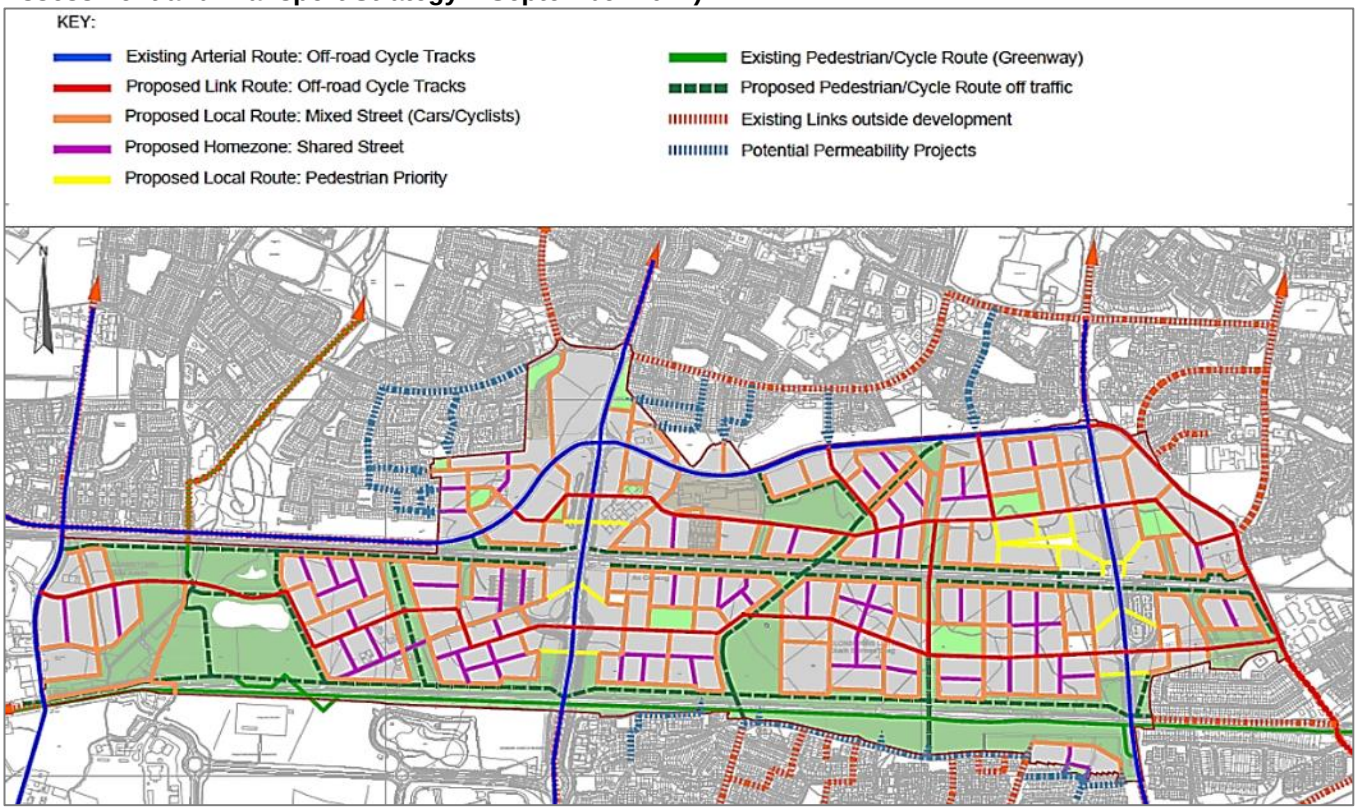
The South Dublin County Council has prepared a six-year Cycle Network Plan within the county development plan. Cycle routes detailed in the plan are at different stages of development, while some have been completed, other await construction or are at a design or consultation stage. A hierarchy of the routes within the Greater Dublin Area is shown in **Figure 10.16** below. As incorporated by the NTA’s Greater Dublin Area Strategic Cycle Network, notable routes include the Grand Canal and Griffeen Valley Greenways, both green routes will benefit from extensions to Hazelhatch and Lucan respectively.

Figure 10.16 – County Wide Strategic Cycle Network (Source: SDCC Development Plan 2016-2022)



Likewise, the Clonburris SDZ Strategy also contains a comprehensive proposed walking and cycling network to be developed within the Clonburris SDZ Area as shown in **Figure 10.17** below:

Figure 10.17 – Proposed Walking and Cycling Network (Source: Source: Clonburris SDZ Transport Assessment and Transport Strategy – September 2017)



Furthermore, the existing Grand Canal and Griffeen Valley Greenways will be complemented by a series of interconnecting and dedicated cycle routes linking the residential areas to key attractions, both internal and external to Clonburris including the proposed development. The proposed dedicated Cycle Routes within the development are:

- West-East Cycle Trails
    - Cycle Trail adjacent to the Railway Line on both sides of the railway line.
    - Cycle Trail on the northern side Grand Canal setback along the street frontage
- North-South Cycle Trails
    - On the Western side of the development, three Cycle Trails are proposed:
        - Following the existing path near Hayden's Lane (Kilmahuddrick Stream Open Space)
        - New trail along the eastern side of the Griffeen Park Extension.
        - New trail along the central green area between Kishoge South West.
    - On the eastern side of the development, a Cycle Trail along the proposed 'Barony Park' linking the Grand Canal Greenway on Kilcronan Avenue with Thomas Omer Way.

10.4.11 Proposed Public Transport Infrastructure

10.4.11.1 High Frequency Orbital Bus

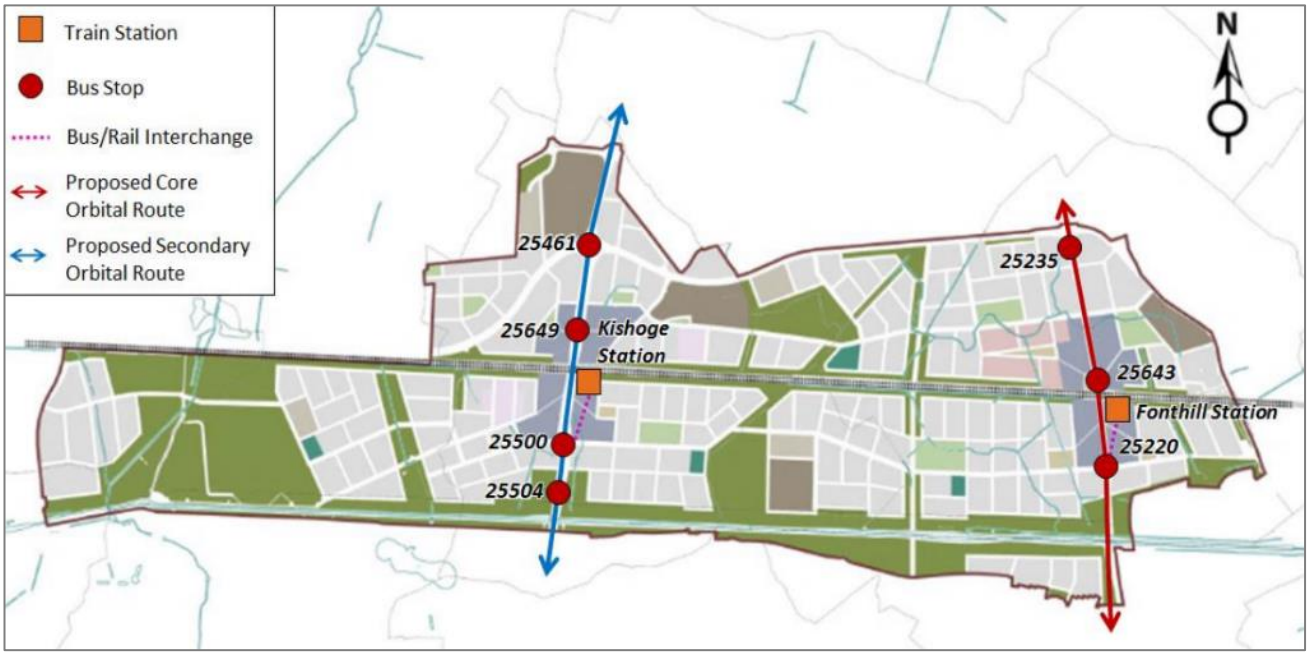
The Clonburris SDZ Strategy outlines two orbital bus services operating from Tallaght to Blanchardstown, serving the Clonburris SDZ. These Orbital routes would tie into the BusConnects Plans and the GDA Greater Dublin Area Transport Strategy 2016-2035. It must be noted that these services have not been finalised and may be subject to change based on further design and planning undertaken by the NTA and SDCC. The two services include:

- Core Orbital Service operating North – South on the Fonthill Road North (R113) with an indicative headway of 5 minutes; and

- Secondary Orbital Service serving Liffey Valley to Tallaght via Lucan and Grange Castle Road (R136) with an indicative headway of 15 minutes.

As mentioned, these proposals are part of the 2035 GDA Strategy and it is envisaged that the provision of these high-quality orbital bus services would serve the demand by the residents and employees of Clonburris, provide an interchange with the rail stations at both Kishoge and Clondalkin-Fonthill and provide a high frequency service linking Clonburris to Tallaght, Blanchardstown, Liffey Valley and Fonthill Retail Park. **Figure 10.18** illustrates that the proposed orbital routing through the SDZ lands with indicative stopping and interchange locations highlighted.

Figure 10.18 – Orbital Bus Stop Locations within the Clonburris SDZ (Source: Clonburris SDZ Transport Assessment and Transport Strategy – September 2017)



10.4.11.2 Local Bus

Local bus routes are planned to travel along the proposed Clonburris Southern Link Street in both directions. However, there would be an overall low to medium frequency. The Strategy also outlines local bus proposals that could support sustainable travel from Clonburris to key trip attractors with Lucan and Liffey Valley. These services include the following: -

- Local Bus 1: Lucan – Park West Service and
- Local Bus 2: Grange Castle to Liffey Valley Service via Clonburris.

Local Bus 1 would link Lucan, Adamstown, Clonburris and Park West Business Park (Ref. **Figure 10.19**) whilst Local Bus 2 would provide a connection between Clonburris and the employment areas at Grange Castle Business Park and Liffey Valley (Ref. **Figure 10.20**). Both of these services will serve the aforementioned bus stops and these local services could potentially provide a sustainable alternative instead of car journeys within the local area. It would also provide interchange with core and orbital bus services and supports the Public Transport measure detailed in the 2025 GDA Strategy.

Figure 10.19 – Proposed Lucan – Park West Bus Route (Source: Clonburris Transport Assessment and Strategy)

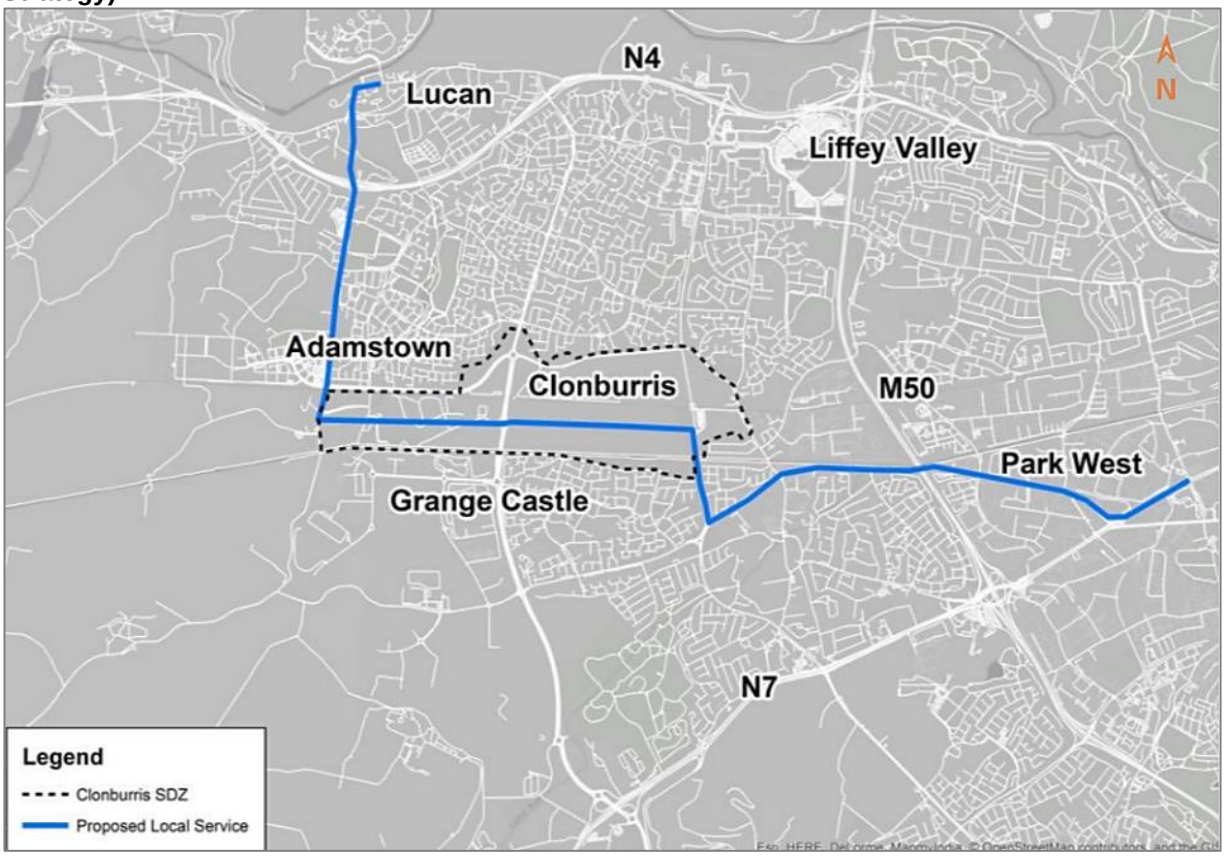


Figure 10.20 – Proposed Grange Castle to Liffey Valley Service via Clonburris (Source: Clonburris Transport Assessment and Strategy)

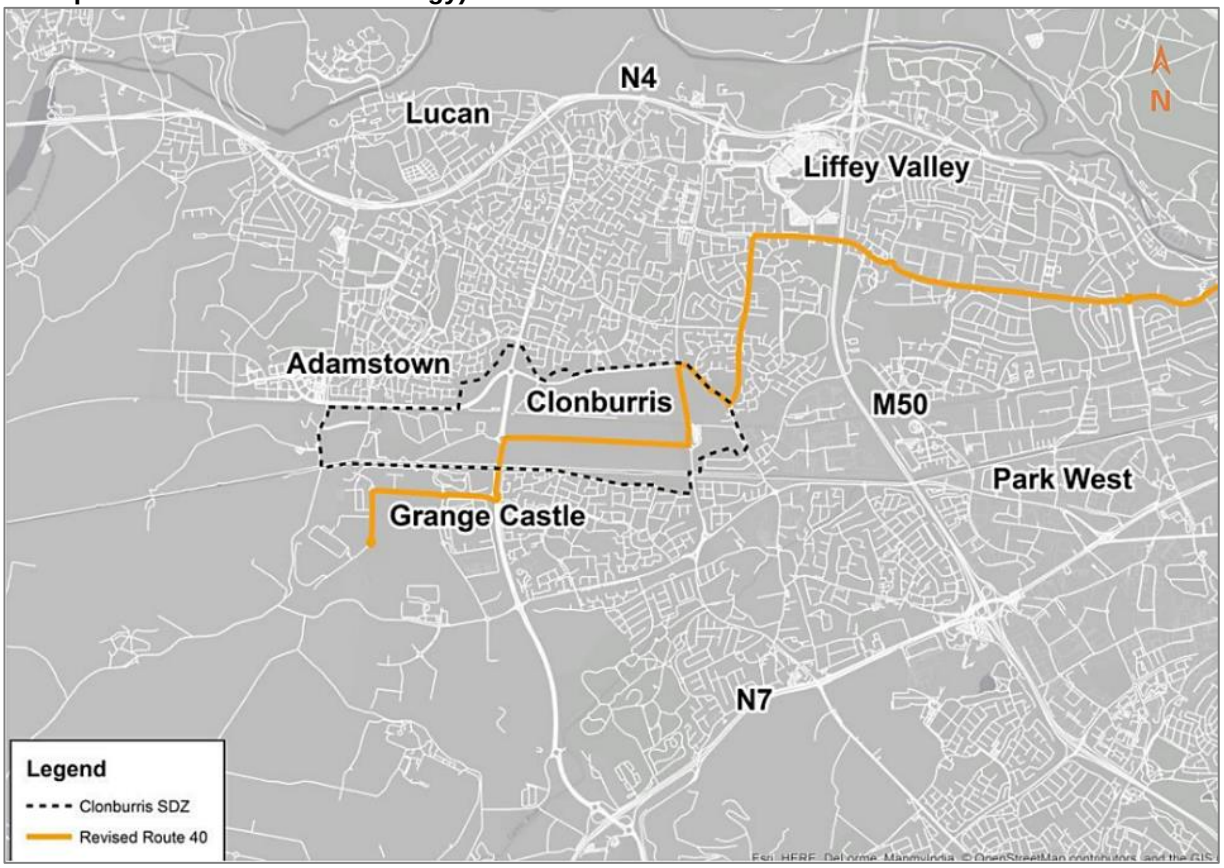
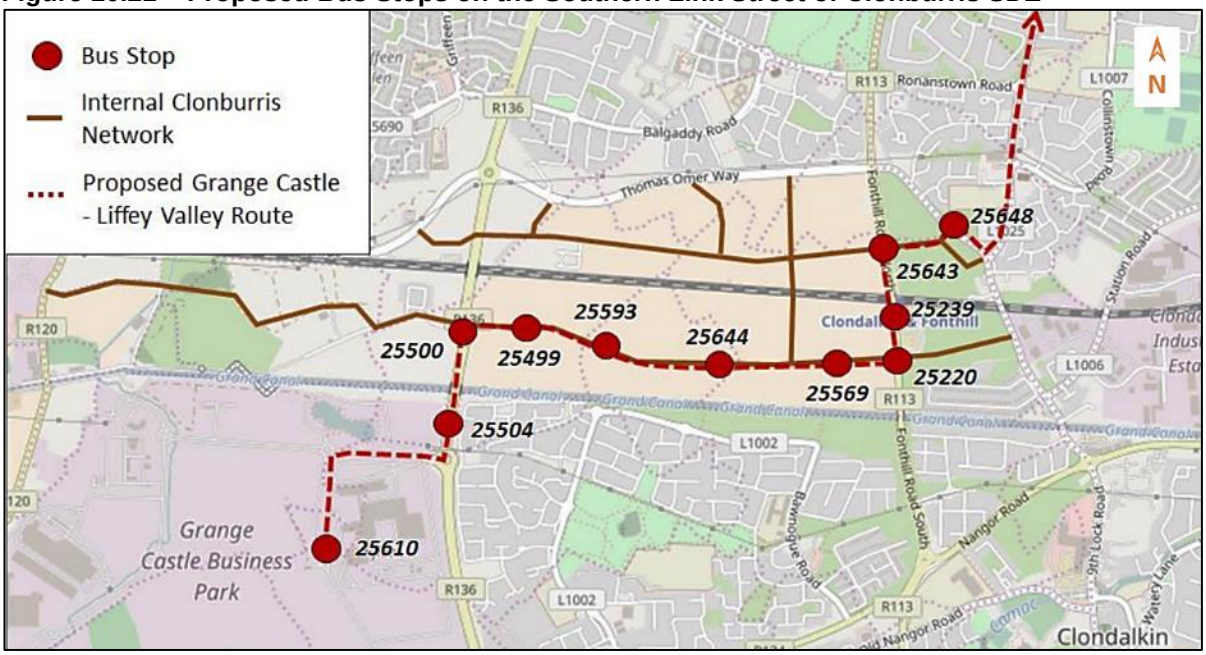


Figure 10.21 illustrates the proposed routing of the new service through the Southern East-West Link Road within the Clonburris SDZ.

Figure 10.21 – Proposed Bus Stops on the Southern Link Street of Clonburris SDZ



(Source: Clonburris Transport Assessment and Strategy)

10.4.11.3 BusConnects

The latest BusConnects network redesign and core bus corridors have been considered as part of this brief. The current proposals effect the current existing road corridors in the Clonburris SDZ lands however, the BusConnects network is intended to evolve with the future road network in the Greater Dublin Area. As such future revisions of the BusConnect could include the proposed road infrastructure in the Clonburris SDZ lands.

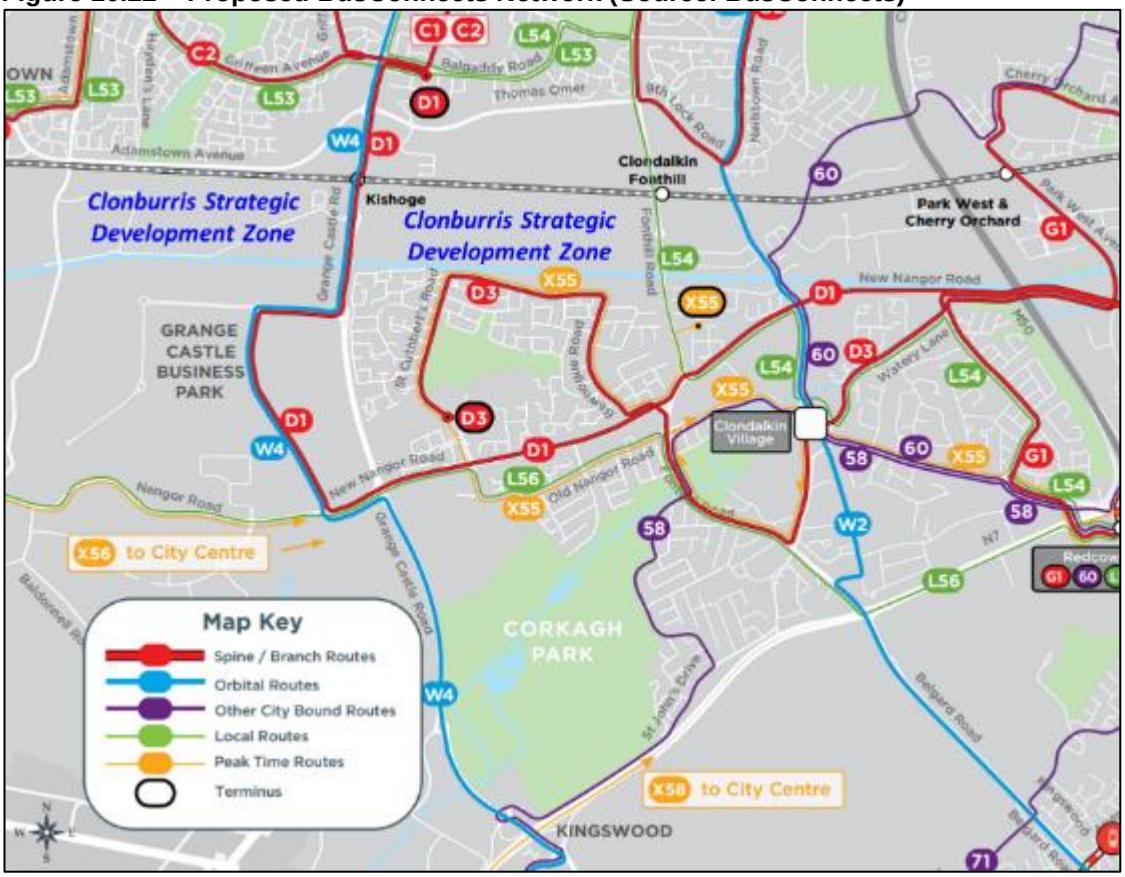
As **Figure 10.22** shows, the Clonburris SDZ will benefit from the proposed orbital W4 which will travel through the Clonburris site on Grange Castle Rd. BusConnects aims to operate this route every 30 minutes on weekdays and weekends (every 15 minutes during peak hours on weekdays). An additional orbital route, the W2, will operate on Ninth Lock Rd at a frequency of every 15 minutes. These routes serve the following destinations: -

- Orbital Route W4: Blanchardstown Shopping Centre to Tallaght via Liffey Valley,
- Orbital Route W2: Liffey Valley to Tallaght via Clondalkin.

The development will benefit from convenient access to the C Spine which will operate north of the scheme on Griffeen Avenue. The C Spine that is located within the vicinity of the scheme will make up of two branches, namely the C1 and C2. Both of these routes will have a frequency of 8 to 15 minutes during peak hours on weekdays and 30 minutes at weekends and weekday off-peak hours. Both routes will begin at Adamstown and terminate in Sandymount. Furthermore, branch D1 and G2 (both routes operate 15 minutes on weekdays/every 20 minutes on weekends) are proposed on Grange Castle Rd and Ninth Lock Road respectively while branch D3 will travel on St. Cuthbert's Road. These routes will serve the following destinations:

- Branch Route C1 and C2: Adamstown to Sandymount via Dublin City Centre, Ballyowen and Griffeen Valley.
- Branch Route D1: Foxborough to City Centre via Grange Castle Business Park and the New Nangor Road.
- Branch Route G2: Liffey Valley Shopping Centre to Spencer Dock via Dublin City Centre.
- Branch Route D3: Clongriffin to Clondalkin via Bawnogue and Dublin City Centre.

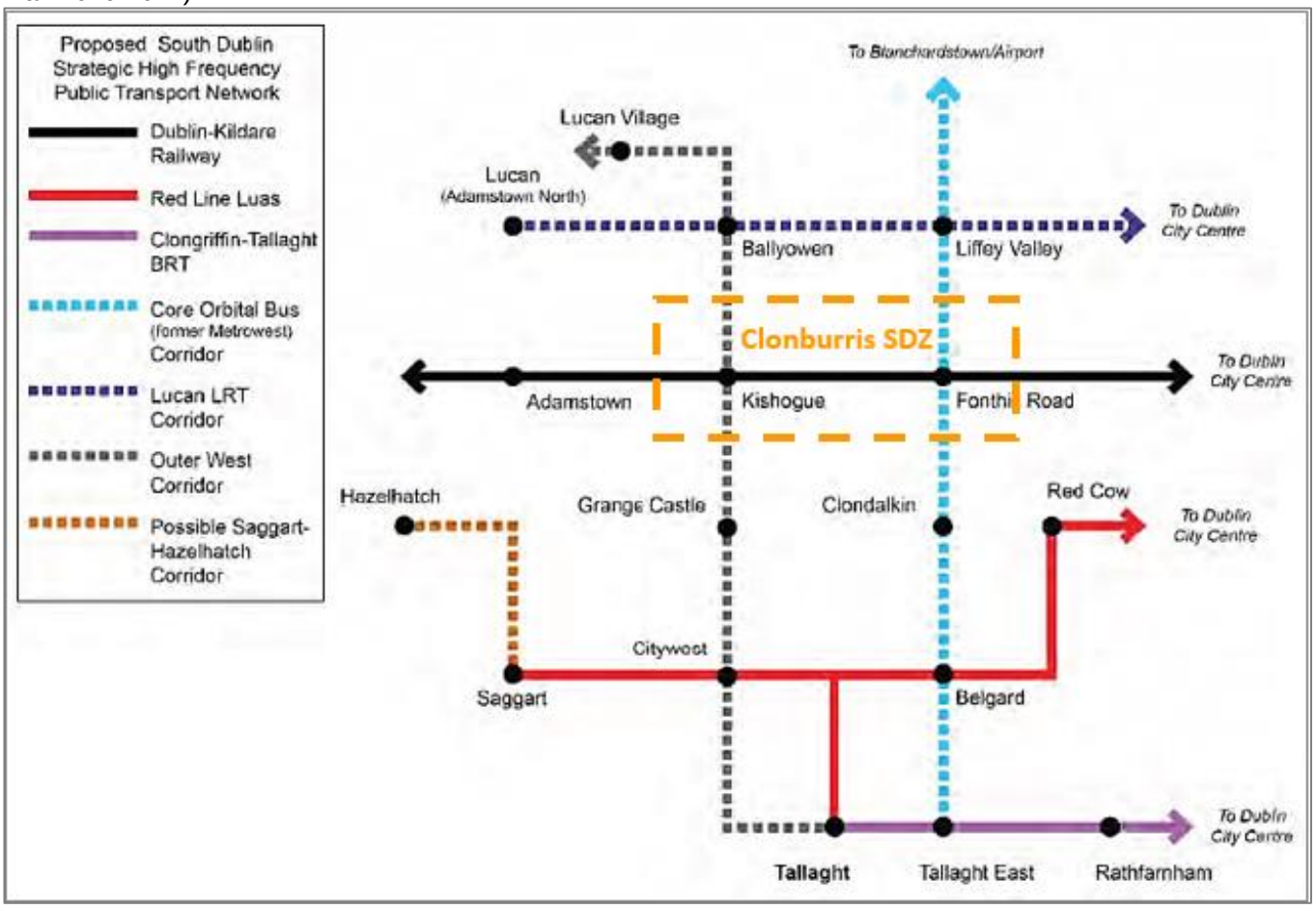
Figure 10.22 – Proposed BusConnects Network (Source: BusConnects)



10.4.12 Proposed Light Rail Infrastructure

The SDZ lands can be potentially served by the Lucan Luas that is currently planned under the NTA's Transport Strategy for the Greater Dublin Area 2016 – 2035. Under this strategy, the future Lucan Line would serve Lucan, Liffey Valley and Ballyowen (**Figure 10.23**). Although the proposals are in its infancy stage, the Luas Line could extend towards the Clonburris SDZ lands and would in turn expand the Luas transport users including the residents and employees in Clonburris.

Figure 10.23 – Schematic of County Wide Higher Capacity Public Transport Network (Source: SDCC Development Plan 2016-2022)



10.4.13 Proposed Heavy Rail Infrastructure

The 2035 GDA Strategy outlines numerous public transport proposals to serve predicted growth in travel demand to 2035 and promote the use of sustainable modes of travel. In terms of heavy rail, the SDZ lands benefit from access to existing high-quality public transport services that operate along the Kildare/Cork Railway Line (Error! Reference source not found.), which includes a four-track system between Park West and Hazelhatch railway stations. Specific heavy rail measures which are likely to impact on the Clonburris development include: -

- The DART+ Programme: Extension of the DART system, providing fast, high frequency electrified services to Hazelhatch on the DART+ South West Line (Kildare Line) as shown in **Figure 10.24** below. The expansion incorporates both the Kishoge and Clondalkin-Fonthill Railway Stations (**Figure 10.25**); and
- Kishoge Station: Opening the Kishoge Station within the proposed Clonburris SDZ will provide improved rail access for residents and staff employed at the site.

Figure 10.24 – DART+ Programme Scope 2018 - 2027 (Source: Irish Rail)

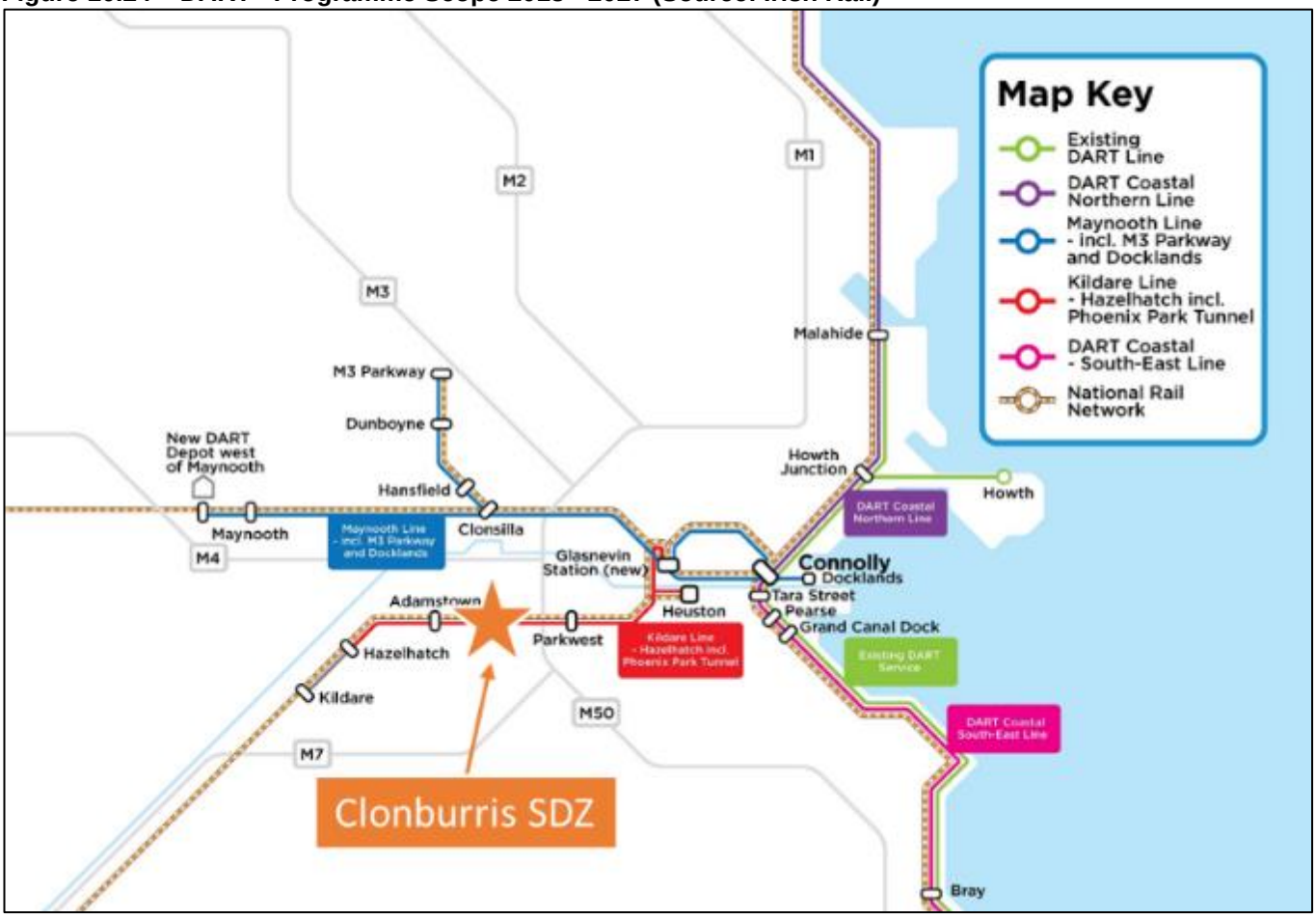


Figure 10.25 – DART+ South West Line (Source: Irish Rail)

10.4.14 Timescales of Proposed Infrastructure

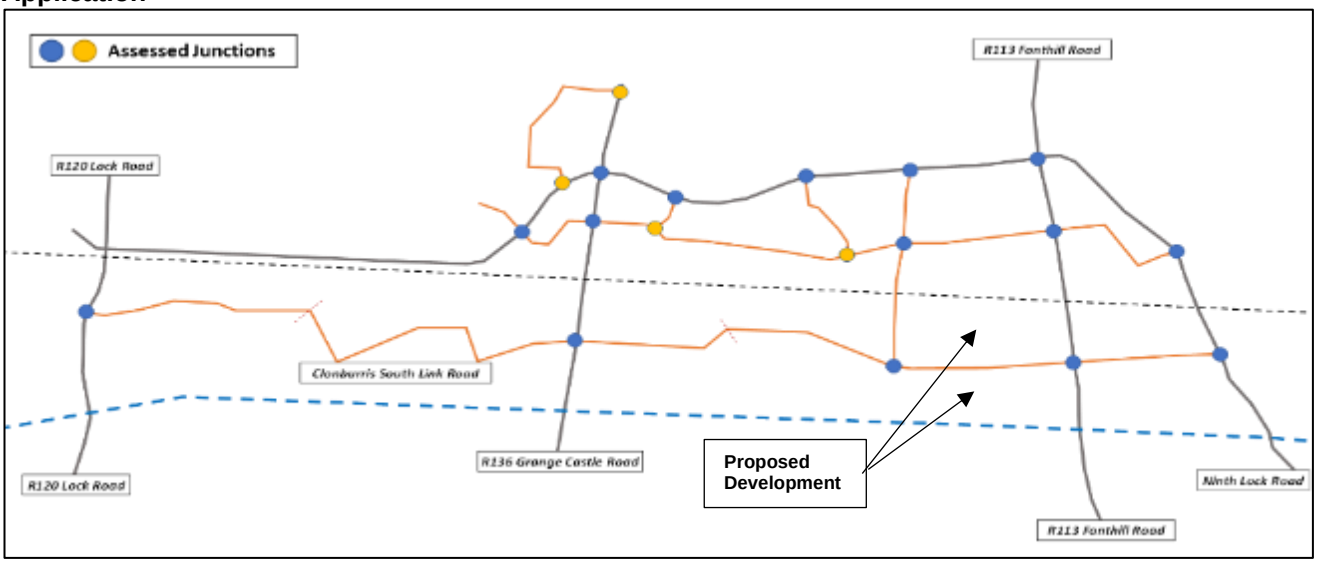
The implementation of the above infrastructure schemes by the local authority will be subject to the availability of funding. As no specific completion dates for either of these schemes have been published, for the purpose of this assessment we have assumed that none will be constructed by the subject road scheme's adopted design years. The subject Clonburris Southern Link Street, included in the planning application of Clonburris infrastructure Works, have been recently granted. This will be followed by the construction of this road in the coming years.

10.4.15 Baseline traffic data

With the objective of quantifying the existing baseline traffic movements travelling across the local road network historic traffic counts were obtained via the planning application for the Clonburris Southern Link Street; the historic baseline data was made available under National Transport Authority / South Dublin County Council's South West Dublin Local Area - Model Development Report.

This report was analysed with the objective of establishing local traffic characteristics in the immediate area of the proposed development based on these historic figures.

Figure 10.26 – Junctions Included Within the Network Analysis for the Clonburris Southern Link Street Application



10.5 CHARACTERISTICS OF THE PROPOSAL

10.5.1 Development Schedule

The proposed development comprises a mixed-use residential development comprising of houses, duplexes, and apartments with a community/civic building and associated infrastructure. Refer to Chapter 2 for a detailed project description. The proposed development can be summarised as per **Table 10.5**.

Table 10.5 – Development Schedule Summary

Unit Type		No. of Units	Total No. of Units
House	2 Bed	8	172
	3 Bed	153	
	4 Bed	12	
Duplex	2 Bed	74	148
	3 Bed	74	

Apartment	1 Bed	108	248
	2 Bed	135	
	3 Bed	5	
Total No. of Units		**569**	

Unit Type	No. of Units	Gross Area (sqm)
Creche	1	547
Shared Office	1	626

10.5.2 Site Access Arrangements

10.5.2.1 Vehicle Access

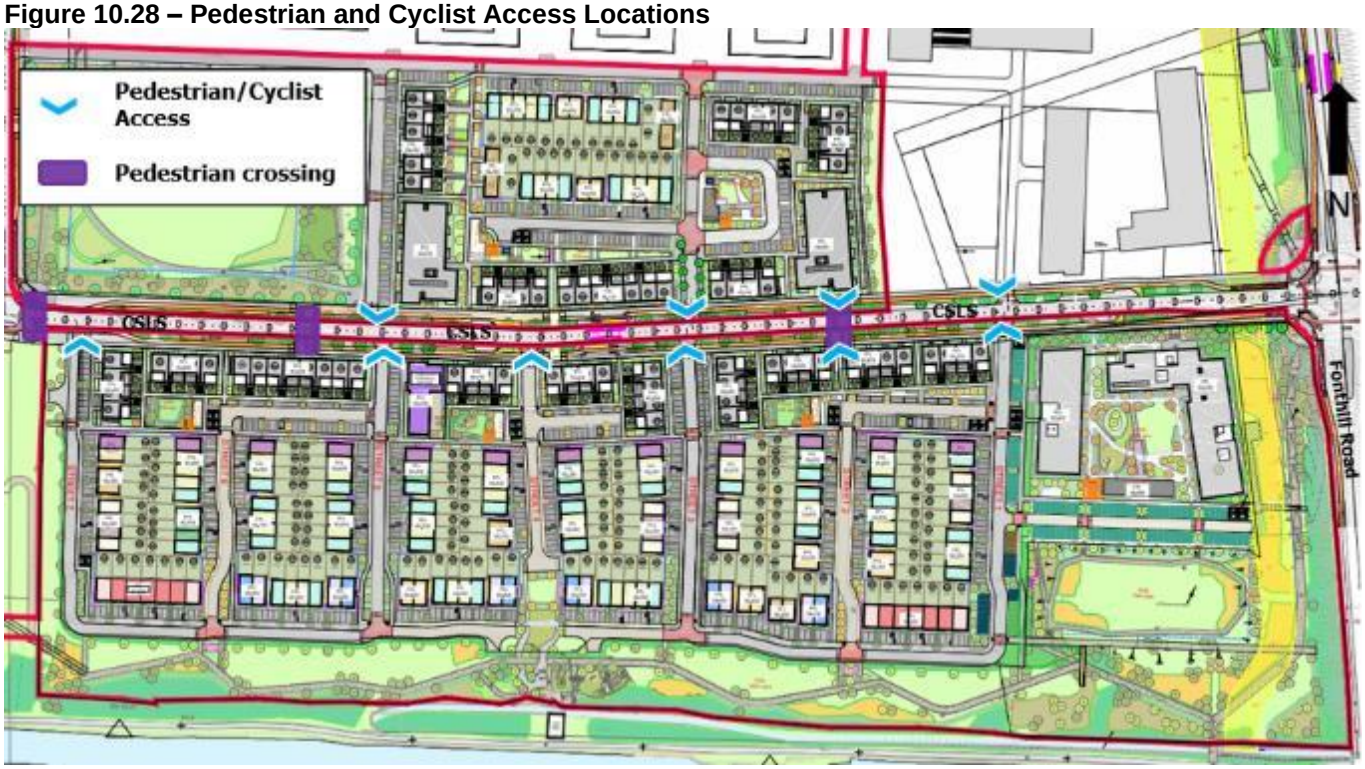
The subject site will benefit from 5 no. vehicle accesses located along the Clonburris Southern Link Street, 3 no. accesses to the southern section of the site and 2 no. accesses to the northern section of the site as shown in **Figure 10.27** below. All of the vehicle accesses are in the form of priority junctions.

Figure 10.27 – Vehicle Access Locations

10.5.2.2 Pedestrian and Cyclist Access

The subject site will benefit from 10 no. pedestrian/cyclist accesses located along the Clonburris Southern Link Street, 6 no. accesses to the southern section of the site and 4 no. accesses to the northern section of the site as shown in **Figure 10.28** below. Pedestrian crossings will also be provided along the Clonburris Southern Link Street and at the Clonburris Southern Link Street/ Fonthill Road junction. The pedestrian accesses enhance site connectivity and permeability through the site.

Figure 10.28 – Pedestrian and Cyclist Access Locations



10.5.3 Car Parking

Reference has been made to the Transport Assessment & Transport Strategy section of the *Clonburris Strategic Development Zone (SDZ) Draft Planning Scheme*, as published in September 2017.

The subject development site is located within SDCC Zone 2 Parking and therefore the quantum of car parking provision should be minimised. The car parking standards as set out in the *South Dublin County Council Development Plan 2016 – 2022* are illustrated in **Table 10.6** below.

Table 10.6 – SDCC County Development Plan 2016 – 2022 Maximum Parking Rates (Residential)

Dwelling Type	Number of Bedrooms	Zone 2
Apartment / Duplex	1	0.75 Space
	2	1 Space
	3+	1.25 Space
House	1	1 Space
	2	1.25 Space
	3+	1.5 Space

In addition, as per the SDCC Parking Standards, 10% of the total car parking provision will be allocated as electric vehicle charging stations while the remainder of the parking spaces should be constructed to be capable of accommodating future charging points, as required. Additionally, The SDCC Development Plan outlines that 5% of car parking provision is allocated for Mobility Impaired spaces within the development. In this case, this rate applies for car park provision for apartments, as houses have curtilage driveways which cater to the mobility impaired parking.

Table 10.7 – SDCC County Development Plan 2016 – 2022 Maximum Parking Rates (Subject Development)

Dwelling Type	Number of Bedrooms	Zone 2
Apartment / Duplex	1	0.75 Space
	2	1 Space
	3+	1.25 Space
Total Maximum Spaces		**389**

It is proposed that the 396 no. apartments/duplexes will be provided with 347 no. car parking spaces, (0.88/ unit). This includes 17 no. mobility impaired parking spaces. Additionally, every house will count with its own curtilage driveway which will be wide enough to be suitable for impaired mobility users.

The South Dublin County Council (SDCC) Development Plan 2016-2022 aims to take a "balanced approach to the provision of car parking with the aim of meeting the needs of businesses and communities whilst promoting a transition towards more sustainable forms of transportation." SDCC states that the number of spaces for a proposed site must not exceed the maximum provision. It also states that the "maximum provision should not be viewed as a target and a lower rate of parking may be acceptable". This depends on the environment of the proposed site and its future residents.

The Department of Housing, Planning and Local Government (DHPLG) has also mentioned car parking, within the 'Intermediate Urban Locations' section of the document 'Sustainable Urban Housing: Design Standards for New Apartments'. It states that "*In suburban/urban locations served by public transport or close to town centres or employment areas and particularly for housing schemes with more than 45 dwellings per hectare net (18 per acre), planning authorities must consider a reduced overall car parking standard and apply an appropriate maximum car parking standard."*

The proposed residential development is located within the 'Intermediate Urban Location' as classified within these guidelines. The document highlights that for new developments in these locations, 'the Planning Authority must consider a reduced overall car parking standard.'

It is an objective for this development to reduce the need for commuters to travel by car and instead to avail of more sustainable modes of travel in line with current and future travel requirements as set out in recent policy documents within Ireland. It is noted that the concept for car parking reduction in apartments is relatively new in Ireland and, therefore, proposals to implement a more sustainable approach for car parking may take time.

10.5.4 Cycle Parking

In order to determine the appropriate level of cycle parking provision for the proposed development, reference should be made to both (i) the South Dublin County Council (SDCC) requirements; and (ii) the Department of Housing and Planning and Local Government (DHPLG) Government 'Sustainable Urban Housing: Design Standards for New Apartments' (SUHDS guidance 2018).

The SDCC cycle parking standards state that 1 no. long term cycle space is required per 5 no. apartments / duplexes and 1 no. short term cycle space is required per 10 no. apartments/ duplexes. Therefore, according to the SDCC cycle parking standards the development is required to provide 72 long term cycle spaces for residents and 36 short term cycle spaces for visitors. This equates to a total cycle parking provision requirement of 108 cycle parking spaces.

The Department of Housing, Planning and Local Government 'Sustainable Urban Housing: Design Standards for New Apartments' (SUHDS guidance 2018) states the following requirements for cycle parking:

- 1 cycle storage space per bedroom;
- 1 cycle storage space for studio units and
- 1 cycle space per two residential units for visitor parking.

In total, there are 396 no. apartment/ duplex units proposed. Of these, there is proposed to be 108 No. 1-bedroom apartments, 135 No. 2-bedroom apartments, 5 No. 3-bedroom apartments, 74 No. 2-bedroom duplexes and 74 No.

3-bedroom duplexes. Therefore, the development is required to provide a total of 961 no. of cycle parking spaces based on the DHPLG guidelines. The SDCC cycle parking requirement for the development is proportionally low at 119 spaces whereas the DHPLG requirement is high at 961 cycle parking spaces. It is considered that a provision of cycle parking that is between the SDCC guidelines (119 spaces) and the DHPLG guidelines (961 spaces) is acceptable.

Therefore, the development proposes to provide a total of 672 cycle parking spaces with 592 of these proposed as long term parking for the residents and an additional 80 proposed as short term stay. The increased level of cycle parking spaces is proposed to encourage positive modal shift towards a more sustainable mode of travel. Moreover, future residents of the subject site will also be able to benefit from pedestrian/cycle facilities along most of the roads to/from the proposed development.

10.6 POTENTIAL IMPACT OF THE PROPOSAL

10.6.1 Construction Phase

10.6.1.1 Management of Construction Activities

All construction activities on-site will be governed by a Construction Traffic Management Plan (CTMP), the details of which will be agreed in full with South Dublin County Council prior to the commencement of construction activities on site. Preliminary details of the CTMP are outlined within the Construction and Environmental Management Plan. 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 thereby ensuring that both the public's and construction workers safety is maintained at all times, disruptions minimised and undertaken within a controlled hazard free / minimised environment. The impact of the construction period will be temporary in nature.

10.6.1.2 Construction Traffic

All construction activities on-site will be governed by a Construction Traffic Management Plan (CTMP), the details of which will be agreed in full with South Dublin County Council prior to the commencement of construction activities on site. Preliminary details of the CTMP are outlined within the Construction and Environmental Management Plan.

Haul routes have been designed considering all traffic during the Construction Stage. Construction traffic will only be generated on weekdays (07:00-19:00, subject to conditions of a planning permission) and will consist of the following two principal categories:

- Private vehicles owned and driven by site construction staff and by full time supervisory staff.
- Excavation plant, dumper trucks and delivery vehicles involved in site development works and material delivery vehicles for the following: granular fill materials, concrete pipes, manholes, reinforcement steel, ready-mix concrete and mortar, concrete blocks, miscellaneous building materials, etc

On-site employees will generally arrive before 08:00, thus avoiding the morning peak hour traffic. These employees will generally depart after 16:00. It should be noted that a large proportion of construction workers are anticipated to arrive in shared transport subject to Covid-19 restrictions. Deliveries will be actively controlled and subsequently arrive at a dispersed rate during the course of the working day.

Based upon the experience of similar developments, a development of this type and scale would at a maximum necessitate approximately 40 staff on site at any one time, subsequently generating no more than 40 two-way vehicle trips over the day over the period of the construction works.

Based on a preliminary review of the existing survey data and proposed site levels we estimate that approximately 1,500m^3 of material will require excavation.

An appropriate control and routing strategy for HGVs can also be implemented for the duration of site works as part of the CTMP. It is not proposed to utilise any roads with weight/height restrictions as part of the routing of HGVs during the construction phase.

A significant benefit of the subject development site's characteristics is that all construction traffic vehicle parking demands can be accommodated on-site thereby minimising the impact upon the operational performance and safety levels of the adjacent public road network.

Considering the site's proximity to the strategic road network and following the implementation of an appropriately detailed CTMP, it is concluded that construction traffic will not give rise to any significant traffic concerns or impede the operational performance of the local road network and its surrounding junctions. All construction traffic will access the site via Fonthill Road to the east of the site.

The scheme shall be constructed in a manner to minimise disruption to road users, local residents and businesses. All construction works are to be undertaken in a clearly delineated site area which will have specific entry and exit points for construction traffic.

10.6.2 Operational Phase

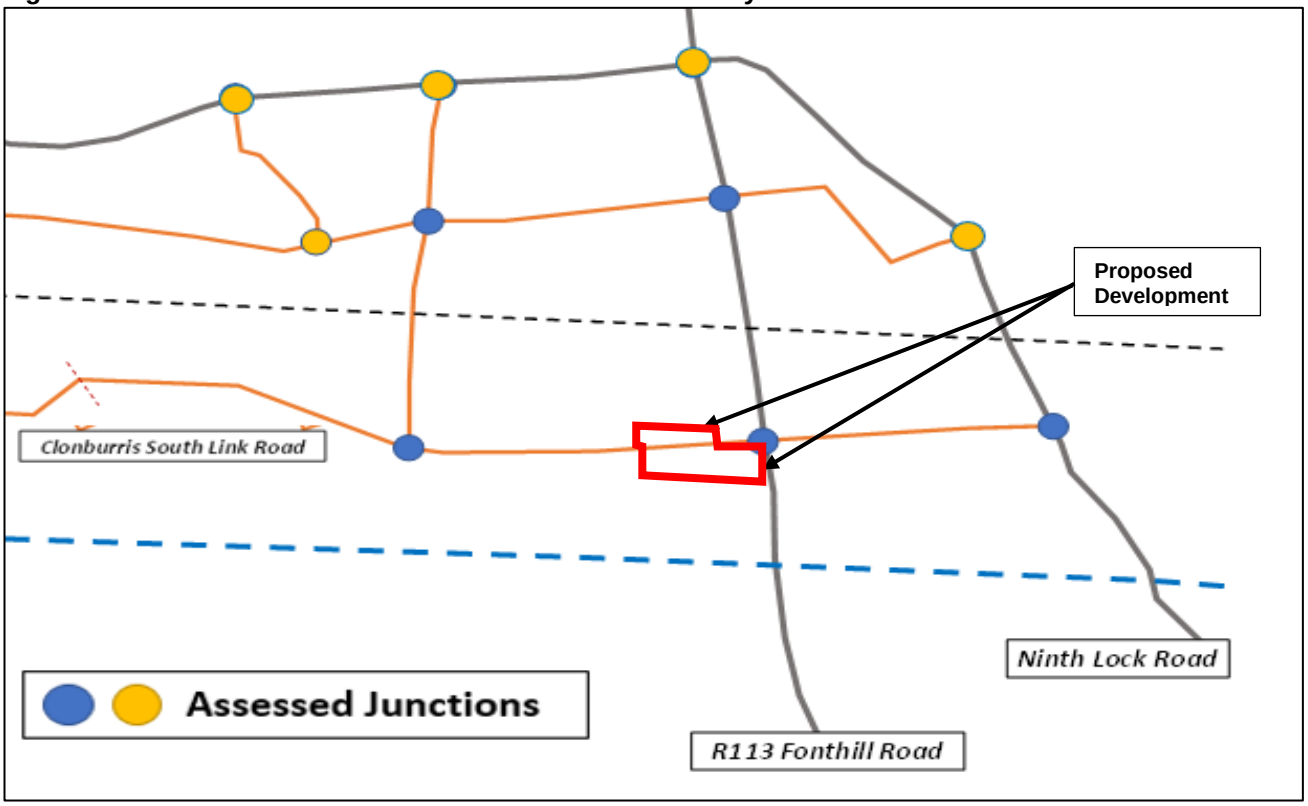
10.6.2.1 Traffic Assessment

Historic traffic counts were obtained via the planning application for the Clonburris Southern Link Street; the historic baseline data was made available under National Transport Authority / South Dublin County Council's South West Dublin Local Area - Model Development Report. This report was analysed with the objective of establishing local traffic characteristics in the immediate area of the proposed development.

In order to analyse and assess the impact of the proposed link road scheme on the surrounding road network, a traffic generation and distribution model (excel based) of the following key junctions ,as shown in **Figure 10.29,** was created:

- Junction 1 – Ninth Lock Road / CSLS;
- Junction 2 – R113 Fonthill Road / CSLS;
- Junction 3 – CSLS / New Link Road;
- Junction 4 – CNLS / New Link Road; and
- Junction 5 – R113 Fonthill Road / CNLS.

Figure 10.29 – Junctions Included Within the Network Analysis



10.6.2.2 Trip Generation

Historic traffic counts were obtained via the planning application, Planning Ref: SDZ20A/0021, for the Clonburris Southern Link Street; the historic baseline data was made available under National Transport Authority / South Dublin County Council's South West Dublin Local Area - Model Development Report. This report was analysed with the objective of establishing local traffic characteristics in the immediate area of the proposed development.

A review of trip generation factors contained within the TRICS database was carried out. TRICS data is primarily UK based, although a number of Irish sites have recently been included and the number of Irish sites continues to expand. Nevertheless, we consider that TRICS will provide a reasonable indication of traffic generation from the proposed development.

Data supplied for inclusion in TRICS undergoes a procedure of validation testing, and there is no evidence from this procedure suggesting that data from Ireland bears any significant fundamental differences to that from the other countries included. Consequently, we consider that TRICS will provide a reasonable indication of traffic generation from the proposed development.

Table 10.8 below includes the predicted vehicle trip rates of the potential unrestrained traffic flows in and out of the proposed development during the morning and evening peak hour periods using data from TRICS.

Table 10.8 – Proposed Development Trip Rates (TRICS)

Land Use	AM Peak Hour			PM Peak Hour		
	Arr	Dep	Two-Way	Arr	Dep	Two-Way
Houses	0.074	0.208	0.282	0.150	0.080	0.230
Apartments / Duplexes	0.021	0.085	0.106	0.079	0.043	0.122
Creche	2.775	2.423	5.198	2.511	2.731	5.242

Based on the above trip rates, potential peak hour traffic generation is calculated based on 173 No. houses, 396 no. apartment/duplexes and a 547m2 creche.

Table 10.9 summarises the revised predicted peak hour AM and PM vehicle trips generated by the proposed development.

Table 10.9 – Proposed Development Trip Rates

Land Use	AM Peak Hour			PM Peak Hour		
	Arr	Dep	Two-Way	Arr	Dep	Two-Way
Houses	13	36	49	26	14	40
Apartments / Duplexes	8	31	38	28	15	44
Creche	17	15	31	15	16	31
Total	37	81	118	70	46	115

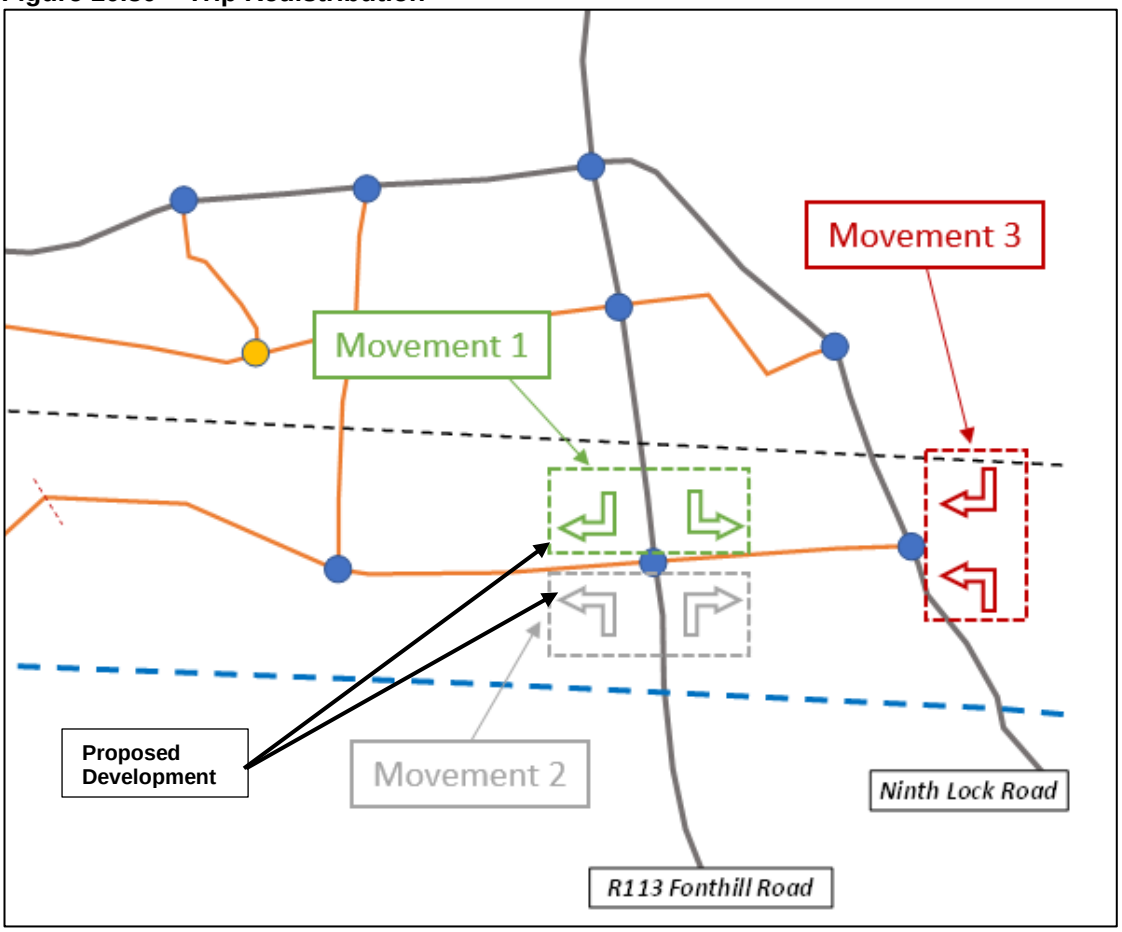
10.6.2.3 Trip Redistribution

A redistribution of traffic on the local network was carried out following the assumption that when the subject link road scheme is completed on the opening year of 2022 that this will have an impact on the surrounding road network as a new link is provided between the three regional routes, the R120 Lock Road, the R136 Grange Castle Road, and the R113 Fonthill Road. Hence providing an alternative route for a proportion of motorists and bypassing the R134 and Thomas Omer Way corridors.

The following assumptions **(Figure 10.30)** were made for the redistribution of the 2018 base year traffic to the surrounding network and the proposed CSLS:

- Movement 1 – Of the traffic travelling on the R113 Fonthill Road North 3% would turn right onto the CSLS West and 3% would turn left onto the CSLS East;
- Movement 2 – Of the traffic travelling on the R113 Fonthill Road South 10% would turn left onto the CSLS East and 40% would turn right onto the CSLS West;
- Movement 3 – 20% of traffic travelling along the Ninth Lock Road South would turn left onto the Clonburris Southern Link Street.

Figure 10.30 – Trip Redistribution



10.6.2.4 Traffic Growth

In response to the applicant's proposed construction schedule, this TTA adopts an Opening Design Year of 2025 and a long-term Future Design Year of 2040 (+15 years) as per TII guidelines. Although traffic growth may not increase at the rates once predicted, to ensure a robust analysis of the impact of traffic upon the local road network we have adopted growth rates using the Transport Infrastructure Ireland (TII) "Travel Demand Projections".

Applying the TII Zone growth factors (medium growth) for the adopted Opening Year of 2025 and Future Horizon Year of 2040 (+15 years), the following growth rates have been adopted to establish corresponding 2025 and 2040 baseline network flows: -

- 2018 to 2025 – 1.0950 (or 10.95%); and
- 2018 to 2040 – 1.1906 (or 19.06%).

10.6.2.5 Assessment Scenarios

Three different traffic scenarios have been assessed, namely (a) the 'Base' (Do-Nothing) traffic characteristics without the introduction of the CSLS and Full SDZ roads, (b) the 'Base' traffic characteristics with the introduction of the CSLS and Full SDZ roads (Do-Minimum) and (c) the 'Post Development' traffic flows with the introduction of the CSLS and Full SDZ roads (Do-Something).

The 'Base' traffic scenario considers the existing flows travelling across the network prior to the redistribution of the introduction of the subject link road scheme.

The proposed redistributed traffic accessing the CSLS and Full SDZ roads are then added to the network's 'Base' (Existing) traffic flows to establish the Do-Minimum Scenario. For the Do-Minimum scenarios in 2025 it is assumed that the CSLS is on service, and in 2040, the Full SDZ is developed. The proposed development traffic is then added to the network's 'Do-Minimum' (Base + Redistributed Traffic) traffic flows to establish the 'Post Development' traffic flows.

Do Nothing

- A1– 2018 Base Traffic Flows;
- A2– 2025 Base Traffic Flows (Growth from 2018); and
- A3– 2040 Base Traffic Flows (Growth from 2018).

Do Minimum

- B1– 2018 Base Traffic Flows (Redistributed);
- B2– 2025 Base Traffic Flows (Growth from 2018) (Redistributed) (CSLS fully developed); and
- B3– 2040 Base Traffic Flows (Growth from 2018) (Redistributed) (SDZ lands fully developed).

Do Something

- C1– 2025 Do Minimum + Proposed Development; and
- C2– 2040 Do Minimum + Proposed Development.

10.6.2.6 Assessment Scenarios

The network's AM and PM peak hour flows have been identified as occurring between 08:00 to 09:00 and 17:00 to 18:00 respectively.

The following figures (Appendix B Volume III of the EIAR) present the vehicle flows across the local road network for each of the adopted scenarios:

- **Figure 1** – 2018 Do Nothing (A1)
- **Figure 3** – 2025 Do Nothing (A2)
- **Figure 5** – 2040 Do Nothing (A3)
- **Figure 2** – 2018 Do Minimum (B1)
- **Figure 4** – 2025 Do Minimum (B2)
- **Figure 6** – 2040 Do Minimum (B3)
- **Figure 9** – 2025 Do Something (C1)
- **Figure 10** – 2040 Do Something (C2)

10.6.2.7 Network Impact

The Institution of Highways and Transportation document *'Guidelines for Traffic Impact Assessments'* states that the impact of a proposed development upon the local road network is considered material when the level of traffic it generates surpasses 10% and 5% on normal and congested networks respectively. When such levels of impact are generated a more detailed assessment should be undertaken to ascertain the specific impact upon the network's operational performance. These same thresholds are reproduced in the NRA/TII document entitled *Traffic and Transport Assessment Guidelines* (2014).

For the key local junctions, it can be seen in **Table 10.10**, that the proposed development upon full completion would have a material effect on the following two junctions in the adopted Do-Something scenario.

- Junction 2 – R113 Fonthill Road / CSLS Junction; and
- Junction 3 – CSLS / New Link Road Signalised Junction.

Table 10.10 – Increase in Vehicle Trips

Junction ID	Location	2025		2040	
		AM Peak	PM Peak	AM Peak	PM Peak
1	Ninth Lock Road / CSLS	2.8%	1.6%	1.6%	1.5%
2	R113 Fonthill Road / CSLS	4.0%	3.4%	2.5%	2.0%
3	CSLS / New Link Road	12.2%	12.3%	5.1%	5.3%
4	CNLS / New Link Road	N/A	N/A	1.3%	1.6%
5	R113 Fonthill Road / CNLS	2.3%	2.4%	1.2%	1.2%

For this proposed development's analysis, Junction 2 and Junction 3 have been analysed.

10.7 REMEDIAL OR REDUCTIVE MEASURES

10.7.1 Overview

A package of integrated mitigation measures has been identified to off-set the additional local demand that the proposed mixed-use development could potentially generate as a result of the forecast increase in vehicle movements by residents, commuters and visitors of the development. The strategy includes specific measures for both the construction and operational stages of the proposed development.

10.7.2 Construction phase

The Construction Management Plan (which is a standalone report and included in the planning documentation) and the associated Construction Traffic Management Plan (CTMP) in addition to the application's accompanying Construction and Waste Management Plan will incorporate a range of integrated control measures and associated management initiatives with the objective of mitigating the impact of the proposed development's on-site construction activities.

The CTMP will be prepared prior to the commencement of construction work on site. This plan will be prepared in consultation with SDCC and submitted for approval in order to agree on traffic management and monitoring measures (in advance of works commencing) some of which are outlined below:

- All works on site will be undertaken during hours of the day in accordance with SDCC requirements.
- During the pre-construction phase, the site will be securely fenced off from adjacent properties, public footpaths and roads.
- The surrounding road network will be signed to define the access and egress routes for the development including dedicated 'haul' routes to/from the development site.
- The traffic generated by the construction phase of the development will be strictly controlled in order to minimise the impact of this traffic on the surrounding road network and local properties. All HGV trips could potentially be restricted from traveling to / from the development during the local road network's peak hours.
- All road works will be adequately signposted and enclosed to ensure the safety of all road users and construction personnel.
- All employees and visitors' vehicle parking demands will be accommodated by a permeable hardstand carparking area within the construction compound. The exact location of the construction compound is to be confirmed in advance of commencement of the works. On-street parking of construction vehicles and construction personnel vehicles will be discouraged.
- A programme of street cleaning across the local street and identified 'haul' routes' will be implemented.

- A construction Mobility Management Plan will be developed by the appointed contractor to encourage all construction personnel to utilise the vast range of sustainable travel options available when travelling to/from the subject proposed development site.

Construction of the proposed scheme will cause temporary short-term traffic impacts on the local road network. Enforcement of a Construction Management Plan will ensure that construction traffic impacts are minimized through the control of site access / egress routes and site access locations and any necessary temporary lane closure requirements.

10.7.3 Operational phase

A management regime will be implemented by the development's management company to control access to the on-site car parking spaces thereby actively managing the availability of on-site car parking for residents of the development.

Infrastructure measures identified to reduce reliance of private vehicles include the provision of ample secure cycle parking on site and ensuring a design which promotes permeability for pedestrians and cyclists to, through and from the development. The high level of high-frequency public transport facilities (Dublin Bus, Irish Rail) will also act as a powerful mobility management measure, as residents can rely on public transport over the private vehicle.

With the objective of mitigating the potential impact of the proposed development as predicted in section 10.6 above during its operational stage, and with the objective of promoting sustainable travel for all residents, workers, and visitors to the development; the following initiatives have been identified and subsequently form an integral part of the subject development proposals.

- Strategic Employment Centres – The location of the subject development adjoining the R113 Fonthill Road North corridor provides the unique ability for many of Dublin's strategic employment zones to achieve many of their sustainability obligations particularity in regard to staff accessibility, health and sustainable modes of travel. Beyond the obvious ease of access to Dublin City Centre and Dublin Docklands provided by both LUAS and bus services, the proximity of the proposed development to a number of strategic employment areas has the potential to address existing staff access and recruitment issues at the following locations. Accordingly, a specific focus of the development's mobility strategy will be encouraging the uptake of sustainable travel options for the development's residents' 'commuter' trips to / from the local employment centres:
    - Clondalkin Industrial Estate / Fonthill Retail Park – both located within convenient walking and cycling distance of the subject site; and
    - Park West / Liffey Valley / Western Industrial Estate / JFK Industrial Estate / Cherry Orchard Industrial Estate / Grange Castle Business Park / Cookstown Industrial Estate / Tallaght / Ballymount Industrial Estate / Greenogue Business Park– All located within cycling distance and with direct public transport connections to / from the subject site.
- Management – A Mobility Management (MMP) is to be rolled out with the aim of guiding the delivery and management of a range of coordinated initiatives by the scheme promotor. The MMP ultimately seeks to encourage sustainable travel practices for all journeys to and from the proposed development site. It is proposed that two land use specific MMP's are developed under the framework of a 'parent' MMP for the entire site. These two associated MMPs will be developed in partnership with SDCC to specifically consider the opportunities of shaping all journeys and promoting sustainable transport habits at both the proposed (i) residential units, and (ii) the office element of the proposed mixed-use scheme.
- Management – A Car Park Management Strategy. The availability of parking spaces is a key determinant of mode choice and car usage. With the objective of minimizing travel by car and encouraging the use of sustainable modes instead, it is proposed to limit the car parking provision and promote a 'car lite' scheme. This is considered an appropriate approach considering the site's excellent accessibility characteristics (e.g. walking, cycling, bus, coach, LUAS and rail opportunities) to places of work, education and essential services. This 'car lite' approach will help to reduce car dependency in Dublin, reduce traffic congestion and pollution levels, improve the quality of the environment and help tackle climate change in addition to encouraging sustainable travel.
- Facilities - In addition to facilitating and encouraging bicycle use, increasing the number of cycle parking provision on-site is considered best practice in situations such as when reducing car parking spaces. A total of 672 no. cycle spaces are proposed within the development site as long term and short term facilities. With 396 no. apartment / duplex units being proposed, this equates to approximately 1.49 cycle spaces per residential unit with 592 no. cycle spaces for residents of the development. Although this ample level of cycle parking is being proposed within the development, it is noted that there is an opportunity to provide additional cycle parking

specifically for the use of the relatively new 'BLEEPER bike' scheme, which is a stationless bike sharing scheme. This scheme uses a phone application and bikes can be picked up and left anywhere that traditional bike parking is permitted, thereby not requiring custom built docking bays.

- Infrastructure (by others) - Planning infrastructure investment that will further enhance the sites sustainable accessibility credentials include:
    - The latest BusConnects network redesign include a number of routes that will benefit the subject site and provide access to locations including, Dublin City Centre, Clongriffin, Liffey Valley Shopping Centre, Clondalkin, Blanchardstown Shopping Centre and Tallaght. The routes in close proximity to the subject site include orbital routes W2 and W4 as well as branch routes C1, D1, D3 and G2.
    - The Clonburris SDZ Transport Assessment and Transport Strategy – September 2017 proposes a number of bus services that will serve the Clonburris SDZ including, two orbital bus services operating from Tallaght to Blanchardstown and two local bus routes, Lucan – Park West and Grange Castle – Liffey Valley.
    - The Clonburris SDZ Transport Assessment and Transport Strategy – September 2017 proposes the existing Grand Canal and Griffeen Valley Greenways will be complemented by a series of interconnecting and dedicated cycle routes linking the residential areas to key attractions, both internal and external to Clonburris.
    - The proposed GDA cycling network plan will also encourage a greater uptake in walking and cycling amongst residents, staff and visitors.
    - The DART Expansion Programme will see the DART system expanded, providing fast, high-frequency electrified services to Drogheda on the Northern Line, Hazelhatch on the Kildare Line, Maynooth and M3 Parkway on the Maynooth Line and to Greystones on the South-Eastern Line. The subject site is ideally located to access these DART services via the existing Clondalkin-Fonthill Station and the new Kishoge Station.
    - The SDZ lands can be potentially served by the Lucan Luas that is currently planned under the NTA's Transport Strategy for the Greater Dublin Area 2016 – 2035. Under this strategy, the future Lucan Line would serve Lucan, Liffey Valley and Ballyowen, however, the Luas Line could extend towards the Clonburris SDZ lands and would in turn expand the Luas transport users including the residents and employees in Clonburris.

Mode specific measures could be promoted to encourage the best choice of travel other than private car. These mode specific measures include:

- Car Sharing – Car sharing is also known as lift-sharing, car-pooling or ridesharing. Car sharing offers people a cost effective and a more sustainable way of travelling by car when other forms of transport are not viable. Car sharing schemes encourage individuals to share private vehicles for particular journeys. Car sharing can be both formal and informal. Informal car sharing operates between individuals and neighbours and formal car sharing is defined by a more elaborate approach to trip matching, often focussed on the commuting journey. Car sharing has the aim of reducing the number of car trips made and participants have the opportunity to meet other members in the community. A National Car Sharing database is now available at www.carsharing.ie. It is an all-island service for the public and is free of charge to use. Car sharing has a number of benefits including reduces transport costs, reduces the number of cars on the road which results in less pollution, less congestion and fewer parking issues and reduces the need for a private car. The proposed development website would have a section dedicated to the car share scheme and the staff / residents would have an option to register. To encourage take up of the car sharing, the MMP Coordinator would host events to introduce prospective car sharers to each other and would help 'break the ice' as it is always more likely that people will share, particularly for the journey 'home', with somebody that they have met rather than a complete stranger.
- Car Clubs – Car Clubs are membership-based schemes providing shared cars for hire. A Car Club can play an important role in reducing costs, congestion and environmental impact. Members have flexible access to the hire of a vehicle. Vehicles are parked in reserved parking spaces close to homes, town centres or workplaces and can be used and paid for on an hourly rate, daily or weekly basis. Individuals can join a car club; alternatively, an organisation may have a corporate package with one of the car club providers. Car sharing clubs in Dublin have experienced significant growth in recent years. The facility allows members' access to a shared car in the local area for an hourly fee. This facility could be an attractive option for those who choose to start walking or cycling to work but may require access to a car at short notice. Residents can obtain further information at www.gocar.ie and also www.yuko.ie.
- Walking – The development has been designed to ensure that there are a number of access points / gateways to facilitate permeable walking through the site. The feasibility of measures that promote walking will be influenced by factors such as the safety and ease of walking to and from the site and the age profile of commuters. Generally speaking, a distance of up to 3km is considered reasonable for walking. This distance is

only indicative but can help to define target groups. The health benefits of walking are a key element in promoting Mobility Management Plans. Walking improves cardiovascular fitness and burns calories. Walking will also increase your muscle tone, boost metabolism, ease stress, raise energy levels and improve sleep, which combined can also help with weight loss. Regular walking can also reduce the risk of coronary heart disease, diabetes, strokes, high blood pressure, cancer, osteoporosis and arthritis. Walking will mainly be self-promoting, and initiatives should focus on making people aware of the routes available to them. A map showing the walking routes should be prepared and placed at key locations within the development. These could be stand-alone signs or maps on notice boards. This information would also be available on the community website. It is important to ensure that pedestrians are safe and are satisfied with the facilities available and their maintenance. It should be noted that: -

- Walking is truly the most-sustainable form of transportation.
- All trips, regardless of mode, both begin and end on foot.
- Walking needs to have a greater level of priority in most cities, like walk-signal times, safer well-lit / marked crosswalks and pedestrian zones.
- Walking is an easy mode of travel for distances under 2km. Most people are prepared to walk between 800m to 1km to a train station or bus stop.

- Cycling – The proposed development is well located for cycling journeys and this mode of travel should be encouraged with the provision of a wide range of routes within the development and new links to existing and future major routes in the local area. A distance of up to 10km is considered reasonable for cycling. This distance is only indicative but can help to define target groups. A total of 672 cycle spaces are proposed within the development to accommodate residents and visitors to the site. The on-site cycle facilities will be linked to the existing off-site cycle routes. Also, improved cycle infrastructure is proposed under the Greater Dublin Area Cycle Network Plan routes which runs in close proximity to this site. As with many measures relating to cycling, the aim is a mixture of support, through incentives and facilities, and encouragement, through information and marketing. Incentives and facilities at both trip origin and destination / place of work, education, worship etc. can include some of the following. The MMP will highlight that many of these are available at trip end destinations:
  - the provision of “pool” bicycles for short distance travel and Bleeper bikes for example serving the site
  - the provision of well-located high-quality cycle parking facilities
  - storage, changing and shower facilities for cyclists
- Public Transport (Bus) – The proposed development will be well served by Dublin Bus services, with bus routes available along New Nangor Road, Grange Castle Road, Adamstown Avenue, Ninth Lock Road and Fonthill Road as well as BusConnects proposals for new routes which are proposed to pass close to the subject site along Grange Castle Road, Ninth Lock Road, St. Cuthbert’s Road and New Nangor Road. At Present, the bus stops are located in close proximity with the closest bus stops are located along New Nangor Road, Grange Castle Road, Adamstown Avenue, Ninth Lock Road and Fonthill Road which offers the subject site a variety of frequent services operating daily. The subject site is located close to the proposed Bus Connects C1, D1, D3, G2, W2 and W4 routes which will provide enhanced levels of accessibility and mobility.
- Public Transport (Rail) – The proposed development is situated on the Kildare railway line and has two railway stations in close proximity, the Clondalkin-Fonthill Station and the completed but not yet operational Kishoge Railway Station. Clondalkin-Fonthill Station is served by commuter services to Heuston Station and following the recent upgrading of the Phoenix Park Tunnel, services calling at Clondalkin-Fonthill Station now offer connections to Drumcondra, Connolly, Tara Street, Pearse and Grand Canal Dock. The DART Expansion Programme will see the DART system expanded, providing f electrified services to locations such as Drogheda, Hazelhatch, Maynooth and Greystones. The proposed development can be potentially served by the Lucan Luas, which could extend towards the Clonburris SDZ lands and would in turn expand the Luas transport users including the residents and employees in Clonburris.

10.8 PREDICTED (RESIDUAL) IMPACT OF THE PROPOSAL

10.8.1 Construction phase

Provided the above remedial or reductive measures and management procedures are incorporated during the construction phase, the residual impact on the local receiving environment will be temporary in nature and neutral in terms of quality and effect.

The significance of each of the projected impacts during construction phase are detailed in **Table 10.11** for the following key junctions:

- Junction 1 – Ninth Lock Road / CSLS;
- Junction 2 – R113 Fonthill Road / CSLS;
- Junction 3 – CSLS / New Link Road;
- Junction 4 – CNLS / New Link Road; and
- Junction 5 – R113 Fonthill Road / CNLS.

The significance of the impacts has been determined in accordance with the classifications stipulated within the *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports - Draft* (EPA, August 2017).

Table 10.11 – Impact Assessment – Construction Phase

Junction ID	Location	Environment Character	Quality / Scale of Impact	Impact Significance	Duration
1	Ninth Lock Road / CSLS	Low Sensitivity	Negative - Low	Not Significant	Temporary
2	R113 Fonthill Road / CSLS	Low Sensitivity	Negative - Medium	Not Significant	Temporary
3	CSLS / New Link Road	Low Sensitivity	Negative - Low	Not Significant	Temporary
4	CNLS / New Link Road	Low Sensitivity	Negative - Low	Not Significant	Temporary
5	R113 Fonthill Road / CNLS	Low Sensitivity	Negative - Low	Not Significant	Temporary

10.8.2 Operational phase

The significance of each of the projected impacts during operational phase are detailed in **Table 10.12** for the following key junctions:

- Junction 1 – Ninth Lock Road / CSLS;
- Junction 2 – R113 Fonthill Road / CSLS;
- Junction 3 – CSLS / New Link Road;
- Junction 4 – CNLS / New Link Road; and
- Junction 5 – R113 Fonthill Road / CNLS.

The significance of the impacts has been determined in accordance with the classifications stipulated within the *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports - Draft* (EPA, August 2017).

Table 10.12 – Impact Assessment – Operational Phase

Junction ID	Location	Environment Character	Quality / Scale of Impact	Impact Significance	Duration
1	Ninth Lock Road / CSLS	Low Sensitivity	Negative - Low	Not Significant	Short/Medium-term
2	R113 Fonthill Road / CSLS	Low Sensitivity	Negative - Low	Not Significant	Short/Medium-term
3	CSLS / New Link Road	Low Sensitivity	Negative - Low	Not Significant	Short/Medium-term
4	CNLS / New Link Road	Low Sensitivity	Negative - Low	Not Significant	Short/Medium-term
5	R113 Fonthill Road / CNLS	Low Sensitivity	Negative - Low	Not Significant	Short/Medium-term

The operational assessment of the local road network has been undertaken using the Transport Research Laboratory (TRL) computer package TRANSYT for two signal-controlled junctions.

When considering signalised junctions, a Degree of Saturation (DoS) of greater than 90% (0.90) would indicate a junction to be approaching capacity, as operation above this DoS value is poor and deteriorates quickly.

For the TRANSYT analysis a one-hour AM and PM period has been simulated, from 08:00 to 09:00 and 17:00 to 18:00 respectively. Additionally, for the PICADY analyses a 90-minute AM and PM period has been simulated, from 08:00 to 9:00 and 17:00 to 18:00, respectively. For the TRANSYT and PICADY analyses traffic flows were entered using an Origin-Destination table for the peak hours.

In order to analyse and assess the impact of the proposed development on the surrounding road network, a traffic model of the junctions was analysed for the schemes following opening and design years:

- 2025 – Opening Year;
- 2040 – Future Design Year (Opening Year + 15 years)

The following key junctions have been analysed:

- Junction 2 – Signalised Junction – R113 Fonthill Road / CSLS; and
- Junction 3 – Signalised Junction – CSLS / New Link Road.

The evaluation of the operational performance of the key off site junctions following the implementation of the proposed mixed-use scheme is summarised below for the Do Nothing (DN) and two Do Something (DS) scenarios.

The revised network analysis of Junctions 2 & 3 has been updated to investigate the following three scenarios thereby enabling a comparison and evaluation of the results for all scenarios:

- Do Minimum (DM). This scenario considers a network with the Clonburris South Link Street in 2025, and the full Strategic Development Zone in 2040, but without the Proposed Development.
- Do Something (DS). This scenario considers a network with the Proposed Development and the Clonburris South Link Street in 2025, and the full Strategic Development Zone in 2040.

In addition, **Table 10.13** provides a summary of the operational performance of Junctions 2 & 3 based upon the findings of the TRANSYT-based junction assessments.

Table 10.13 – Impact Significance – Operational Phase

Year	Scenario		Junction 2	Junction 3
			R113 Fonthill Road / CSLS	CSLS / New Link Road
2025	DM	AM	105%	32%
		PM	68%	22%
	DS	AM	107%	32%
		PM	68%	25%
	DN v. DS	AM	+2%	+0%
		PM	+0%	+3%
2040	DM	AM	135%	72%
		PM	143%	58%
	DS	AM	135%	76%
		PM	143%	58%
	DN v. DS	AM	+0%	+4%
		PM	+0%	+0%

TRANSYT assessment for Junction 2 shows an oversaturated performance during the morning peak hour in the DN and DS scenarios, and within capacity in the evening peak time. However, the impact of the development is an increase of 2% in capacity in the morning, and no increase in the evening. This means that the network is over capacity regardless of the Proposed Development. This result is expected and consistent with the Traffic & Transport Assessment of the Southern Link Street – Clonburris SDZ, prepared by DBFL Consulting Engineers. This document showed an oversaturated network for Opening Year and Future Horizon Year, similar to results obtained above. It is important to note that the analysis has assumed the pedestrian stage will be called during every cycle. As such the TRANSYT analysis represents a worst-case scenario, with the junctions performing better than the TRANSYT results indicate. Additionally, the area will be served with high frequency bus & rail services, high quality cycle infrastructure and new road developments.

For Junction 3, the analysis shows a network performance within capacity during all scenarios. The impact of the Proposed Development is again minimal, with an increase of capacity of 3% in the evening peak hour in 2025, and 4% in the morning peak hour in 2040.

Therefore, the impact of the development in Junctions 2 & 3 is an increase of 0% to 4% of the junction capacity, so it is not severe.

10.9 MONITORING

10.9.1 Construction phase

During the construction stage, the following monitoring exercises are proposed:

- Compliance with construction vehicle routing practices;
- Compliance with construction vehicle parking practices;
- Internal and external road conditions; and
- Timing of construction activities.

10.10 REINSTATEMENT

10.10.1 Construction phase

The construction work areas will be reinstated following completion of development with landscaped areas provided where proposed. The works will be restricted to the footprint of the site for the proposed scheme. Excavated topsoil and subsoil will be reused in reinstatement and landscaping where appropriate or dealt with in the appropriate manner i.e. sent for soil recovery as appropriate.

10.10.2 Operational phase

No reinstatement requirements have been identified in relation to the operational phase of the proposed scheme.

10.11 POTENTIAL CUMULATIVE IMPACTS

The EU Guidelines define cumulative effects/impacts as: “Impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project. For Example;

- Incremental noise from a number of separate developments;
- Combined effect of individual impacts, e.g. noise, dust and visual, from one development on a particular receptor; and
- Several developments with insignificant impacts individually but which together have a cumulative effect.”

The EPA draft guidelines on the information to be contained in EIAR’s mirrors this approach and defines cumulative impacts/effects as ‘The addition of any minor or significant effects, including effects of other projects, to create larger, more significant effects’.

Therefore, the assessment of cumulative impacts considers the total impact associated with the Proposed Project when combined with other past, present, and reasonably foreseeable future developments.
An examination of the potential for other projects to contribute cumulatively to the impacts from this Proposed Project was undertaken during the preparation of this EIAR. The traffic assessment in this chapter includes a comprehensive assessment of the development within the strategic road network for the area and includes the effect of the forecast schemes in the area. The development has an integrated relationship with land use under the Clonburris SDZ, in that it supports the sustainable development of the SDZ area. This cumulative assessment has considered cumulative impacts that are:

1. Likely;
2. Significant; and
3. Relating to an event which has either occurred or is reasonably foreseeable together with the impacts from this development.

A search in relation to plans and projects that may have the potential to result in cumulative impacts was carried out. Data sources included the following:

- South Dublin County Council (planning and roads section);
- An Bord Pleanála website;
- South Dublin County Development Plan 2016-2022;
- Clonburris Strategic Development Zone;
- EIAR Portal.

10.11.1 Strategic Transport developments in the Area

From the County Development Plan, the following relevant roads were identified as a six-year road development for the County;

- Adamstown Street Network
- Celbridge Link Road
- Clonburris/Kishogue Street Network
- Griffeen Avenue
- Kennelsfort Road and the R148,
- New Nangor Road/R134 Upgrade
- Newcastle Road (R120)
- Fonthill Road/N4

The development process on each road is at different stages. There are a number of Medium to Long term road developments which are referred to in **Table 6.6** of the Development Plan. The proposed development is not dependent on road schemes outside the SDZ area, and in turn does not restrict or limit other infrastructure investment outside the SDZ area as a result of its implementation or non-implementation.

Additionally, other transport developments have been identified affecting the area. The following plans are undergoing Planning/Design/Construction.

- Dublin BusConnects

The total estimated cost of this development is €2 billion euro with an estimated completion date of 2027. Dublin BusConnects will deliver a transformational redesign of the bus system in Dublin. It will comprise a network of 'next generation' bus corridors on the busiest routes with segregated cycling facilities, a complete redesign of the bus network, cashless and simpler fare structures, and state-of-the-art ticketing systems, account-based ticketing, new bus branding, integrating bus vehicles of different operators and types, new bus stops and shelters and use of low-emission vehicles. The development of this scheme will improve the overall Clonburris Development and vice versa.

- DART+

The DART+ Programme will revolutionise travel in the Greater Dublin Area. It will see the DART network grow from its current 50km in length to over 150km. Bringing DART travel with all its benefits to new and existing communities. It will promote multi modal transit, active transport, boost regional connectivity and make public transport the preferred option for more and more people. The DART+ Programme will deliver frequent, modern, electrified services within the Greater Dublin Area (GDA) and will improve connectivity to regional towns and cities. The DART+ includes DART+ South West, with the high-frequency connection of Hazelhatch and Celbridge to the City Centre, and it serves directly the Clonburris area.

10.11.2 Planning applications in the area

Other developments currently under construction and other potential committed development in the vicinity of the site are likely to have similar impacts during the construction phase in relation to Traffic and Transportation. Any other future development in the vicinity of the site would have to similarly undergo Traffic and transport assessments to assess the potential cumulative impacts to the transport network. A desktop study was conducted of planning application in the vicinity of the subject development in South Dublin County Council planning database archive to assess any cumulative impacts from granted or committed applications to the subject scheme. Planning applications found that would have a cumulative impact to traffic or to the subject scheme were as follows:

- The road and drainage infrastructure works permission under the Clonburris Strategic Development Zone Planning Scheme (Application no. SDZ20A/0021).
- Green Pedestrian and Cycle Route along Grand Canal from 12th Lock to Inchicore (Application no. SDZ078/0012).

11.0 MATERIAL ASSETS – WASTE MANAGEMENT

11.1 INTRODUCTION

This chapter was prepared by Ian Byrne MSc, MIOA, Dip Environmental & Planning Law and presents the Waste Management Impact Assessment for the control and management and monitoring of waste associated with a residential development at Clonburris, Co. Dublin during both the Construction and Operational Phases of the development.

The development will consist of the construction of a residential development of 569 no. dwellings, located to the north and south of the permitted Clonburris Southern Link Street (under SDZ20A/0021) on an overall site of c. 17.02 hectares in a mixture of semi-detached, terraced houses, duplexes and apartments comprising (248 no. apartments, 173 no. houses and 148 no. duplex units), a creche/community facility (c. 547 sq. m), shared offices (c. 626 sq. m).

11.2 STUDY METHODOLOGY

The proposed Construction Waste Management Impact Assessment has been prepared to demonstrate how the Construction Phase will comply with the following relevant legislation and relevant Best Practice Guidelines:

- *Waste Management Acts 1996;*
- *Waste Management (Collection Permit) Regulations 2007 (SI No. 820 of 2007).*
- *Waste Management (Collection Permit) Amendment Regulations 2008 (SI No. 87 of 2008).*
- *Department of the Environment, Heritage and Local Government – Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects – July 2006.*
- *EPA "Guidance on Soil and Stone By-Products in the context of Article 27 of the European Communities (Waste Directive) Regulations – Version 3 June 2019*
- *Directive 2014/52/EU*
- *EPA Draft Best Practice Guidelines for the preparation of resource management plans for construction and demolition projects, April 2021*

The proposed Operational Waste Management Impact Assessment has been prepared to demonstrate how the Operational Phase will comply with the following relevant regulations and South Dublin County Council's design standards for waste management in residential developments.

- *Waste Management Acts 1996.*
- *Waste Management (Collection Permit) Regulations 2007 (SI No. 820 of 2007).*
- *Waste Management (Collection Permit) Amendment Regulations 2008 (SI No. 87 of 2008).*
- *Eastern-Midlands Region Waste Management Plan 2015-2021.*
- *Section's 4.8 and 4.9 Refuse Storage* of *The Department of Housing, Planning and Local Government – Sustainable Urban Housing: Design Standards for New Apartments – Guidelines for Planning Authorities. 2018.*
- *South Dublin Development Plan 2016 – 2022*
- *EPA Draft Best Practice Guidelines for the preparation of resource management plans for construction and demolition projects, April 2021*

The South Dublin County Council Development Plan 2016 – 2022 has a Waste Management Strategy, the purpose of which is to promote and facilitate best practice in prevention, re-use, recovery, recycling and disposal of all waste and environmental emissions produced in the County.

11.2.1 Residential Waste Management

Chapter 7.5.0 – Waste Management of the South Dublin County Council Development Plan 2016 – 2022 – includes the following Objectives and Actions relating to Domestic Waste Management:

IE5 OBJ1 *To support the implementation of the Eastern-Midlands Region Waste Management Plan 2015-2021 by adhering to overarching performance targets, policies, and policy actions.*

IE5 OBG 8 *To secure appropriate provision for the sustainable management of waste within developments including the provision of facilities for the storage, separation and collection of such waste.*

Actions

Support and facilitate the separation of waste at source into organic and non-inorganic streams or other waste management systems that divert waste from landfill and maximise the potential for each waste type to be re-used, recycled or composted and divert organic waste from landfill.

11.3 EXISTING RECEIVING ENVIRONMENT (BASELINE SCENARIO)

The construction and operation of the proposed residential development will introduce new volumes of waste into the local area in terms of the short-term generation of construction waste and the longer-term generation of domestic waste when the development is occupied.

There closest recycling centre in the local South Dublin area is Ballymount Civic Amenity.

11.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The development will consist of 569 residential units including 248 apartments, 173 houses and 148 duplex units. The development also includes community facilities, a creche, shared offices and open spaces.

Table 11.1 – Residential Units

Dwelling Type	Apartments	Duplex	Houses	Overall
Apartments	248	148	173	569

The Construction and Operational Waste Management Plans prepared as part of the application shall be implemented throughout the construction phase and operational stage of the development to ensure the following:

- That all site activities are effectively managed to minimise the generation of waste and to maximise the opportunities for on-site reuse and recycling of waste materials.

- To ensure that all waste materials generated by site activities are removed from site by appropriately permitted waste haulage contractors and that all wastes are disposed of at approved waste licensed / permitted facilities in compliance with the Waste Management Act 1996 and all associated Waste Management Regulations.

- The Operational Phase Waste Management Plan, a copy of which accompanies this application, for the development which will ensure that users of the development are provided with sufficient facilities to store, segregate and recycle waste.

11.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

11.5.1 Construction Phase

The development of the subject site will initially require the stripping of top and subsoils and the excavation of ground to foundation level. The range of works required for the Construction Phases are summarised in Table 11.2. The expected construction wastes that will be generated throughout the course of the development are described in Table 11.3.

Construction wastes if not managed and segregated on-site will have the potential to be difficult to separate into different waste streams to allow for further processing, recovery, re-use or to be recycled.

11.5.2 Description of Proposed Development Site Activities

The range of development works to which the Waste Management Plan will be integrated into during the design phase, construction phase and operation phase of the site are summarised as follows:

- Ground preparation works;
- Development of site infrastructure;
- Construction of buildings and hard standing areas;
- Landscaping of entire site including open soft landscaped areas;

A Construction Waste Management Plan (CWMP) has been prepared as a stand-alone report to accompany the application.

Table 11.2 – Sequence of Construction Works

Activity Sequence	General Description
Identification of Existing Utility Services	Set up bunting, mark location of live services, including E.S.B., Gas etc.
Removal of ground surfaces	Removal of vegetation
Infrastructure	Installation of drainage, ducting, cabling
Site preparation	Excavation soils
Substructure	Foundations/Basement
Superstructure	Frames and Roof
External Envelope	Place façade to superstructure
Internal Finishes	Mechanical & Electrical etc.
External Landscaping	Hard and soft landscaping

Table 11.3 – Typical Construction Waste Composition

Description of Waste	%
Mixed Construction & Demolition Waste	33
Wood	28
Plasterboard (Gypsum materials)	10
Ferrous Metals	8
Concrete Mixed other wastes *Total*	6 15 *100*

Table 11.4 – Predicted Construction Waste Generation

Waste Type	Predicted tonnage to be produced	Re-Use		Recyclable		Disposal	
		Tonnage	%	Tonnage	%	Tonnage	%
Mixed C&D	1,250	125	10	1000	80	125	10
Timber	1,000	400	40	550	55	50	5
Plasterboard	500	150	30	300	60	50	10
Metals	250	12.5	5	225	90	12.5	5
Concrete	200	60	30	130	65	10	5
Mixed waste	800	160	20	480	60	160	20
Total	4,000	907.5		2,685		407.5	
Top Soil	31,000m^3	29,500m^3	95	-	-	1,500m^3	8
Sub Soils	3,250m^3	3,250m^3	100	-	-	-	-

11.5.3 Soil Excavation

Stripped and excavated soils shall be reused at the development. It is estimated that 1,500m^3 will be exported off-site to an appropriately licensed/permitted facility.

11.5.4 Operational Phase

11.5.5 Waste Types & Quantities Operational Phase

The most recent EPA Waste statistics (2018) on household waste generation states 315kg is produced per person per year.

A value of 0.863Kg of waste generated per person per day has been therefore assumed for the purposes of this report to estimate the volume of waste to be generated at the proposed fully occupied development will be c. 1761Kg/day,12330Kg/week or 90m^3/week as detailed below in Table 11.5.

Table 11.5 – Calculated domestic waste composition Residential Development

Waste Type	% Waste	Kg/week	Kg/day
Organic waste	30.6	3773	539
Paper	12.5	1541	220
Cardboard	3.6	444	63
Composites	1	123	18
Textiles	15.5	1911	273
Plastics	13.6	1677	240
Glass	3.4	419	60
Metals	3.1	382	55
Wood	1.2	148	21
Hazardous municipal waste	0.9	111	16
Unclassified combustables	1.4	173	25
Unclassified incombustables	1.2	148	21
Fines	11.7	1443	206
Bulky Waste & WEEE	0.3	37	5
Totals	*100*	*12,330*	*1,761*

If waste infrastructure and appropriate waste management systems are not integrated into the design and the operation of the proposed development, domestic waste will not be segregated at source or appropriately managed on-site and the operation of the development will not function in accordance with the waste management policies of Kildare County Council or comply with the waste reduction and recycling and re-use targets defined in the *Eastern-Midlands Region Waste Management Plan 2015-2021.*

11.5.6 Do Nothing' Scenario

Should the site not be developed for residential use it will continue not to have any impact or demand on local waste services or on the receiving environment. A vacant site may however be subject to unauthorised illegal dumping or fly-tipping.

11.6 MITIGATION MEASURES

The following measures will mitigate the impact of the construction and operational phases impact on regional waste management infrastructure.

11.6.1 Construction Phase Waste Management Plan

The Construction Waste Management Plan prepared by Byrne Environmental (included with the application) specifically addresses the following aspects:

Waste materials generated by construction activities will be managed according to the Department of the Environment, Heritage and Local Government's 2006 Publication - *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects.*

- Analysis of waste arisings / material surpluses;
- Specific Waste Management objectives for the Project including the potential to re-use existing on-site materials for further use in the construction phase;
- Methods proposed for Prevention, Reuse and Recycling;
- Waste Handling Procedures;
- Waste Storage Procedures;

- Waste Disposal Procedures;
- Record Keeping.

Waste minimisation and prevention shall be the primary responsibilities of the Construction Project Manager who shall ensure the following:

- Materials will be ordered on an *"as needed"* basis to prevent over supply;
- Materials shall be correctly stored and handled to minimise the generation of damaged materials;
- Materials shall be ordered in appropriate sequence to minimise materials stored on site;
- Sub-contractors will be responsible for similarly managing their wastes.

11.6.2 Programme of Waste Management for Construction Works

It is proposed that the construction Contractor as part of regular site inspection audits will determine the effectiveness of the waste management statement and will assist the project manager in determining the best methods for waste minimisation, reduction, re-use, recycling and disposal as the construction phase progresses and waste materials are generated.

11.6.3 Construction Waste Disposal Management

It is proposed that from the outset of construction activities, a dedicated and secure compound containing bins, and/or skips, and storage areas, into which all waste materials generated by construction site activities, will be established within the active construction phase of the development site.

In order to ensure that the construction contractor correctly segregate waste materials, it is the responsibility of the site construction manager to ensure all staff are informed by means of clear signage and verbal instruction and made responsible for ensuring site housekeeping and the proper segregation of construction waste materials.

It will be the responsibility of the Project Construction Manager to ensure that a written record of all quantities and natures of wastes exported -off site are maintained on-site in a Waste File at the Project office.

It is the responsibility of the Project Manager or his/her delegate that all contracted waste haulage drivers hold an appropriate Waste Collection Permit for the transport of waste loads and that all waste materials are delivered to an appropriately licensed or permitted waste facility in compliance with the following relevant Regulations:

- *Waste Management (Collection Permit) Regulations 2007 (SI No. 820 of 2007);*
- *Waste Management (Collection Permit) Amendment Regulations 2008 (SI No. 87 of 2008;)*
- *Waste Management (Facility Permit and Registration) Regulations S.I.821 of 2007 and the Waste Facility Permit under the Waste Management (Facility Permit and Registration) Amendment Regulations S.I.86 of 2008.*

Prior to the commencement of the Project, the Construction / Project Manager shall identify a permitted Waste Contractor who shall be employed to collect and dispose of all wastes arising from the project works. In addition, the Construction / Project Manager shall identify and all waste licensed / permitted facilities that will accept all expected waste exported off-site and will maintain copies of all relevant Waste Permits / Licences as required.

All waste soils prior to being exported off-site, shall be classified as inert, non-hazardous or hazardous in accordance with the *EPA's Waste Classification Guidance – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* document dated 1st June 2015 to ensure that the waste material is transferred by an appropriately permitted waste collection permit holder and brought to an appropriately permitted or licensed waste facility.

11.6.4 On-Site Waste Reuse and Recycling Management

Construction waste material such as soils, damaged or broken concrete slabs, blocks, bricks and tiles generated that is deemed by the Project Engineer to be suitable for reuse on the Project site for ground-fill material and landscaping. This initiative shall provide a positive environmental impact to the construction phase as follows:

- Reduction in the requirement for virgin aggregate materials from quarries;
- Reduction in energy required to extract, process and transport virgin aggregates;
- Reduced HGV movements associated with the delivery of imported aggregates to the site;

- Reduced noise levels associated with reduced HGV movements;
- Reduction in the amount of landfill space required to accept C&D waste;
- Reduction in the volume of soils to be exported off-site.

11.6.5 Waste Storage Compound

A waste storage compound shall be set up on-site from the commencement of site activities. The compound shall include the following:

- Separate waste skips labelled with signage stating the nature of waste materials that can only be placed in the skips;
- Waste oils / containers shall be placed in dedicated mobile bunds units;
- Soils contaminated by accidental on-site spillages of oils / construction hydrocarbons shall be stored in clearly identified hazardous waste storage containers;
- Spill kits with instructions shall be located in the waste storage compound.

11.6.6 Soil Classification

Soils to be exported off-site the site shall be sampled and analysed to classify the soils with regard to *The Landfill Directive (2003/33/EC).*

11.6.7 Contaminated Soils

Where contaminated soils/materials are discovered or occur as a result of accidental spillages of oils or fuels during the construction phase, these areas of ground will be isolated and tested in accordance with the *2002 Landfill Directive (2003/33/EC)* for contamination, and pending the results of laboratory WAC testing, will be excavated

11.6.8 Invasive Species listed on the Third Schedule of S.I. 477/2011 (as amended)

An ecological assessment of the site prepared by Altemar has concluded that there are no invasive plant species on the subject site.

11.6.9 Top-Soil Reuse

Approximately 29,500m^3 of top soils shall be stripped and maintained on-site to facilitate the construction phase. This soil shall be re-used for landscaping purposes. Approximately 1,500m^3 of excess top soils shall be exported off-site to an appropriately permitted/licensed facility.

11.6.10 Record Keeping

It is the responsibility of the Project Manager or his/her delegate that a written record of all quantities and natures of all wastes reused / recycled and exported off-site during the construction phase are maintained in a Waste File at the site project office.

The following information shall be recorded for each load of waste exported off-site:

- Waste Type EWC Code and description;
- Volume of waste collected;
- Waste collection contractor's Waste Collection Permit Number and collection receipt including vehicle registration number;
- Destination of waste load including Waste Permit / Licence number of facility;
- Description of how waste at facility shall be treated: disposal / recovery / export;
- The waste records shall be issued to South Dublin County Council as required / requested.

11.6.11 Waste Management Auditing

In order to ensure that construction wastes generated during the course of the development are being effectively managed and recorded, a waste management audit shall be conducted on a routine basis by an independent waste management consultant to determine compliance with the Construction Waste Management Plan.

11.6.12 Operational Phase Waste Management Plan

An Operational Waste Management Plan (OWMP) has been prepared as a stand-alone report to accompany the application. The OWMP has been prepared to demonstrate how the required infrastructure will be incorporated into the design and operational management of the development to ensure that domestic wastes will be managed and monitored with the objective of maximizing the quantity of waste segregated at source and maximizing the volume of clean recyclable materials generated by the residents of the development.

The Goal of the OWMP is to achieve a compliance with *The Eastern-Midlands Region Waste Management Plan* 2015-2021 which defines the following Waste Targets:

- *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.*
- *Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill.*

The Operational Waste Management Plan has been prepared with regard to the strategy, policy and objectives and design standards of the South Dublin County Council Development Plan 2016 – 2022.

Chapter 7.5.0 – Waste Management of the South Dublin County Council Development Plan 2016 – 2022 includes the following Objectives and Actions relating to Domestic Waste Management:

- IE5 OBJ1 To support the implementation of the Eastern-Midlands Region Waste Management Plan 2015-2021 by adhering to overarching performance targets, policies, and policy actions.

- IE5 OBG 8 To secure appropriate provision for the sustainable management of waste within developments including the provision of facilities for the storage, separation and collection of such waste.

Actions

Support and facilitate the separation of waste at source into organic and non-inorganic streams or other waste management systems that divert waste from landfill and maximise the potential for each waste type to be re-used, recycled or composted and divert organic waste from landfill.

The Operational Phase of the Waste Management Plan is defined by the following stages of waste management for both the residential and commercial aspects of the development:

- Stage 1 Occupier Source Segregation;
- Stage 2 Occupier Deposit and Storage;
- Stage 3 Bulk Storage and On-Site Management;
- Stage 4 On-site treatment and Off-Site Removal;
- Stage 5 End Destination of wastes.

The OWMP has been prepared with regard to *British Standard BS 5906:2005 Waste Management in Buildings-Code of Practice* which provides guidance on methods of storage, collection, segregation for recycling and recovery for residential building.

The apartments which will include a 3 - bin waste segregation at source system together with the communal waste storage areas have been designed with regard to *Section's 4.8 and 4.9 Refuse Storage of The Department of Housing, Planning and Local Government – Sustainable Urban Housing: Design Standards for New Apartments – Guidelines for Planning Authorities. 2020.*

The proposed residential development shall be designed and managed to provide residents with the required waste management infrastructure to minimise the generation of un-segregated domestic waste and maximise the potential for segregating and recycling domestic waste fractions.

The **Objective** of the OWMP is to maximise the quantity of waste recycled by residents by providing sufficient waste recycling infrastructure, waste reduction initiatives and waste collection and waste management information services to the residents of the development.

The **Goal** of the OWMP is to achieve a residential recycling rate of 50% of managed municipal waste by 2020 (and future targets in subsequent Regional Waste Management Plans).

All residential units will have a 3-bin system (non-recyclable, organic and recyclable) in each kitchen to encourage residents to segregate waste at source.

Apartment residents will be provided with waste recycling and waste disposal information by the development's Facility Management Company who will be responsible for providing clean, safe and mobility impaired accessible communal waste storage areas for the apartment blocks.

The Facility Management Company shall maintain a register of all waste volumes and types collected from the development each year including a break-down of recyclable waste and where necessary, shall introduce initiatives to further encourage residents to maximise waste segregation at source and recycling. They shall also provide an annual bulky waste and WEEE and waste battery collection service for all residents.

The development shall be designed to provide adequate domestic waste storage areas for each apartment blocks. This will promote the appropriate segregation at source of domestic generated waste from all residential units at the development. Communal waste bin storage areas shall be designed in a manner to ensure that appropriate signage for the correct disposal and recycling of waste is available for residents.

11.7 PREDICTED RESIDUAL IMPACTS

11.7.1 Construction Phase

The management of wastes generated during the construction of the proposed development will be in accordance with a Site-Specific Construction Phase Waste Management Plan. With regard to how it has been demonstrated how construction wastes will be managed through design, management and waste reduction and recycling initiatives at the proposed development, it is predicted that the impact of the construction phase of the development will not have an adverse impact on the receiving environment, existing material assets and local and regional waste management services.

The Table below summarises the identified likely significant effects of the proposed development during the construction phase post application of mitigation measures.

Table 11.6 – Summary of Construction Phase Likely Significant Effects with Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Regional Construction Waste Infrastructure	Negative	Not Significant	Regional	Likely	Short-Term	Residual

11.7.2 Operational Phase

The development shall be designed to provide adequate domestic waste infrastructure and storage areas for all apartments. This will promote the appropriate segregation at source of domestic generated waste from all residential units at the development and thus reduce the potential for the generation of mixed un-recyclable domestic waste streams.

The Table below summarises the identified likely significant effects of the proposed development during the operational phase post application of mitigation measures.

Table 11.7 – Summary of Operational Phase Likely Significant Effects with Mitigation

Likely Significant Effect	Quality	Significance	Extent	Probability	Duration	Type
Regional Construction Waste Infrastructure	Negative	Not Significant	Regional	Likely	Long-Term	Residual

11.7.3 'Worst-case' Impacts

There are no worst-case impacts associated with the proposed development as sufficient capacity, waste storage space will be provided for both the construction and operational phases. The implementation of the Construction and Operational Waste Management Plans shall ensure all wastes are controlled and monitored thus reducing the impact on the receiving environment and Regional waste management infrastructure.

11.8 CUMULATIVE IMPACTS

In accordance with the Planning and Development Regulations 2001 as amended, this section has considered the cumulative waste impact of the proposed development in conjunction with future and current development in the vicinity of the subject site. This section relates to the cumulative impact on the subject site itself and on surrounding sites.

The cumulative waste impact of the proposed residential development and adjoining phases of development within the Clonburris SDZ when developed in the future will place a greater demand on local waste management services. However, with regard to the requirements of all new developments to integrate waste segregation and recycling infrastructure into the design of residential units, the impact on regional waste management infrastructure will be minor.

Other new residential developments in the area will be similarly 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.

The legislative and best practice mitigation measures set out in this chapter would also be applicable to these projects and the implementation of these measures will ensure that there are no negative cumulative impacts on the environment from the management of waste materials from these projects with the proposed development, should all projects proceed.

The site specific Construction and Operational Waste Management Plans for the development have been designed to ensure that the construction and operational phases of the proposed development will be managed to reduce the generation of unsegregated wastes, to maximise the potential for recycling, recovery and re-use and to demonstrate how the development will operate in a sustainable manner in terms of waste management and contribute to the achievement of the Regions compliance with the waste reduction targets specified in *The Eastern-Midlands Region Waste Management Plan 2015-2021* (and any subsequent future revisions).

The Construction and Operational Waste Management Plans that have been designed for the proposed development will provide the designers the information to ensure that the potential impact of the construction and operational phases of the development will have a negligible impact on the receiving environment.

The compliance requirements and mitigation measures set out in this chapter would be applicable to the subject development and together with the implementation of the mitigation measures set out in this chapter in respect of the proposed development will ensure that there are no negative cumulative impacts on the environment from the management of waste materials, during the operational phase.

11.9 MONITORING

11.9.1 Construction Phase Waste Monitoring

The Construction Manager will maintain a written record of all quantities and types of construction wastes generated, reused / recycled and exported off-site during the construction phase.

The following information shall be recorded for each load of waste exported off-site:

- Waste Type EWC Code and description.
- Volume of waste collected.
- Waste collection contractor's Waste Collection Permit Number and collection receipt including vehicle registration number.
- Destination of waste load including Waste Permit / Licence number of facility.
- Description of how waste at facility shall be treated i.e. disposal / recovery / export

Waste Management Auditing

In order to ensure that construction wastes generated during the course of the development are being effectively managed and recorded, a waste management audit shall be conducted on a routine basis to determine compliance with the Construction Waste Management Plan.

11.9.2 Operational Phase Waste Monitoring

The Facility Management Company shall prepare an annual report for the Local Authority and residents of the development on the quantities of waste generated within the development to demonstrate how waste reduction and recycling targets are being achieved with regard to the targets defined in The Eastern-Midlands Region Waste Management Plan 2015-2021.

11.10 SUMMARY OF MITIGATION & MONITORING

The Table below summarises the proposed construction phase mitigation and monitoring measures.

Table 11.8 – Summary of Construction Phase Mitigation and Monitoring

Likely Significant Effect	Mitigation	Monitoring
Additional construction Waste generation	Implementation of Site-Specific Construction & Demolition Waste Management Plan	Recording of all waste generated and exported off-site Waste auditing

The Table below summarises the proposed operational phase mitigation and monitoring measures.

Table 11.9 – Summary of Operational Phase Mitigation and Monitoring

Likely Significant Effect	Mitigation	Monitoring
Additional domestic waste generation	Implementation of Site-Specific Operational Waste Management Plan	Recording of all waste generated.

11.11 INTERACTIONS

The identified interactions between the management of waste arisings during both the construction and operational stages are as follows;

- Population & Human Health, management of waste in the construction and operational phase to mitigate nuisance.
- Land & Soils, excavation to facilitate the development.
- Traffic, specifically movement of waste associated with the construction stage.

11.12 REINSTATEMENT

No reinstatement is required.

12.0 MATERIAL ASSETS - UTILITIES

12.1 INTRODUCTION

This chapter was prepared by DBFL Consulting Engineers and assesses likely effects of the proposed development on existing surface water, water supply, foul drainage, and utility services in the vicinity of the site as well as identifying proposed mitigation measure to minimise any effects. The material assets considered in this chapter of the EIAR include Surface Water Drainage, Foul Drainage, Water Supply, Power, Gas and Telecommunications.

This chapter was prepared by Thomas Carrigg, Civil Engineer, DBFL Consulting Engineers. & John Carr, Chartered Civil Engineer [B.Eng MSc CEng], DBFL Consulting Engineers. Utilities sections (ESB, Telecoms & Gas) was prepared by Kevin Farrell, Chartered Engineer with Waterman Moylan Consulting Engineers.

12.2 METHODOLOGY

12.2.1 Guidelines

Assessment of the likely effect of the proposed development on existing infrastructure, services and public utilities in the vicinity of the site included the following:

- Review of Irish Water wastewater (foul drainage) and watermain records
- Submission of a Pre-Connection Enquiry Application to Irish Water and consultation with Irish Water
- Review of South Dublin County Council surface water drainage records
- Consultation with South Dublin County Council.
- Review of ESB Networks service records and consultation with ESB Networks.
- Review of Gas Networks Ireland service records and consultation with Gas Networks Ireland.
- Review of Eircom E-Maps.
- Review of Virgin Media service records.
- Review of the Clonburris Strategic Development Zone (SDZ) Scheme and the corresponding strategy for infrastructure, services, and public utilities.

As part of assessing the likely effect of the proposed development, surface water runoff, future foul drainage discharge and future water usage calculations were carried out in accordance with the following guidelines:

- Greater Dublin Strategic Drainage Study (GDSDS).
- Method outlined in Irish Water's Code of Practice for Wastewater Infrastructure.
- Method outlined in Irish Water's Code of Practice for Water Infrastructure.

12.2.2 Study Area

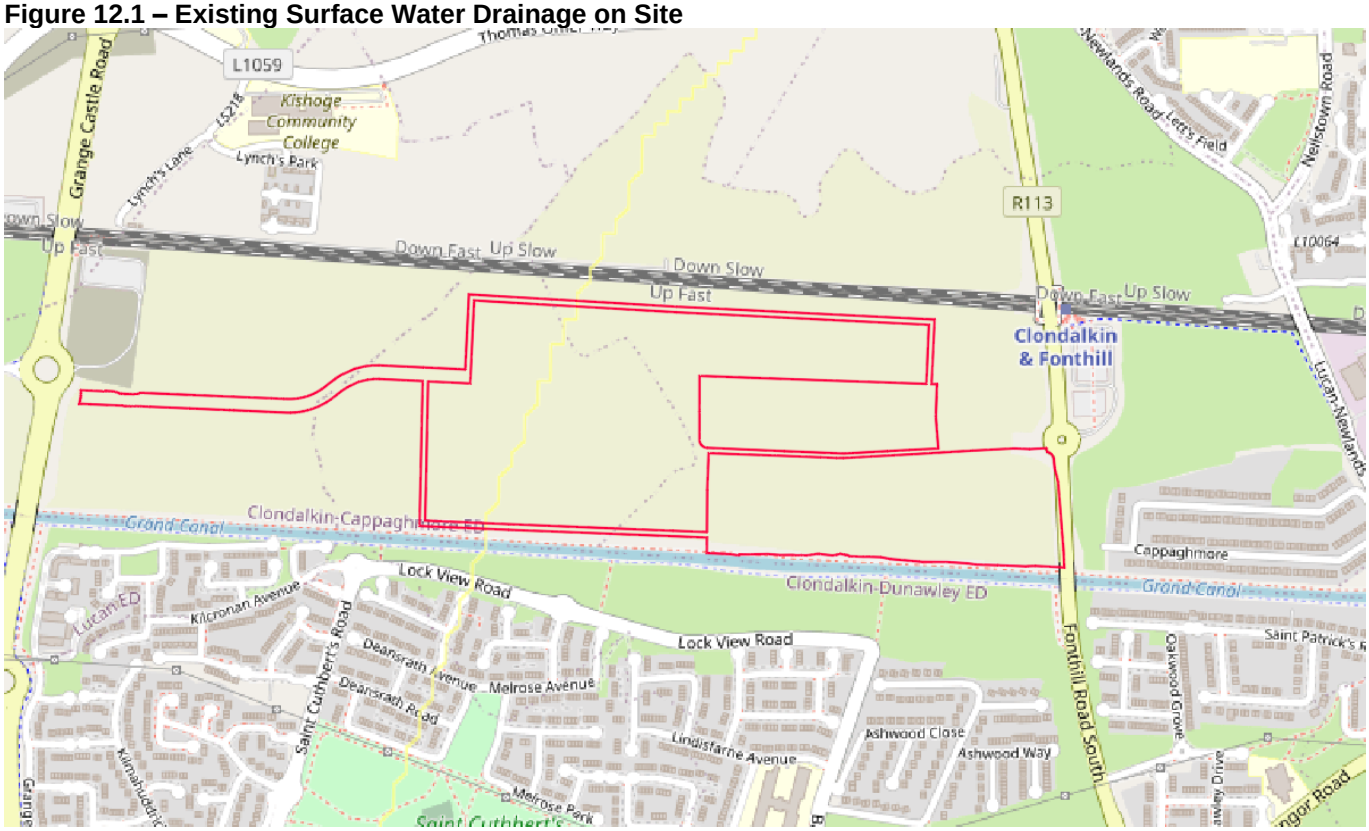
The proposed development site is located in the Local Authority area of South Dublin County Council (SDCC) and is part of the Clonburris Strategic Development Zone (SDZ). The subject site for this development is situated in the southern area of the Clonburris SDZ lands to the south of the Kildare/Cork railway adjacent to the R113 Font Hill Road. The Grand Canal forms the southern boundary of the site.

12.3 EXISTING RECEIVING ENVIRONMENT (BASELINE SCENARIO)

12.3.1 Existing Storm Water Infrastructure

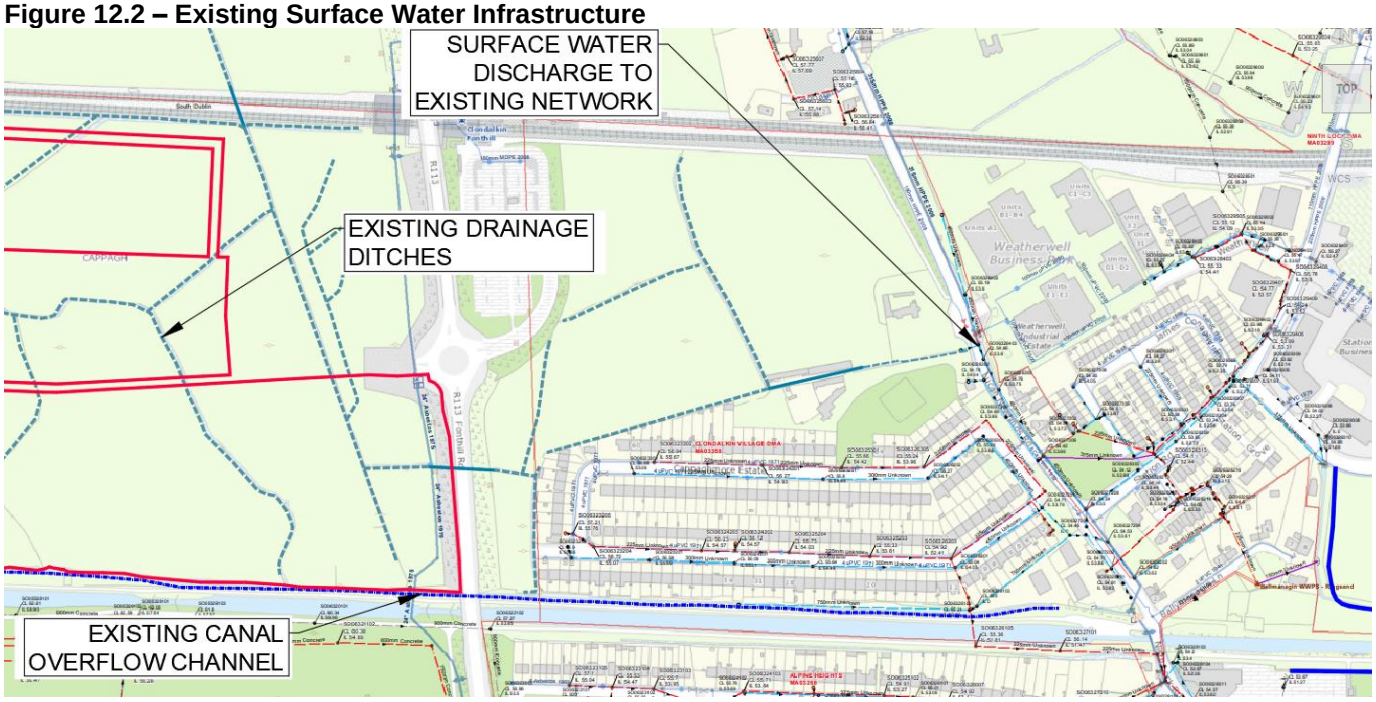
The topography of the subject site is reasonably flat. Much of the primary road network bounding the site is situated at a significantly higher level. Site levels outside road embankments and watercourses generally range between 58m – 62m. There are a number of existing drainage ditches located throughout the subject site. These ditches are noted to generally have extremely flat or inconsistent gradients and are poorly maintained appearing to discharge beneath the R113 to the east.

Figure 12.1 – Existing Surface Water Drainage on Site



The lands east of the R113 and south of the railway, drain to the south-east to existing stormwater networks on Ninth Lock Road, as per Figure 6.3 below. The drainage run continues south on Ninth Lock Road where it splits into parallel runs along Station Road which later merge and discharge to an open watercourse within the industrial estate and eventually discharge to the Camac River. A canal overflow channel runs alongside the canal towpath north of the canal before re-entering the canal downstream, it does not appear that local drainage connects to this overflow channel.

Figure 12.2 – Existing Surface Water Infrastructure



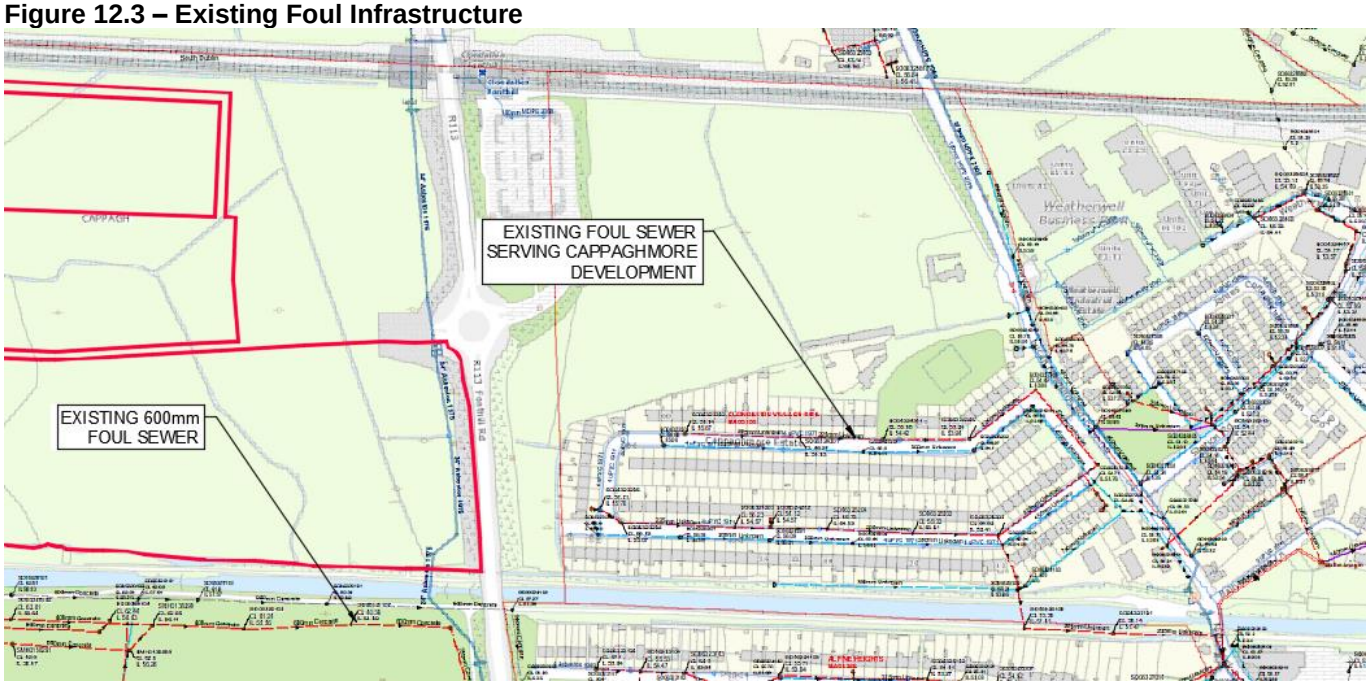
Refer to Chapter 6 Water and the Infrastructure Design report for additional details on existing drainage.

12.3.2 Existing Foul Water Infrastructure

According to wastewater drainage records from Irish Water, there is an existing network of three 600mm foul sewers located to the south of the Grand Canal, to the south of the subject site. There is a network of existing 225mm foul sewers to the south-east of the subject site within the Cappaghmore development which cross under the canal and discharge to a 900mm diameter sewer to the south.

To the north of the subject site, a foul sewer ranging from 750mm to 900mm runs in a west to east direction along the length of Thomas Omer Way to the Fonthill Road where it connects to the 1050mm diameter 9B sewer running southwards along the R113 Fonthill Road. The 9B sewer then turns east through the SDZ lands north of the railway line and outfalls to the east towards Ringsend Wastewater Treatment Plant. The existing 9B sewer has been identified as the main outfall for the overall future SDZ development.

Figure 12.3 – Existing Foul Infrastructure



12.3.3 Existing Potable Water Infrastructure

There is an existing 600mm watermain running adjacent to Fonthill Road at the bottom of the road embankment on the west side of the R113.

12.3.4 Existing ESB Infrastructure

ESB Networks have been contacted and an existing ESB network map for the area surrounding the proposed development has been obtained, refer to Appendix C Volume III of the EIAR. There are existing ESB Networks (ESBN) infrastructure within the site in the form of Medium Voltage overhead power lines which traverse south east corner of the site.

12.3.5 Existing Broadband Infrastructure

Eir and Virgin Media have been contacted and the existing network maps for the area surrounding the proposed development have been obtained, refer to Volume III of the EIAR.

12.3.6 Existing Gas Infrastructure

Gas Networks Ireland (GNI) have been contacted and an existing gas network map for the area surrounding the proposed development has been obtained, refer to Volume III of the EIAR. There are existing gas transmission line which runs parallel to R113 in the form of High Pressure (70bar) mains pipework.

12.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

12.4.1 Surface Water Drainage

The Clonburris SDZ Planning Scheme included a pre-construction requirement to prepare a Surface Water Management Plan (SWMP) to implement the SDZ Surface Water Strategy for the overall SDZ lands. DBFL prepared this SWMP to provide robust, effective and economic measures for the management of surface water quality and quantity in the SDZ. This plan has been agreed with South Dublin County Council's Drainage Department.

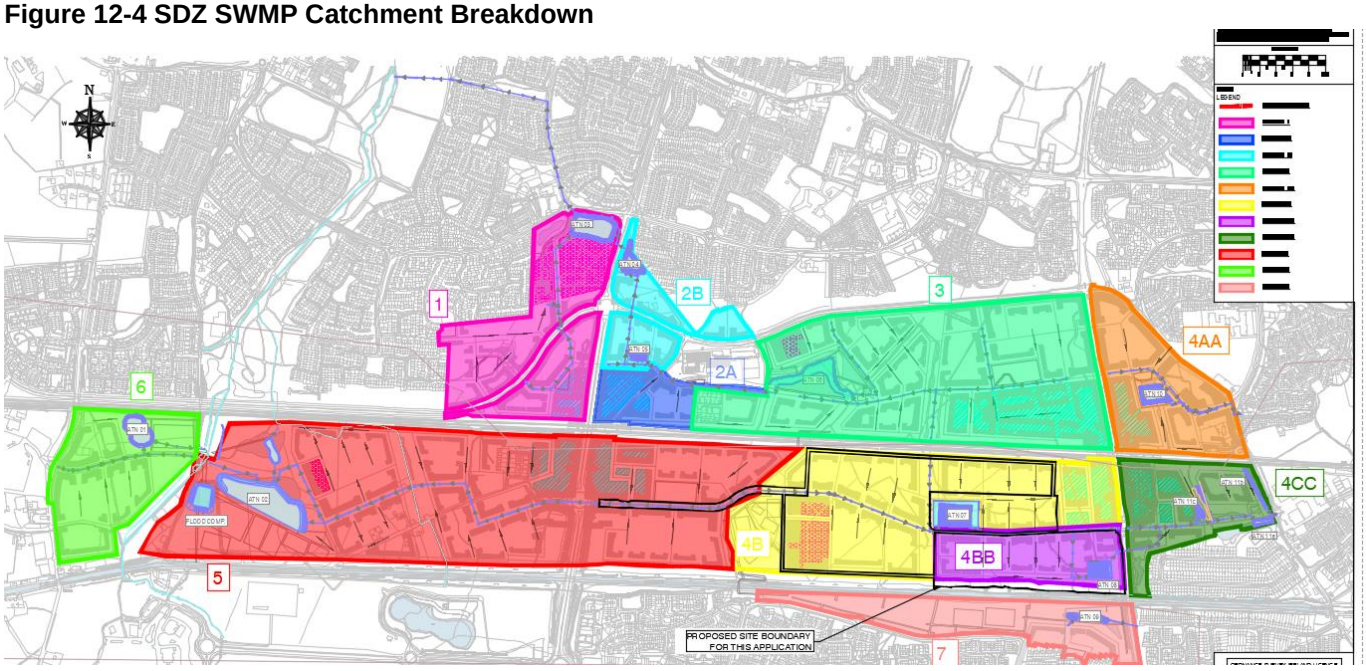
The proposed surface water drainage strategy for this planning application has been developed in accordance with the agreed measures in this SWMP.

The key objectives of the drainage strategy are as follows:

- Provide adequate infrastructure to discharge surface water generated on site to the trunk surface water sewer constructed as part of the greater SDZ.
- Minimise the risk of flooding of the development and avoid a flood risk increase upstream or downstream of the site.
- Provide an allowance for the effects of climate change.
- Implement a treatment train of Sustainable Drainage Systems (SuDS) measures within the drainage network to improve water quality prior to discharge to receiving watercourses.
- Establish the key infrastructural requirements required to implement the surface water management measures set out by the SWMP.

The Surface Water Management Plan intends for the proposed development to discharge east under the R113 via a new drainage network within a new gravity sewer to be constructed as part of the Clonburris Southern Link Street (CSLS), subject to a current planning application SDZ20A/0021. Trunk surface water sewers and regional attenuation are to be constructed as part of the CSLS to serve all lands in the southern portion of the SDZ including the proposed development.

Figure 12-4 SDZ SWMP Catchment Breakdown



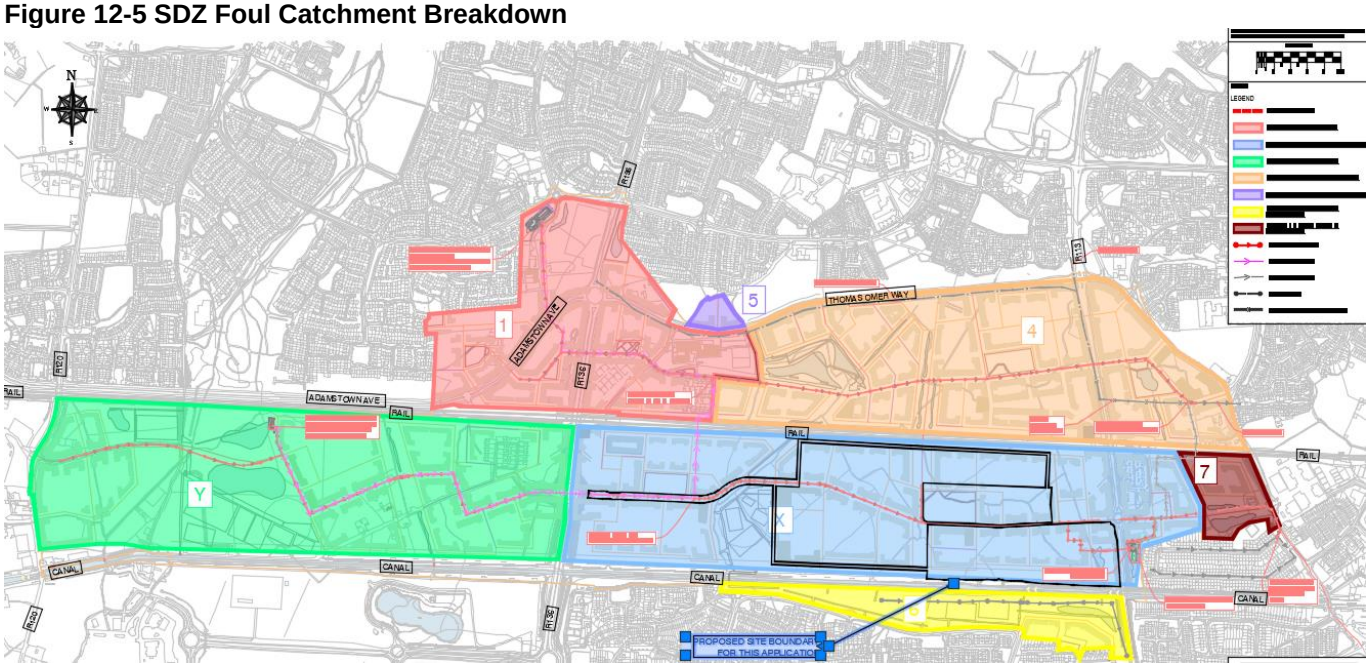
The canal overflow channel to the south of the proposed site is to be maintained. No surface water run-off from the new development will discharge to this channel.

Refer to Chapter 6 Water and the Infrastructure Design report for additional details on proposed drainage.

12.4.2 Foul Drainage

A Water and Wastewater Design Report has been prepared by DBFL for the overall Clonburris SDZ. As part of the CSLS application, a trunk foul sewer is to be constructed within the CSLS. It is proposed that the wastewater generated from the new houses and apartments for this application will be collected by new gravity sewers that discharges to the trunk sewer within the new Link Road. This in turn discharges to a future Irish Water pumping station adjacent to the R113 Fonthill Road. This future pumping station and its rising main connection to the existing 9B trunk sewer on Fonthill Road is being delivered by Irish Water as part of the Irish Water Clonburris Local Infrastructure Housing Activation Fund (LIHAF) Scheme. The pump station is currently at planning application stage with SDCC under planning reference SDZ21A/0006.

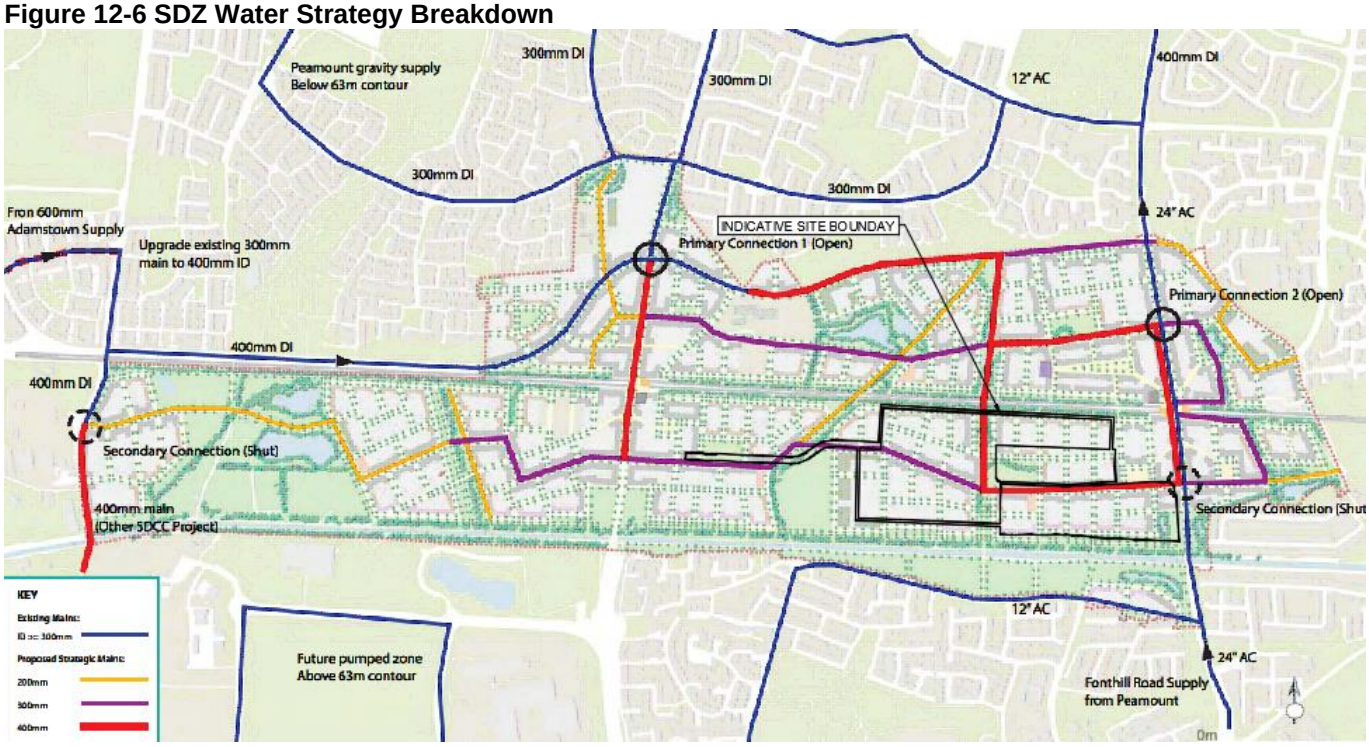
Figure 12-5 SDZ Foul Catchment Breakdown



12.4.3 Water Supply

The Water and Wastewater Design Report prepared by DBFL sets out a strategy for the water infrastructure to be constructed as part of the Joint Infrastructure Works (JIW) for the overall Clonburris SDZ. 200mm, 300mm and 400mm internal diameter trunk watermains are proposed to supply the site in order to satisfy the water requirement of the SDZ lands. DBFL have further developed the water supply strategy within the SDZ planning scheme through consultation with Irish Water and the preparation of preliminary watermain layouts. A number of trunk watermains are proposed along the main Arterial and Link Streets as shown in Figure 12.8. Water supply to the new houses and apartments in this application will be provided via new mains located with the footpaths of the proposed development which will feed from the new 400mm trunk main to be installed within the new Clonburris Southern Link Street to be constructed as part of the overall Clonburris SDZ.

Figure 12-6 SDZ Water Strategy Breakdown



12.4.4 ESB Power

The existing overhead services on the site will be undergrounded and diverted as required. A new Medium Voltage below ground network will be provided in the proposed development which will connect to the existing ESB Networks infrastructure in the area. Up to 4 new “unit sub-stations” will be provided throughout the site to meet the electrical demands associated with the new houses and duplex units while a further 1no “in-building” sub-station will be provided to serve the apartments.

The exact extent and location of the connections will be agreed with ESB Networks during the design stage of the project.

12.4.5 Gas

If gas is adopted as the fuel source of choice for the heating systems in the scheme, a new gas connection will be made to the existing network. The exact extent and location of these connections will be agreed with Gas Networks Ireland during the design stage of the project.

All works on the gas supply infrastructure will be carried out in accordance with Gas Networks Ireland relevant guidelines. All gas infrastructure will be below ground with the possible exception of a gas pressure reduction station if required by Gas Networks Ireland.

12.4.6 Telecommunications – Eir

There is an extensive Eir Network in the roads surrounding the site, the most significant of which is a ducted service with multiple access chambers running along both the northern and southern sides of R113.

New connections will be made to the existing Eir networks at the boundary of the site and services will be distributed throughout the site as required. The exact extent and location of these connections will be agreed with Eir during the design stage of the project.

12.4.7 Telecommunications – Virgin Media

There is an extensive Virgin Media Network in the roads surrounding the site, the most significant of which is a ducted service with multiple access chambers running along both the northern and southern sides of R113.
New connections will be made to the existing Virgin Media networks at the boundary of the site and services will be distributed throughout the site as required. .The exact extent and location of these connections will be agreed with Virgin Media during the design stage of the project.

12.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

12.5.1 Construction Phase

This section identifies a list of possible significant effects to the infrastructure, services and public utilities within the subject site caused by the construction of the proposed development in the absence of mitigation measures.

Potential effects that may arise during the construction phase include:

- Contamination of surface water runoff due to construction activities.
- Improper discharge of foul drainage from contractor's compound.
- Cross contamination of potable water supply to construction compound and associated risk to human health.
- Damage to existing underground and over-ground infrastructure and possible contamination of the existing systems with construction related materials.

12.5.2 Operational Impacts

Potential operational phase effects on infrastructure, services and public utilities are listed below:

- Increased impermeable surface area may potentially increase surface water runoff (if not attenuated to greenfield runoff rate) – refer to Chapter 6 (Water).
- Accidental hydrocarbon leaks on the proposed road and subsequent discharge into piped surface water drainage network.
- Increased future discharge to foul drainage network when future development proceeds.
- Increased future watermain demand when future development proceeds.
- Contamination of surface water runoff from foul sewer leaks.

12.5.3 Power, Gas & Telecommunications

In relation to the high pressure gas network along the Fonthill Road, the potential exists for construction related activity to impact on the network.

12.5.4 'Do-nothing' scenario

There are no predicted effects to infrastructure, services and public utilities should the proposed development not proceed.

12.5.5 Worst Case Scenario

Contact between humans and machinery with above ground or below ground utilities is considered a 'worst case scenario' during the construction phase resulting in risk to health and safety and significant disruption to utility networks.

The majority of the mitigation measures outlined above are design solutions that will be managed through the design and construction process and enforced as part of the contract documentation.

12.6 MITIGATION MEASURES

12.6.1 Construction Mitigation

An Outline Construction Management Plan (prepared by DBFL Consulting Engineers) is included with the planning application. A detailed Construction & Environmental Management Plan will be put in place by the Contractor to implement the mitigation measures from the EIAR. The plan will be resubmitted to the planning authority prior to construction to incorporate any conditions and/or modifications imposed by the local authority and the plan will be maintained by the contractor during the construction phase. The Construction & Environmental Management Plan includes a range of site-specific measures which will include the following mitigation measures in relation infrastructure, services and public utilities:

- Surface water runoff from areas stripped of topsoil and surface water collected in excavations will be directed to on-site settlement ponds where measures will be implemented to capture and treat sediment laden runoff prior to discharge of surface water at a controlled rate.
- The construction compound will include adequate staff welfare facilities including foul drainage and potable water supply. Foul drainage discharge from the construction compound will be tinkered off site to a licensed facility until a temporary connection to the public foul drainage network has been established.
- The construction compound's potable water supply shall be located where it is protected from contamination by any construction activities or materials.
- A competent contractor will be appointed to undertake the works and protect existing systems from damage during construction.

12.6.2 Operational Mitigation

The operational phase will employ the following mitigation measures in relation infrastructure, services and public utilities:

- Refer to Chapter 6 (Water) for mitigation measures associated with the surface water treatment and measures to reduce flood risk.
- All new foul drainage lines will be constructed in accordance with Irish Water Standards. Foul sewers will be pressure tested and will be subject to a CCTV survey in order to identify any possible defects prior to being made operational.
- No specific mitigation measures are proposed in relation to water supply, however water conservation should be included in future developments
- An Emergency Response Plan prepared by the contractor will contain measures to ensure that accidental spillages will be appropriately dealt with, which includes a response procedure to deal with any accidental pollution events. Spillage kits will be available and construction staff will be familiar with the emergency procedures and use of the equipment.

12.7 CUMULATIVE IMPACTS

12.7.1 Stormwater Infrastructure

The proposed surface water drainage infrastructure has been designed in accordance with the relevant guidelines. Any other developments currently under construction or other committed development in the vicinity of the site would have to be similarly designed in relation to permitted surface water discharge, surface water attenuation and SuDS.

All proposed developments in the area are to follow the Surface Water Management Plan for the Clonurris SDZ therefore no potential cumulative impacts are anticipated in relation to surface water drainage and flooding.

12.7.2 Foul Infrastructure

The proposed foul drainage infrastructure has been designed in accordance with the relevant guidelines. Wastewater generated on site is to discharge into the proposed trunk sewer being constructed as part of the Clonburris Southern Link Street, which has been designed to facilitate all wastewater generated within the potential developments of the Clonburris SDZ. Additional capacity within the foul network designed for the proposed development for this application has been allowed for to accommodate future developments to the north and west of the site. No potential cumulative impacts are anticipated in relation to foul drainage.

12.7.3 Potable Water Infrastructure

Water supply for the proposed development will be fed through the trunk watermain in the Clonburris Southern Link Road, designed to satisfy the water requirement of the entire SDZ lands. Therefore, no significant negative cumulative impacts are anticipated in relation to foul drainage.

12.7.4 Gas Infrastructure

The design of the footprint of the proposed development is sufficiently set back from the high-pressure gas network so that there is no impact. During the construction phase the contractor will liaise with Gas Networks Ireland in advance of the works.

12.7.5 ESB Infrastructure

The relocation or diversions of the existing overhead ESB lines may lead to loss of connectivity to and / or interruption of the supply from the electrical grid to the surrounding areas. Any loss of supply will be managed by ESB Networks to minimise impact on neighbouring properties.

12.7.6 Broadband Infrastructure

There is could be a potential loss of connection to the Telecommunications infrastructure while carrying out works to provide service connections. Any loss of supply will be managed by Eir / Virgin Media to minimise impact on neighbouring properties.

12.8 PREDICTED (RESIDUAL) IMPACTS

12.8.1 Construction Phase

Implementation of the measures outlined in Section 12.6 will ensure that the potential effects of the proposed development on infrastructure, services and public utilities do not occur during the construction phase and that any residual effects will be short term and not significant.

12.8.2 Operational Phase

As surface water drainage, foul water drainage, watermain and utilities design has been carried out in accordance with the relevant guidelines, there are no predicted significant negative residual effects on the drainage and water supply arising from the operational phase. All utilities ducting and diversions will be carried out as per the supplier instructions, therefore no predicted residual effects are expected from the operational phase.

12.9 MONITORING

12.9.1 Construction Phase

Proposed monitoring during the construction phase in relation to infrastructure, services and public utilities are as follows:

- Adherence to the Construction & Environmental Management Plan.
- Construction monitoring of the works (e.g. inspection of drainage, watermain and utility installation etc, inspections of works adjacent to existing infrastructure).
- Monitoring in relation to the surface water. Monitoring sediment control measures (sediment retention ponds, surface water inlet protection etc.).
- Monitoring of discharge from sediment retention ponds (e.g. pH, sediment content).

12.9.2 Operational Phase

Proposed monitoring during the operational phase in relation to the infrastructure, services and public utilities are as follows:

- Regular inspection and maintenance of the drainage system and oil interceptors.

12.10 REINSTATEMENT

Reinstatement of any excavations relating to the provision of surface and foul drainage, watermains, electrical, gas and telecommunications connections is to be carried out in accordance with the relevant asset provider's requirements and the requirements of South Dublin County Council.

12.11 DIFFICULTIES ENCOUNTERED IN COMPILING

No significant difficulties were encountered during the assessment.

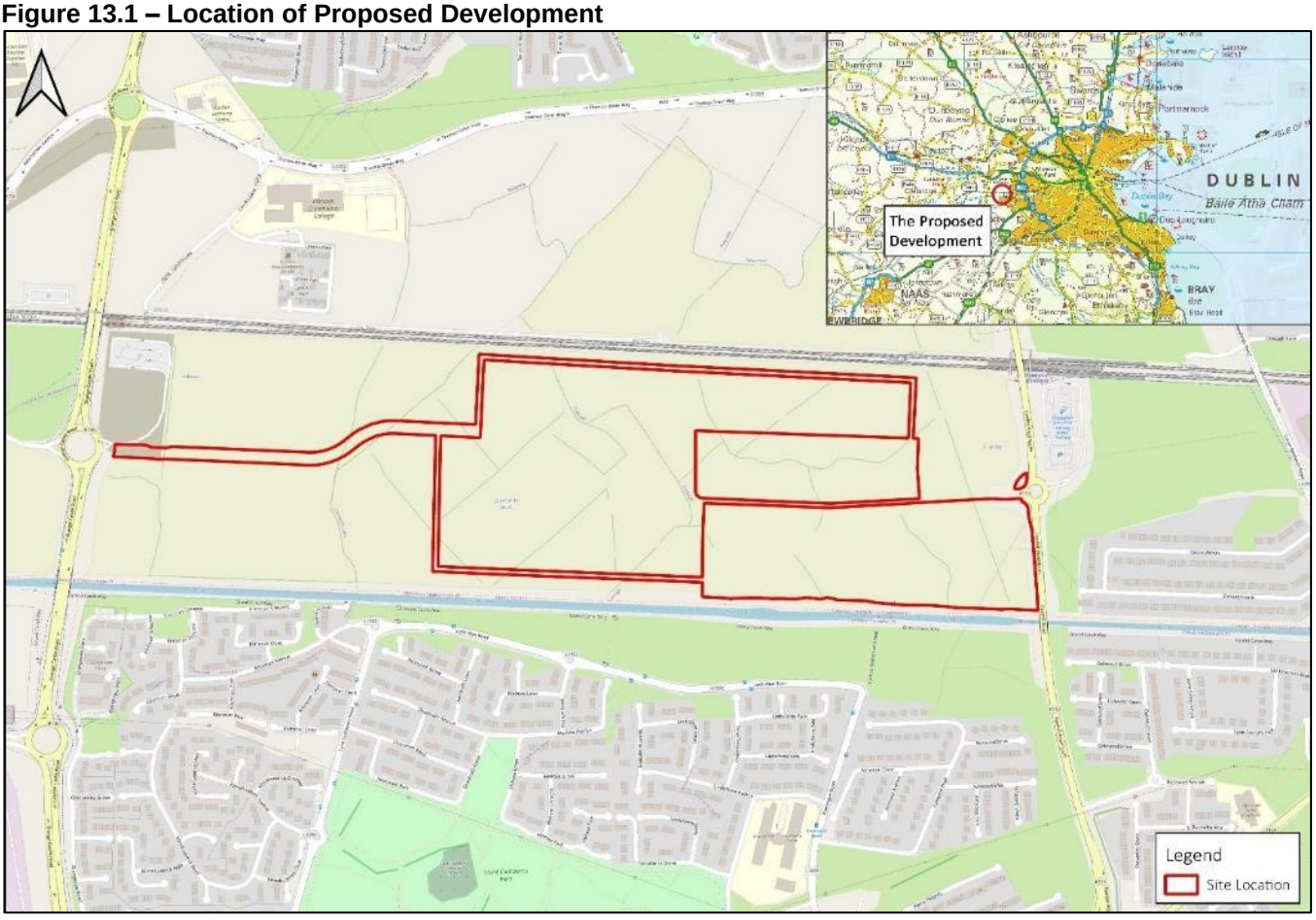
13.0 ARCHAEOLOGY, ARCHITECTURE, AND CULTURAL HERITAGE

13.1 INTRODUCTION

13.1.1 General

IAC Archaeology has prepared this chapter on behalf of Cairn Homes Properties Ltd to assess the impact, if any, on the archaeological, architectural, and cultural heritage resource of a proposed development in the townlands of Cappagh, Clonburris Little and Kishoge, within the Clonburris SDZ, Dublin 22 (ITM 705779,732439; Figure 13.1). The assessment was undertaken by Faith Bailey (MA, BA (Hons), MIAI, MCIfA) and Jacqui Anderson (MA, BA) of IAC Archaeology.

Figure 13.1 – Location of Proposed Development



This study determines, as far as reasonably possible from existing records, the nature of the archaeological, architectural and cultural heritage resource in and within the vicinity of the application 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 and built heritage sites that may be affected by the proposed development;
- Assessment of the likelihood of finding previously unrecorded archaeological remains during the construction programme;
- Determining the impact upon the setting of known cultural heritage sites in the surrounding area;

- 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 site. This included information from the Record of Monuments and Places of 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, Google Earth and Bing Maps were also consulted. Field inspection has been carried out in an attempt to identify any known cultural heritage sites and previously unrecorded features, structures and portable finds within the proposed development.

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.

13.1.2 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.

13.1.3 Impact Definitions

Impact definitions as per the most recent EPA (draft) guidelines (2017):

Imperceptible
An effect capable of measurement but without noticeable consequences

Not significant
An effect which causes noticeable changes in the character of the environment but without noticeable 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 or emerging 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 alters the majority of a sensitive aspect of the environment.

Profound
An effect that obliterates sensitive characteristics.

Significance of Effects as defined by the Environmental Protection Agency (2017) Draft Guidelines (pg. 23).

13.1.4 Consultations

Following the initial research, a number of statutory and voluntary bodies were consulted to gain further insight into the cultural background of the background environment, receiving environment and study area, as follows:

- Department of Housing, Local Government and Heritage (DoHLGH) – the Heritage Service, National Monuments: Record of Monuments and Places; Sites and Monuments Record; Monuments in State Care Database and Preservation Orders;
- National Museum of Ireland, Irish Antiquities Division: topographical files of Ireland;
- South Dublin County Council: Planning Section;
- Trinity College Dublin, Map Library: Historical and Ordnance Survey Maps

13.1.5 Guidance and Legislation

The following legislation, standards and guidelines were consulted as part of the assessment.

- National Monuments Acts, 1930-2014;
- Planning and Development Act, 2000 (as amended);
- Heritage Act, 1995;
- Environmental Protection Agency (EPA) 2015 Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) (Draft Sept. 2015). Dublin, Government Publications Office;
- Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EIAR) (EPA 2017). Dublin: Government Publications Office;
- Guidelines on the Information to be Contained in Environmental Impact Statements, (EPA, 2002);
- Advice notes on Current Practice in the Preparation of Environmental Impact Statements, (EPA, 2003);
- Frameworks and Principles for the Protection of the Archaeological Heritage, 1999, (formerly) Department of Arts, Heritage, Gaeltacht and Islands; and
- Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act.
- Architectural Heritage Protection Guidelines for Planning Authorities (2011);

13.2 ASSESSMENT 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.

13.2.1 Paper Survey

The following sources were examined and a list of areas of archaeological, architectural, and cultural heritage potential was compiled:

- Record of Monuments and Places for County Dublin;
- Sites and Monuments Record for County Dublin;
- National Monuments in State Care Database;
- Preservation Orders List;
- Topographical files of the National Museum of Ireland;
- Cartographic and written sources relating to the study area;
- South Dublin County Development Plan 2016–2022;
- Aerial photographs;
- Excavations Bulletin (1970–2020);
- National Inventory of Architectural Heritage.

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. All recorded archaeological sites are also listed on a website maintained by the Department of Housing, Local Government, and Heritage (DoHLGH) – 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 DoHLGH 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.

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 landscape.

- Down Survey Maps of the Barony of Newcastle, c. 1655
- Rocque's An Actual Survey of County Dublin, 1760
- John Taylor's Map of the County of Dublin, 1816
- Ordnance Survey Maps of Dublin, 1843, 1871, 1906–9 and 1935

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, Bing Maps, 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 South Dublin County Development Plan (2016–2022) was consulted to obtain information on cultural heritage sites in and within the immediate vicinity of the proposed development area.

The National Inventory of Architectural Heritage (NIAH) is a government-based organisation tasked with making a nationwide record of locally, regionally, nationally and internationally significant 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. The hard copy publication 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. The information is also available online and includes years from 2011 to the present (www.excavations.ie).

13.2.2 Field Inspection

Field inspection is necessary to determine the extent and nature of archaeological, architectural, 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 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.

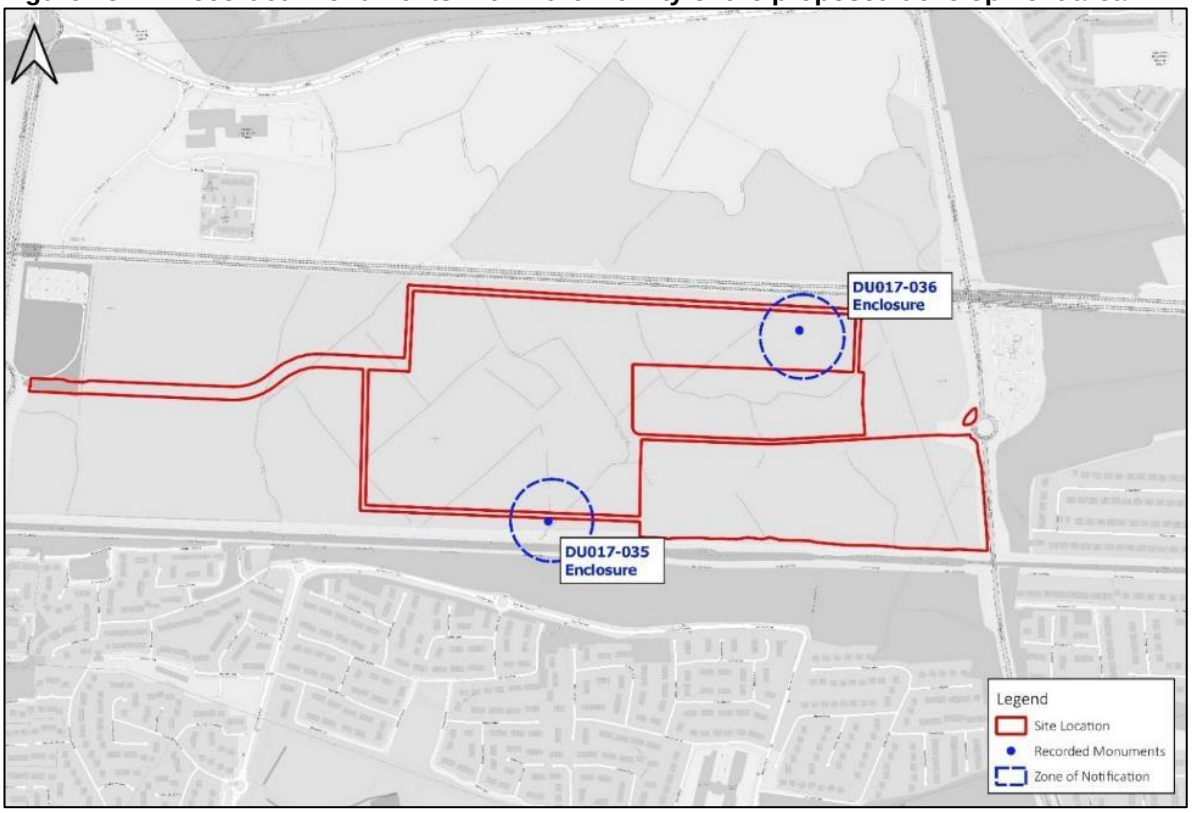
13.3 EXISTING RECEIVING ENVIRONMENT (BASELINE SCENARIO)

13.3.1 Results and Analysis - Archaeology

13.3.1.1 Historical Background

The proposed development is located within the townlands of Cappagh, Clonburris Little and Kishoge, Dublin 22. The proposed development area comprises parts of a number of fields, north of the Grand Canal. There are two recorded monuments located within the immediate proximity of the proposed development, both of which are listed as enclosures (DU017-035 and DU017-036, Figure 13.2). DU017-035 is located immediately adjacent to the proposed southern haul road, whereas DU017-036 is located c. 30m to the south of the northern haul road. It should be noted that neither site possesses any upstanding remains and were identified as sites of potential from aerial photographs dating to 1971 (SMR file).

Figure 13.2 – Recorded monuments within the vicinity of the proposed development area



Prehistoric Period

Mesolithic Period (8000-4000 BC)

Although recent evidence suggests there may have been a human presence in the southwest of Ireland as early as the Upper Palaeolithic (Dowd and Carden 2016), the earliest evidence for widespread settlement in Ireland dates to the Mesolithic period. These communities subsisted on hunting, fishing and foraging with seasonal natural resources being of key importance. The most common evidence found to show the presence of Mesolithic communities at a site is scatters of worked flint, a by-product from the production of flint implements. The coastal areas of County Dublin have produced flint tools dating to the Mesolithic; and seasonal habitation sites have been interpreted through the discovery of shell middens along this coastline. There is no evidence for Mesolithic activity in the vicinity of the proposed development area to date.

Neolithic Period (4000–2500 BC)

During the Neolithic period communities became less mobile and their economy became based on agriculture. This transition was accompanied by major social change. Agriculture demanded an altering of the physical landscape, which meant forests were rapidly cleared and field boundaries constructed. There was a greater concern for territory, which contributed to the construction of large communal ritual monuments called megalithic tombs, which are characteristic of the period. A Neolithic house was discovered in the townland of Kishoge, c. 653m southwest of the proposed development area (Licence 01E0061), indicating that the wider landscape was occupied during the Neolithic period.

Bronze Age (2500–800 BC)

The Bronze Age (2500–800 BC) was marked by the widespread use and production 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 megalithic tomb tradition declined and ended in favour of individual, subterranean cist or pit burials that occur either in isolation or in small cemeteries. These burials contained inhumed or cremated remains and were often accompanied by a pottery vessel. It is noted a bronze axe head (IA/163/1996) is recorded in the topographical files of the National Museum of Ireland as potentially originating from within the SDZ, although no detail as to the circumstances of the find is contained in the record.

Fulachtaí fia or burnt mound sites typically date to the Bronze Age and are amongst the most commonly found sites within the prehistoric landscape, with thousands recorded across the country. Such sites are often characterised by a horseshoe-shaped mound of heat-affected stone and charcoal, often associated with a trough and pits, and are located in close proximity to a water source or in areas where the water table is particularly high. They are often affected by agricultural activities such as ploughing and often survive only as irregular spreads of heat-affected stones and charcoal-rich material. *Fulachtaí fia* have traditionally been interpreted as cooking sites; however, alternative interpretations have been presented including brewing, tanning, dyeing and bathing. There are a number of *fulachtaí fia* recorded in the surrounding landscape. Enclosure DU017-035 located immediately south of the proposed southern haul road and is described in the SMR file as follows: ‘An aerial photograph (FSI 1971/224-6) shows a horseshoe-shaped enclosure. No(t) visible at ground level.’ The description suggests that this enclosure may in fact represent a *Fulachtaí fia* or burnt mound, as a horseshoe plan is a common feature of the site type. Given that the site is located to the immediate north of the Grand Canal, it may also relate to the construction of that feature rather than being archaeological in nature.

Iron Age (800 BC–AD 500)

The Iron Age was traditionally seen as a period for which there was little evidence in comparison to the preceding Bronze Age and the succeeding early medieval period. However, development-led excavation in recent decades and projects such as the Late Iron Age and Roman Ireland Project have added significantly to our knowledge of the Irish Iron Age. In Europe, there are two stages to the Iron Age, the earlier Hallstatt and the later La Tène. While in Ireland, evidence of a Hallstatt phase is rare, and the La Tène phase is reflected strongly in the style of metalwork of this period. It is clear there was significant contact and interaction between the Continental Europe, Britain and Ireland at this time. However, there are no recorded sites of Iron Age date in the vicinity of the proposed development area.

Early Medieval Period (AD 500–1100)

The early medieval period is portrayed in the surviving literary sources as entirely rural, characterised by the basic territorial unit known as a túath. Byrne estimates that there were likely to have been at least 150 kings in Ireland at any given time during this period, each ruling over his own túath (1973). It has been estimated that each túath comprised between 1,700 and 3,300 subjects, according to the most recent estimates placing the population of Ireland in the early medieval period between a quarter and a half a million people (Stout 2017). 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. 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. Multivallate ringforts are generally believed to reflect the higher status of the occupants (Edwards 1996). Many sites recorded as enclosures may represent ringforts or similar sites, though they may also date to the prehistoric period.

Enclosures (DU017-035 and DU017-036) identified within the SDZ lands may represent ringforts or similar sites, although as noted above it seems more probable that DU017-035 relates to Bronze Age activity. It is difficult to ascertain the date and function of 'enclosures' without archaeological investigation, particularly if no above ground trace remains.

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. 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 AD 1169, 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 in AD 1171, 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. By the end of the 12th century the Normans had succeeded in conquering much of the country (Stout and 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 castles.

A castle (DU017-032001) is recorded c. 636m to the northeast of the proposed development area in the townland of Neilstown. In the Down Survey of c. 1655, this site is referred to as 'old castle' suggesting it is of medieval date. A 16th/17th century house (DU017-032002) is recorded in association with the castle at Neilstown. These may relate to the 'three or four cabins' mentioned in the Civil Survey (1654-6). No upstanding remains are extant. A tower house (DU017-029) is recorded c. 1.8km west of the proposed development area, in the townland of Adamstown. While the three-storey tower house was demolished in the 1960s, it is likely that it dated to the later part of the medieval period.

Post-Medieval Period (AD 1600–1900)

Historically the landscape containing the proposed development area was relatively marginal, as farmland. The construction of Grand Canal, to the immediate south of the proposed development area, is likely to have made the lands more attractive in the 1760s and 1770s. Evidence for post-medieval brick manufacturing in Grange and Kishoge, uncovered during archaeological testing, provides further indications of development in the area (O' Neill 2020, Licence 20E0390). Whist no specific dating evidence was recovered, newspaper adverts in the 1780s record the presence and use of good brick clays in the area. This activity may represent a localised brick manufacturing industry, seeking to exploit the opportunity to manufacture and cheaply convey bricks along the canal to the busy Dublin city construction markets. Three areas were identified associated with post-medieval brick manufacturing (Kiln Areas 1-3), with Kiln Area 3 lying to the immediate east of the north-south stretch of the haul route within the proposed development area.

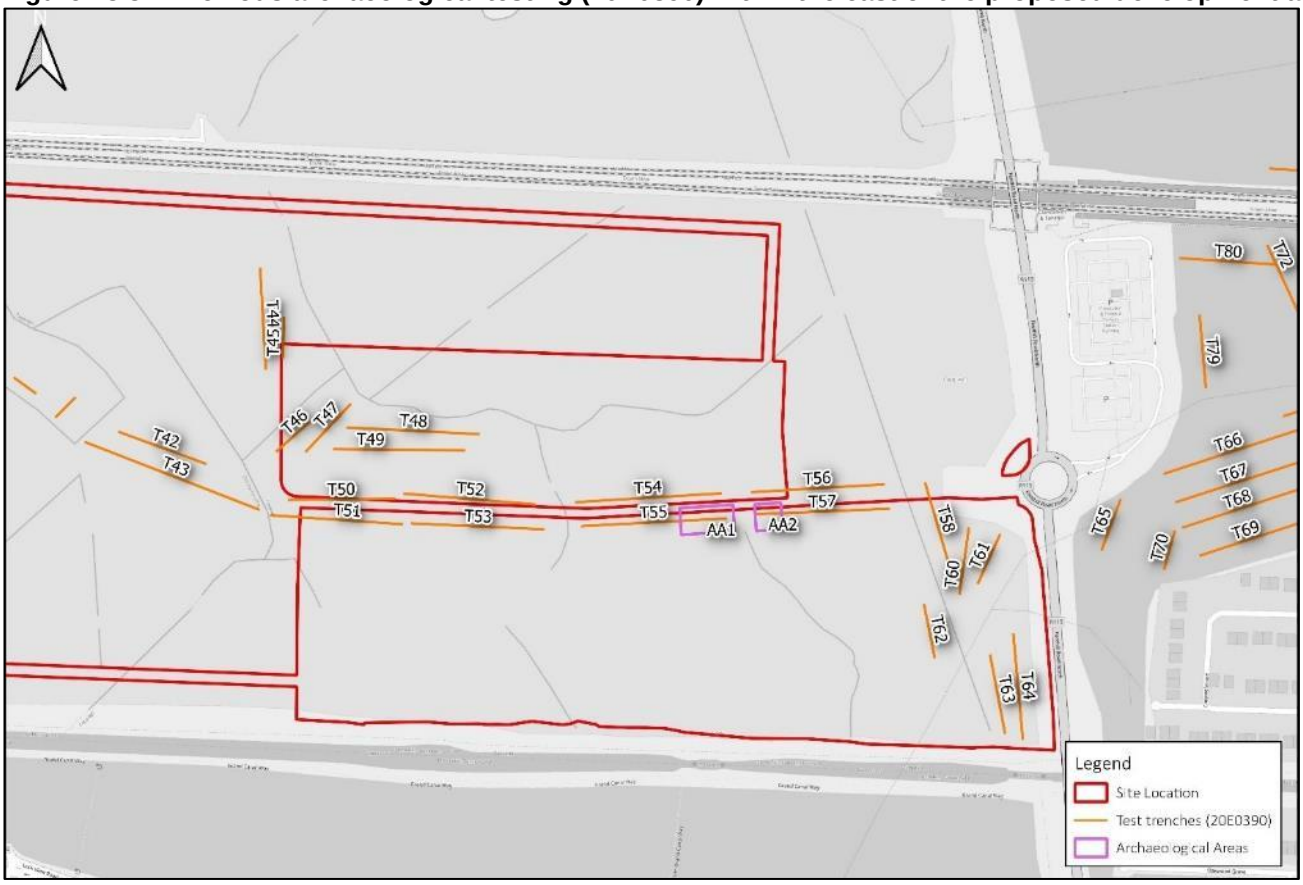
13.3.1.2 Summary of Previous Archaeological Fieldwork

Archaeological testing and metal detection has recently been carried out in advance of the infrastructure development within the Clonburris SDZ under licences 20E0390 and 20R0168 and a number of the test trenches were excavated within the boundary of the proposed development area and immediately adjacent (Figures 13.3 and 13.4). A number of archaeological areas were identified within the wider tested area. Of particular significance to the current application area are AA1 and AA2 (O' Neill 2020). AA1 comprises three pits (C55.1, C55.2 and C55.3), with evidence for burning and charcoal, identified in Trench 55 in Cappagh to the east of the R113. No dating evidence was recovered from these pits during testing. AA2 comprises a single large pit (C57.1), capped in clay and containing

charcoal. The pit was identified in Trench 57 in Cappagh to the east of the R113. This may be the site of a charcoal production pit. No dating evidence was recovered during testing. AA2 lies across the existing field boundary to the east of AA1 in the field to the west. In addition, post-medieval features were identified within the area of the haul route of the proposed development area. These features were recorded as 'Kiln Area 3'. Previously unrecorded post-medieval brick manufacture was evident in Trenches 27 and 28 in Kishoge, in the fields just to the east of the R136. An area of substantial brick debris and burning (C27.1/C28.1) was identified that is potentially derived from a post-medieval brick manufacturing kiln. The debris and burning extended over and area 14m (east-west) by 30m (north-south). Two further brick kilns were identified during testing further to the west in the townland of Grange and AA3 was identified to the east in the townland of Cappagh and consisted of a possible charcoal production pit.

Archaeological features identified as part of the infrastructure investigations will be preserved by record as part of the now permitted infrastructure development.

Figure 13.3 – Previous archaeological testing (20E0390) within the east of the proposed development area



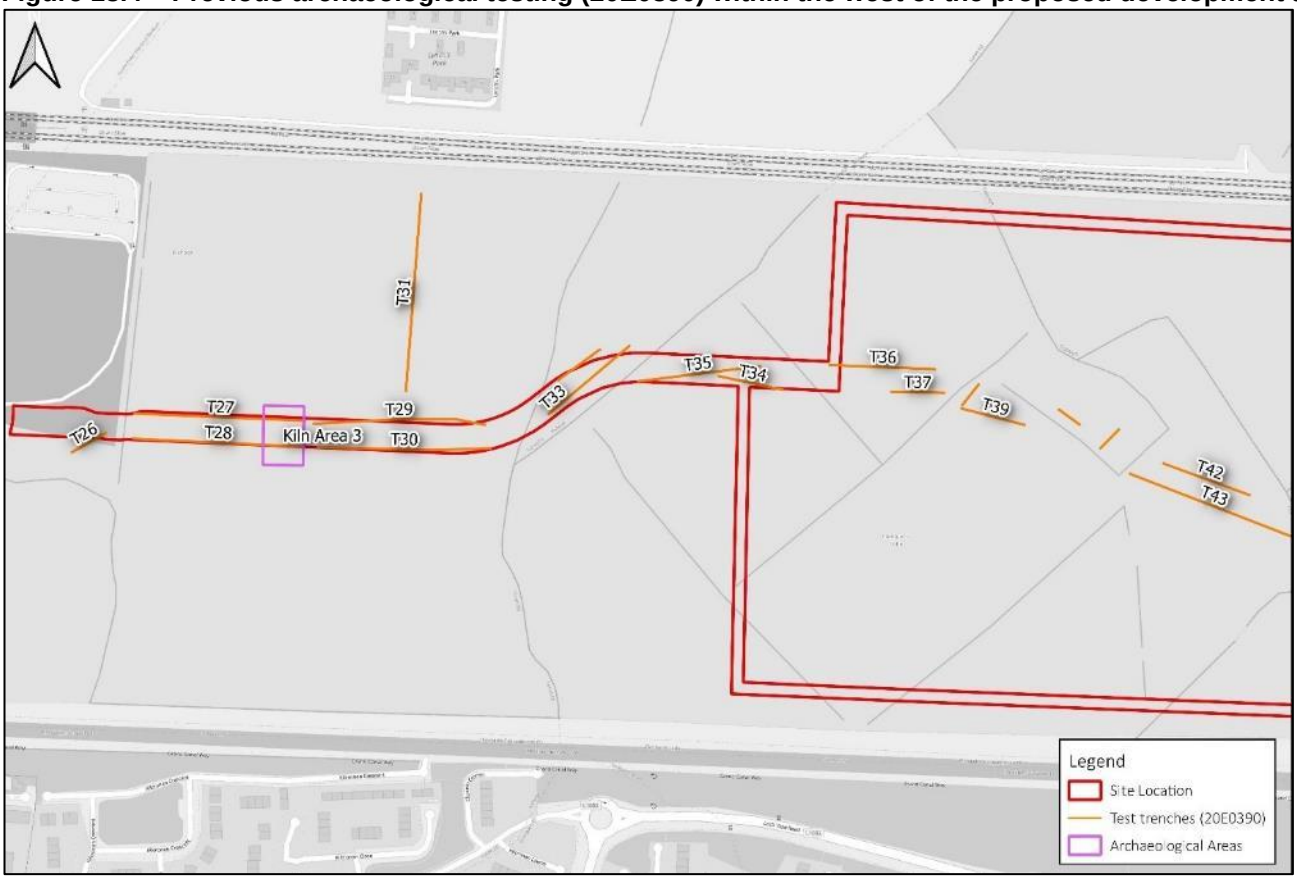
Archaeological testing was also carried out c. 100m east of the proposed development area under licence 21E0084. This phase of testing did not identify any additional features of archaeological potential, although a number of linear features, interpreted as modern drains and field boundaries were noted (O' Neill et. al. 2021).

Archaeological testing was carried out as part of the Kildare Rail Project, (Cappagh to Stacumny) to the north of the railway line. Nothing of archaeological significance was identified (Bennett 2007:436, Licence Ref.: 07E0749).

Archaeological testing in advance of the Adamstown Link Road Scheme, c. 455m northwest of the proposed development area failed to identify archaeological features (Elder 2005, Licence Ref. 05E0477).

The truncated remains of a burnt Neolithic house dated to 3941–3659 cal. BC was excavated in the townland of Kishoge, c. 653m southwest of the proposed development area (Bennett 2001:438, Licence Ref.: 01E0061).

Figure 13.4 – Previous archaeological testing (20E0390) within the west of the proposed development area



13.3.1.3 Cartographic Analysis

Down Survey Maps of the Barony of Newcastle, c. 1655
The Down Survey maps were created as a means to identify land ownership and while they are often scant in detail, major topographical features and occasionally notable man-made landmarks are depicted. The castle (DU017-032001) at Neilstown is shown and labelled as 'old castle', suggesting that the castle was already of substantial age by the time of this map. It is shown in association with a second smaller structure which may represent the 16th/17th century house (DU017-032002).

Rocque's An Actual Survey of County Dublin, 1760 (Figure 13.5)
Rocque's map of 1760 depicts a largely agricultural landscape with dispersed settlement. The Grand Canal is visible as 'New Canal'. A small demesne is present to the east called 'Cappoh'. A group of structures is shown at the location of the castle at Neilstown but the castle is not annotated. To the west, 'Castle Adams' is depicted which may correlate to the tower house (DU017-029) in Adamstown.

John Taylor's Map of the County of Dublin, 1816 (Figure 13.6)
By the time of Taylor's map of 1816, the demesne at Cappagh is shown once more. A number of residences are also marked, including Springfield, immediately north of the Grand Canal, and Kishoge House. 'Castle Adams' is depicted once again possibly correlating to the tower house (DU017-029) in Adamstown. A number of locks are indicated along the Grand Canal to the south.

Figure 13.5 – Extract from Rocque's map of 1760, showing the approximate location of the proposed development area

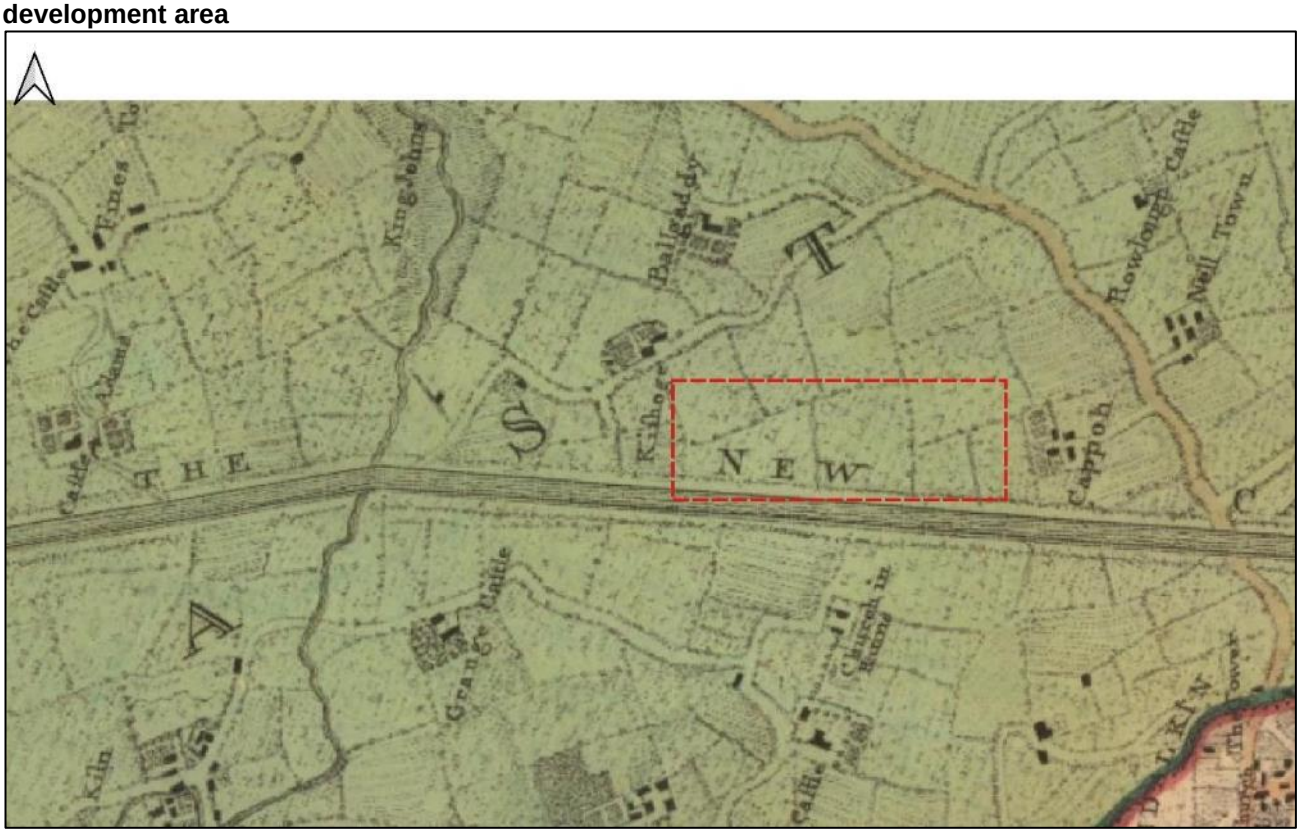
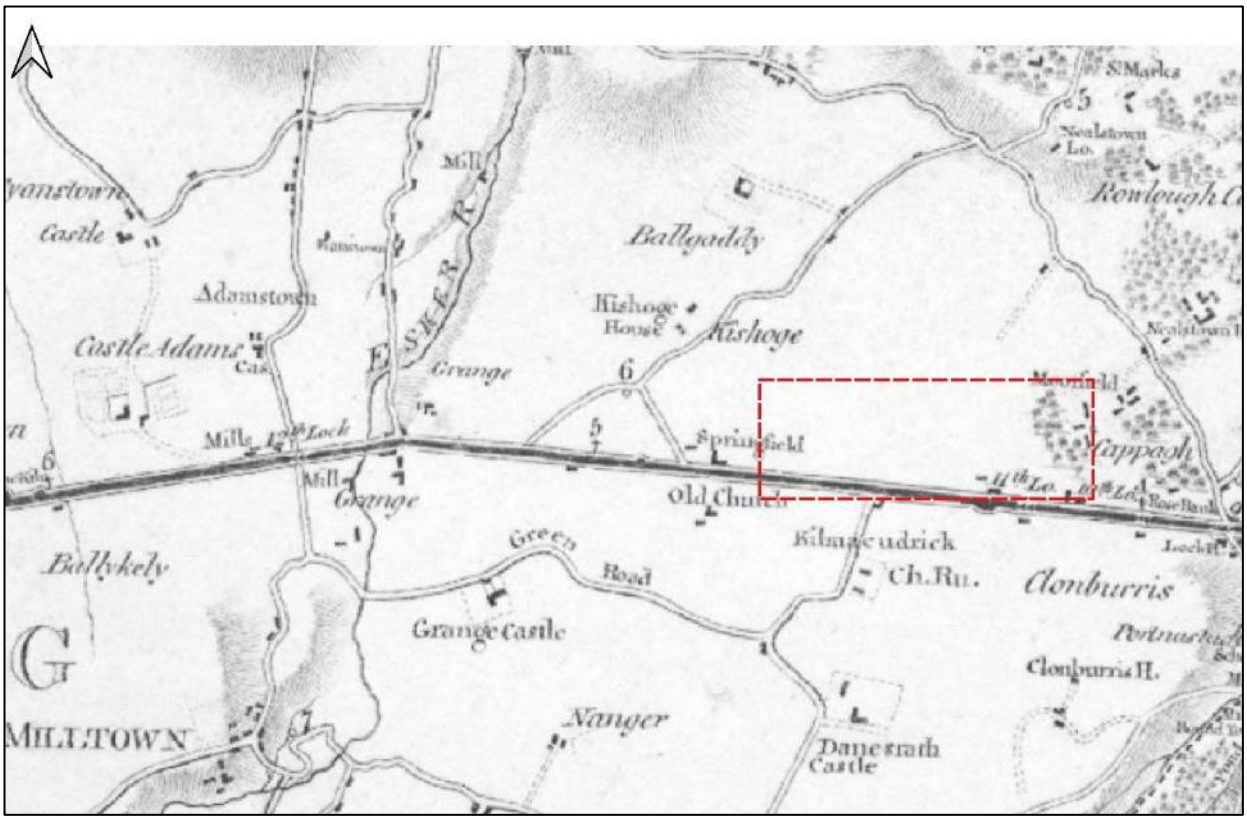
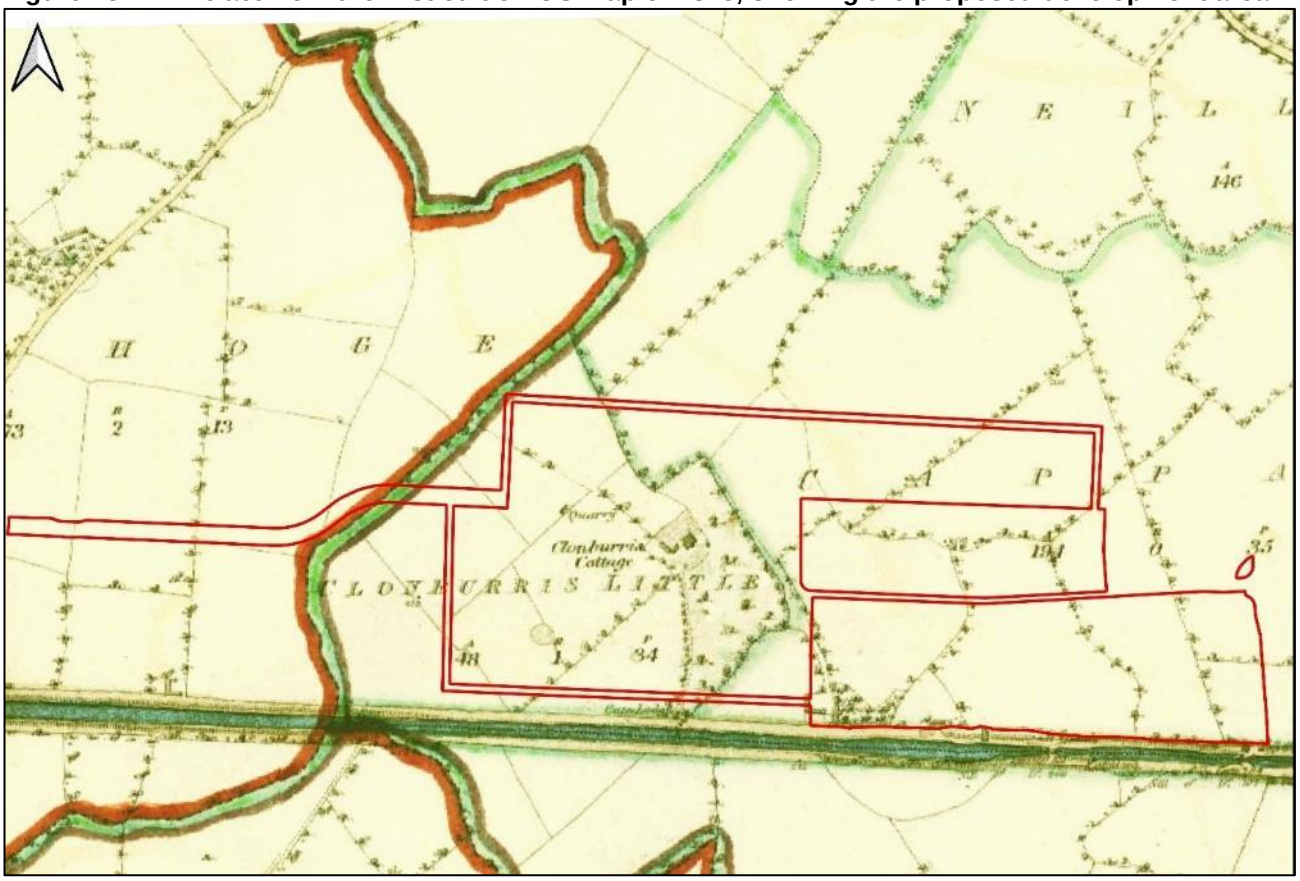


Figure 13.6 – Extract from Taylor's map of 1816, showing the approximate location of the proposed development area



First edition Ordnance Survey Map, 1843, scale 1:10,560 (Figure 13.7)
The first edition OS map of 1843 is the first accurate depiction of the proposed development area. While much of the Clonburris SDZ lands remain agricultural in nature, a number of residences and small demesnes have been established. A small demesne associated with Clonburris Cottage is shown located extending into the proposed development area. Its grounds extend south towards the Grand Canal and a gate lodge is annotated immediate north of the towpath. Further to the west of Clonburris Cottage, a quarry is marked. The route of the proposed haul road crosses a number of townland boundaries, including the Cappagh-Clonburris Little boundary and the Clonburris Little-Kishoge boundary. The Clonburris Little-Kishoge townland boundary also marks the Barony boundary between Uppercross and Newcastle. There is no trace of either enclosure DU017-036 or DU017-035 within the SDZ lands. There are a number of small structures immediately north of the Grand Canal, which are located partially within the proposed development area. These are likely to represent vernacular houses, accessed from the canal path.

Figure 13.7 – Extract from the first edition OS map of 1843, showing the proposed development area



Second Edition Ordnance Survey Map, 1871, scale 1:10,560

There is little change by the time of this map, with the exception of the addition of the Great Southern and Western Railway, which opened in 1846 and runs immediately north of the northern extents of the proposed development area.

Ordnance Survey Map, 1906–9, scale 1:2,500

There are no significant changes to the proposed development area depicted within this map.

Third Edition Ordnance Survey Map, 1935, scale 1:10,560

There are no major changes to note within the cartography of this map with the exception that a house, marked as Cappagh Villa, is shown within the eastern section of the proposed development area, accessed from the canal.

13.3.1.4 County Development Plan

The South County Dublin Development Plan (2016–2022) recognises the statutory protection afforded to all RMP sites under the National Monuments Legislation (1930–2014). The development plans list a number of aims and

objectives in relation to archaeological heritage (Appendix 13.3). It is a policy of the South County Dublin Development Plan (2016–2022) to promote the in-situ preservation of archaeology as the preferred option where development would have an impact on buried artefacts. Where preservation in situ is not feasible, sites of archaeological interest shall be subject to archaeological investigations and recording according to best practice, in advance of redevelopment.

There are two recorded monuments located within the immediate proximity of the proposed development, both of which are listed as enclosures (DU017-035 and DU017-036, Figure 13.2). DU017-035 is located immediately adjacent to the proposed southern haul road, whereas DU017-036 is located c. 30m to the south of the northern haul road. It should be noted that neither site possesses any upstanding remains and were identified as site of potential from aerial photographs dating to 1971 (SMR file). Details of the monuments are given in Appendix 13.1.

Neither of these sites are further protected as National Monuments in State Care or under Preservation Orders.

13.3.1.5 Clonburris Strategic Development Zone Planning Scheme 2019

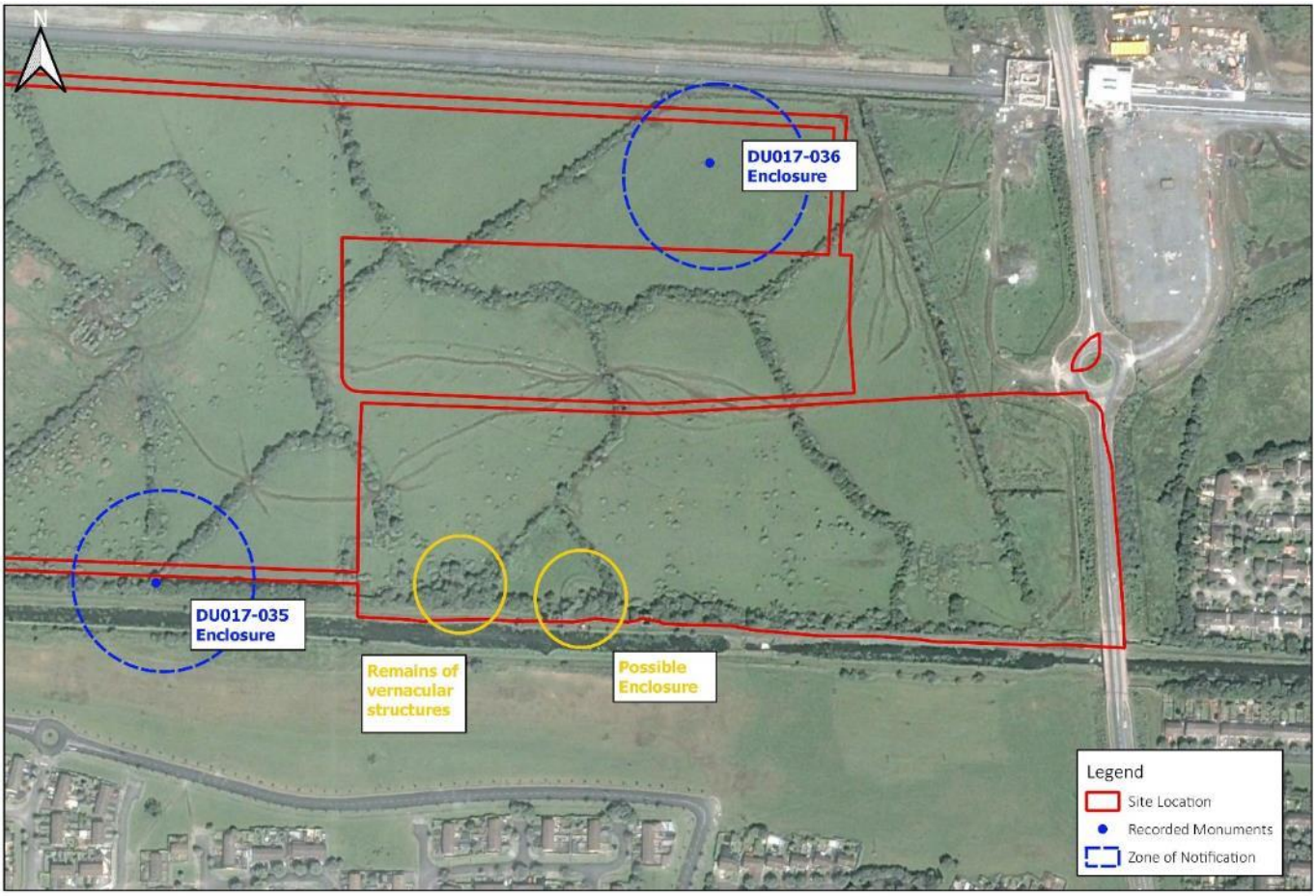
Section 2.12.3 of the Clonburris Strategic Development Zone Planning Scheme 2019, states that, development should be designed and carried out in a manner that protects archaeological heritage and avoids adverse impacts on sites, objects or features of significant archaeological interest and that in accordance with the recommendations of the Framework and Principles for the Protection of Archaeological Heritage (1999), in-situ preservation of archaeological features is favoured.

Section 2.13.2 also states that development that has been pre-determined to have the potential to disturb archaeological sites, objects or features shall be supported by an Archaeological Impact Assessment and Mitigation Strategy particularly for development within the vicinity of known archaeological sites and previously unrecorded features identified through archaeological survey work. Where appropriate, the incorporation of any known or discovered archaeological sites or features should be detailed and described within design statements for all medium to large scale development proposals (see Section 2.8.2 – Design Criteria) on the SDZ lands.

13.3.1.6 Aerial Photographic Analysis

The 1995 (OSI) shows a largely undeveloped area with what appears to be the remains of Clonburris Cottage present to the west of the proposed development area. By 2000, the Fonthill Road has been constructed and the R136 further west is under construction. The construction of the Clondalkin Fonthill Railway Station and associated car park is visible to the east in the aerial imagery of 2008 (Google Earth). A potential archaeological feature is present in the southern section of the proposed development area, adjacent to the canal (Figure 13.8). This consists of a possible double ditched enclosure, with a diameter of c. 28m. The feature is only visible within the 2008 Google Earth coverage and is located within the proposed development area. This site was subsequently inspected, and no obvious features of archaeological potential were noted. As such, the anomaly within the aerial coverage is likely due to modifications in the vegetation possibly caused by vehicles.

Figure 13.8 – Extract from Google Earth imagery (2008) showing the possible enclosure & remains of vernacular structures within the proposed development area



13.3.1.7 Topographical Files of the National Museum of Ireland

Information on artefact finds from the study area in County Dublin has been recorded by the National Museum of Ireland since the late 18th century. Location information relating to these finds is important in establishing prehistoric and historic activity in the study area. A bronze axehead (IA/163/1996) is recorded in the topographical files of the National Museum of Ireland as potentially originating from within the Clonburris SDZ, although no detail as to the circumstances of the find is contained in the record.

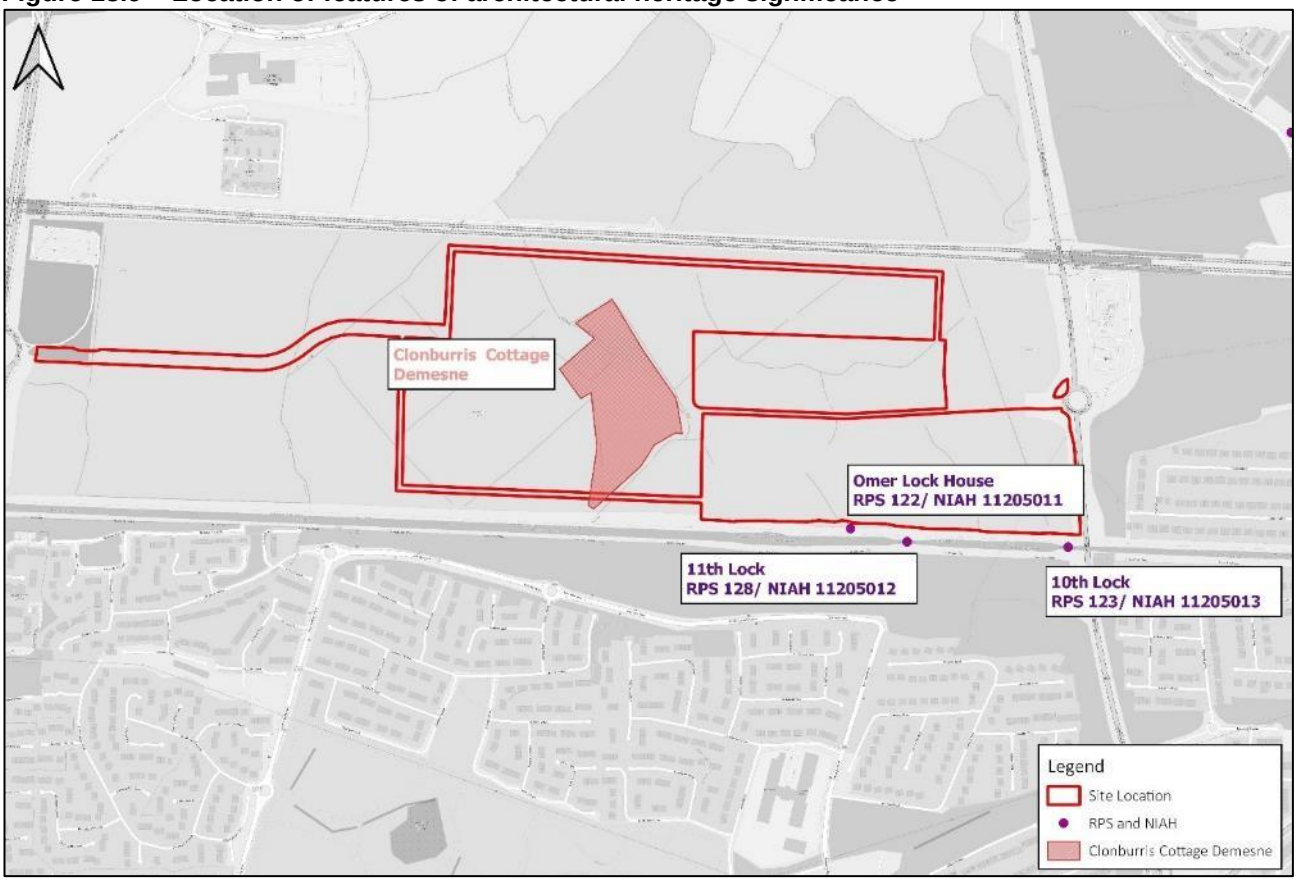
13.3.2 Results and Analysis - Architecture

13.3.2.1 Built Heritage Background

General

The built heritage of the surrounding area was identified from a number of sources including the County Development Plan, Local Area Plans, the National Inventory of Architectural Heritage survey and a field inspection. There are three structures listed within the RPS and NIAH that are located within 250m of the proposed development area. These sites are all located to the immediate south of the site and are directly associated with the Grand Canal (Figure 13.9).

Figure 13.9 – Location of features of architectural heritage significance



During the 18th and 19th centuries this area was typified by large manors with associated demesne landscapes and villages interspersed with medium-sized houses and farmsteads. The 18th century, a relatively peaceful period, saw the large-scale development of demesnes and country houses in Ireland. The large country house was often 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 located nationwide.

Lands associated with the large houses were generally turned over to formal gardens, which were much the style of continental Europe. Gradually this style of formal avenues and geometric gardens designs was replaced during the mid-18th century by the adoption of parkland landscapes – to be able to view a large house within a natural setting. Considerable constructional effort went into their creation - earth was moved, field boundaries disappeared, streams were diverted to form lakes and quite often roads were completely diverted to avoid travelling anywhere near the main house or across the estate. Several small demesnes are depicted on the first edition OS map of 1843, including Clonburris Cottage, which extends within the proposed development area.

The Grand Canal, which travels c. 35m south of the southern extent of the proposed development area, is c. 131km long and links the Dublin City to the River Shannon. Work began on the canal in 1756 and it was officially opened to traffic in 1804. While the rise of the railway significantly reduced the popularity of the canal, it was not until 1960 that the last cargo was transported along the Grand Canal. A number of features of architectural significance are located within the vicinity of the proposed development, which form part of the Grand Canal, including the 10th Lock (RPS 123, NIAH 11205013) and the 11th Lock (RPS 128, NIAH 11205012). In addition, Omer Lock House (RPS 122, NIAH 11205011) is also a protected structure and lies to the immediate south of the proposed development area.

13.3.2.2 County Development Plan – Record of Protected Structures (RPS)

The South County Dublin 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 13.4).

There are no protected structures within the proposed development footprint. Three protected structures are located within 250m of the site (Table 13.1, Figures 13.9). All three of these structures are also listed in the NIAH Building Survey. Details of the protected structures are given in Appendix 13.2.

Table 13.1 – Protected Structures in the vicinity of the proposed development area

RPS No. / NIAH Ref.	Structure Name	Location	Distance from Development
122/ 11205011	Omer Lock House, 11th Lock	Cappagh, Clondalkin	Immediately south of the proposed development area
128/ 11205012	11th Lock	Cappagh, Clondalkin	c. 22m south
123/ 11205013	10th Lock	Cappagh, Clondalkin	c. 34m south

There are no Architectural Conservation Areas (ACA) within the study area of the proposed development.

13.3.2.3 National Inventory of Architectural Heritage (NIAH) – Building Survey

There are three structures listed in the NIAH for the vicinity of the proposed development area. All three of these are also listed in the Record of Protected Structures (see Table 13.1, Figure 13.8).

13.3.2.4 National Inventory of Architectural Heritage – Garden Survey

The route of the haul road of the proposed development area passes through the southern extent of the former small demesne landscape of Clonburris Cottage. It is not included in the NIAH Garden Survey. While Clonburris Cottage itself does not survive, there is evidence of the building visible in the aerial photographic coverage dating to 1995, although it is likely the structure was in a ruinous state by this time. The small associated demesne's boundaries remain unchanged today, but no designed characteristics survive. A gate lodge, shown on first edition OS map of 1843, fronting onto the Grand Canal towpath, no longer survives.

13.3.2.5 Cartographic Analysis

The analysis of the various maps that have shown this area over time shows that the application site has been in agricultural use throughout the period. The addition of the Grand Canal and the railway can be seen in the historic mapping. A group of unnamed structures is shown partially within the proposed development area immediately north of the Grand Canal in the first edition OS map of 1843 (Figure 13.7). One of these structures, the eastern most of the group, remains extant by the time of the 25-inch OS map of 1906-9. None of the structures shown along the canal within the historic mapping remain extant today, with the exception of Omer Lock House (RPS 122/ NIAH 11205011).

13.3.3 Results and Analysis - Cultural Heritage

13.3.3.1 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. Settlements or industrial features such as mills, millraces, kilns and bridges which are visible on historic mapping but have disappeared from the modern landscape can also be considered as sites with cultural heritage value. No specific cultural heritage sites have been identified during the course of this assessment that relate to the proposed development area; however, the archaeological and architectural sites within the study area that are identified within this assessment can be considered as cultural heritage.

13.3.3.2 Placename 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 references used for the place name analysis

is Irish Local Names Explained by P.W Joyce (1870) and logainm.ie. A description and possible explanation of each townland name in the environs of the proposed development area are provided in the below table.

Table 13.2 – Placenames within the study area

Name	Derivation	Possible Meaning
Cappagh	An Cheapach	The tillage plot
Clonburris Little	Cluain Buiríosa	The pasture of the borough-town- likely divided into Little and Great at a later date.
Clonburris Great	Cluain Buiríosa	The pasture of the borough-town- likely divided into Little and Great at a later date.
Kishoge	An Chiseog	A wickerwork causeway
Grange	-	Grange - deriving from the English medieval name for a monastic farm
Kilmahuddrick	Cill Mochuidbhricht	Church of Mochuidbhrict (Cuthbert)

13.3.3.3 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).

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).

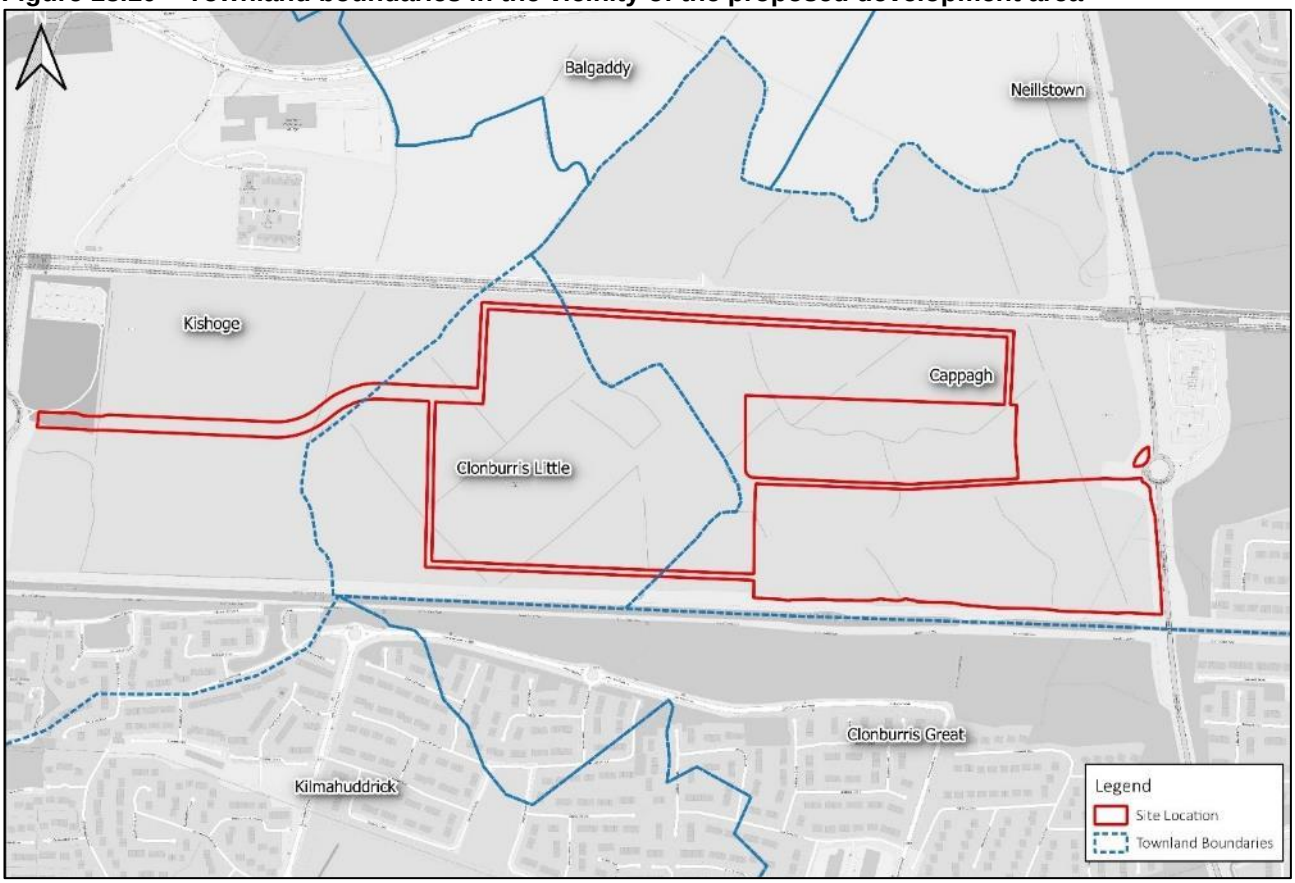
The vast majority of townlands are referred to in the 17th century, when land documentation records begin. Many of the townlands are mapped within the Down Survey of the 1650s, so called as all measurements were carefully *'laid downe'* on paper at a scale of forty perches to one inch. Therefore, most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

Although not usually recorded as archaeological monuments in their own right, townland boundaries are important as cultural heritage features as they have indicated the extents of the smallest land division unit in the country—the townland—which have been mapped since the 19th century. It remains unclear how old these land units actually are, though it has been convincingly argued that they date to at least the medieval period and may be significantly older than this (McErlean 1983; MacCotter 2008).

A number of townland boundaries traverse the proposed development area, including the Cappagh-Clonburris Little boundary and the Clonburris Little-Kishoge boundary (Figure 13.10), both of which are substantially extant. The Clonburris Little-Kishoge townland boundary also marks the Barony boundary between Uppercross and Newcastle.

Figure 13.10 – Townland boundaries in the vicinity of the proposed development area



13.3.4 Field Inspection

The field inspection sought to assess the site, its previous and current land use, the topography and any additional information relevant to the assessment. During the course of the field investigation the proposed development area and its immediate surrounding environs were inspected.

The eastern most field of the proposed development area is formed by two small areas of very rough and disturbed pasture that is bounded by the Fonthill Road to the east and the Grand Canal to the south (Plate 13.1). Further scrubby lands are located further to the north. This portion of the site has been tested as part of the now permitted infrastructure development and no features of archaeological significance were identified (Figure 13.3).

The remaining portion of the proposed development area is formed by all, or parts of six fields, all of which occupy level, very rough and scrubby pasture situated between the railway further to the north and the canal to the south (Plates 13.2-3). The fields and boundaries that are present have been present in the landscape since at least the mid-19th century although the boundaries are heavily overgrown and the landscape has not been activity managed in recent years. Occasional abandoned vehicles are present across the site, as well as dumps of construction material.

Plate 13.1 – Eastern most field of the proposed development area, facing south

Plate 13.2 – Southern section of the proposed development area, facing west

Plate 13.3 – Northern section of the proposed development area, facing northeast

No features of archaeological potential were noted across the main areas of the proposed development. The site of Cappagh Villa, as marked on the third edition 1935 OS map in the south-eastern portion of the site is now covered in debris and overgrowth. A small circular stone lined well was noted in this area (Plate 13.4), but no other remains related to the early 20th century structure were present.

Plate 13.4 – Early 20th century stone lined well associated with Cappagh House

In the south-western portion of the main area of development, a number of structures are shown fronting onto the canal to the immediate south of the site. Today this area is heavily overgrown with trees and scrub. Some possible built remains relating to the ruins of this site were noted through the vegetation (Plate 13.5).

Plate 13.5 – Remains of vernacular structures in south-western corner of the development area, facing southeast

The southern haul route passes to the immediate north of a recorded enclosure (DU017-035). The SMR file states that this is a horse-shoe shaped mound present within aerial photographic coverage dating to the 1970s. No obvious archaeological remains were noted in this area (Plate 13.6). Similarly, no obvious archaeological remains were noted in relation to RMP DU017-036, located to the south of the north haul route.

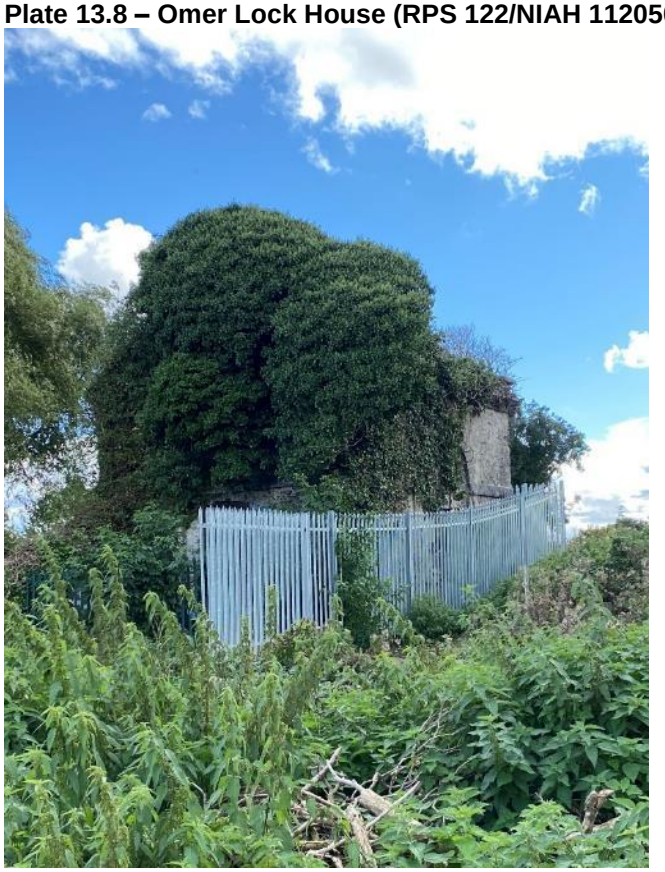
Plate 13.6 – Site of enclosure (RMP DU017-035), facing northeast

The Grand Canal is located to the immediate south of the proposed development area (Plate 13.7) and there are three protected structures directly associated with the canal located to the immediate south of the development area.

The most significant of these is the Omer Lock House (RPS 122/NIAH 11205011). Today the structure is surrounded by modern metal fencing, is completely overgrown and in very poor condition (Plate 13.8).

Plate 13.7 – Grand Canal, facing east

Plate 13.8 – Omer Lock House (RPS 122/NIAH 11205011), facing southeast



13.3.5 Conclusions

The proposed development area is located within the townlands of Kishoge, Clonburris Little and Cappagh, within the Clonburris SDZ, Dublin 22. There are two recorded monuments located in close proximity to the haul roads

associated with the development, both of which are listed as enclosures (DU017-035 and DU017-036). Neither possess any upstanding remains.

There are no protected structures located within the proposed development area, although three structures are located within 250m of the development. All three of these features are also listed in the NIAH Survey and relate to the Grand Canal, which bounds the site to the south. There is one former demesne landscape partially within the proposed development area. The demesne of Clonburris Cottage is located to the north of the southern stretch of the proposed haul route within the proposed development area and extends south into within the site boundary.

A programme of archaeological testing has been carried out as part of the now permitted infrastructure works for the Clonburris SDZ (O. Neill 2020, Licence 20E0390). This resulted in the identification of three areas of post-medieval brick production and three areas of archaeological potential comprising small pits or charcoal production sites, two of which are partially within the proposed development area (AA1, AA2) and one which is within the proposed haul route (Kiln Area 3). Metal detecting was also carried out during the course of testing, but no archaeological artefacts were recovered. These sites will be subject to preservation by record as part of the permitted development.

A bronze axehead (IA/163/1996) is recorded in the topographical files of the National Museum of Ireland as potentially originating from within the Clonburris SDZ, although no detail as to the circumstances of the find is contained in the record.

Cartographic sources depict the proposed development area as primarily agricultural greenfield throughout the post-medieval period. A number of townland boundaries traverse the proposed development area, including the Cappagh-Clonburris Little boundary and the Clonburris Little- Kishoge boundary. Both of which are substantially extant. The Clonburris Little-Kishoge townland boundary also marks the Barony boundary between Uppercross and Newcastle.

A field inspection has been carried out as part of the assessment. The site of both the recorded monuments were inspected and no upstanding archaeological remains were identified. No other areas of archaeological potential were noted. The lands are overgrown and scrubby in nature with no active management in recent years. Omer Lock House, which is a protected structure, is located to the immediate south of the development area and whilst the structure is upstanding, it is overgrown and is very poor condition. The Grand Canal and associated locks (also listed in the RPS) remain present and in good condition. No additional structures of architectural merit were noted in the development area or its study area.

13.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposal comprises the development of 569 no. dwellings as well as a creche, shared offices, open space and associated ancillary development including haul routes. A full description is contained in chapter 2 of the EIAR.

13.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

13.5.1 Construction Phase

13.5.1.1 Archaeology

Archaeological Areas 1-2 identified under 20E0390 are partially within the proposed development area. However, these features are due to be preserved by record as part of the permitted infrastructure development (Planning Ref.: SDZ20A/0021).

Ground disturbances associated with the construction of the haul road and proposed development have the potential to have a direct negative impact on the recorded enclosure site (DU017-035) and any archaeological features that may exist beneath the current ground level with no surface expression. Impacts, prior to the application of mitigation, have the potential to range from moderate to very significant dependant on the nature, extent and significance of the potential remains that are encountered.

13.5.1.2 Architecture

No potential negative impacts upon the architectural resource are predicted as a result of the construction of the proposed development.

13.5.1.3 Cultural Heritage

Two townland boundaries will be subject to direct moderate negative impacts as a result of the construction of the proposed scheme.

13.5.2 Operational Phase

13.5.2.1 Archaeology

No potential negative impacts upon the archaeological resource are predicted as a result of the operation of the proposed development.

13.5.2.2 Architecture

The operation of the proposed development has the potential to impact on the setting of Omer Lock House and the Grand Canal. However, given the derelict nature of the lands under assessment, it is considered that the construction of the development will have an indirect moderate positive impact on the built heritage resource. These structures will be adjacent to a new residential environment, encouraging the enjoyment of the canal as a heritage feature and potentially seeing the re-use or restoration of the Lock House (as part of a separate proposal).

13.5.2.3 Cultural Heritage

No potential negative impacts upon the cultural heritage resource are predicted as a result of the operation of the proposed development.

13.6 'DO-NOTHING' IMPACT

If the proposed development were not to proceed there would be no negative impact on the archaeological, or cultural heritage resource of the subject lands. However, if the development were not to proceed, the Omer Lock House will continue to deteriorate and there is unlikely to be any opportunity in the future to re-use or restore the structure as part of a landscape that is in active use by a residential population.

13.7 AVOIDANCE, REMEDIAL, AND MITIGATION MEASURES

13.7.1 Construction Phase

13.7.1.1 Archaeology

It is recommended that a programme of archaeological testing be carried out within the proposed development area in order to fully assess the archaeological potential of the site prior to the commencement of construction. If any features of archaeological potential are discovered during the course of the works further archaeological mitigation may be required, such as preservation in-situ or by record. Any further mitigation will require approval from the National Monuments Service of the DoHLGH.

It is noted that due to the level of scrub across the development area, along with the presence of abandoned vehicles and dumped material, that geophysical survey is not a suitable form of investigative survey.

13.7.1.2 Architectural

As there are no predicted impacts on the architectural resource, no mitigation is deemed necessary.

13.7.1.3 Cultural Heritage

All works along townland boundaries will be subject to archaeological monitoring in order to ensure a record of each boundary and their characteristics is compiled during the construction of the proposed development.

13.7.2 Operational Phase

13.7.2.1 Archaeology

As there are no predicted impacts on the archaeological resource, no mitigation is deemed necessary.

13.7.2.2 Architectural

As there are no predicted negative impacts on the architectural resource, no mitigation is deemed necessary.

13.7.2.3 Cultural Heritage

As there are no predicted impacts on the cultural heritage resource, no mitigation is deemed necessary.

13.7.3 *'Worst-Case'* Scenario

Under a worst-case scenario, the proposed development would disturb previously unrecorded and unidentified archaeological deposits and artefacts without proper excavation and recording being undertaken.

13.8 PREDICTED IMPACT OF THE PROPOSAL

13.8.1.1 Archaeology

Following implementation of mitigation measures, no impacts are predicted upon the archaeological resource.

13.8.1.2 Architecture

The proposed development is predicted to have an indirect moderate positive impact on the Grand Canal and Omer Lock House. This is due to the fact that the heritage features will be utilised by the residential development and this may also lead to the re-use or restoration of the Omer Lock House, which is an RPS and in very poor condition.

13.8.1.3 Cultural Heritage

Following implementation of mitigation measures, there are no impacts predicted upon the cultural heritage resource.

13.9 MONITORING

The mitigation measures recommended above would also function as a monitoring system to allow the further assessment of the scale of the predicted impacts and the effectiveness of the recommended mitigation measures.

13.10 REINSTATEMENT

Reinstatement is not applicable to this assessment.

13.11 POTENTIAL CUMULATIVE IMPACTS

No cumulative impacts are predicted upon the archaeological, architectural, or cultural heritage resource as all archaeological remains will be preserved by record.

13.12 INTERACTIONS

No interactions with other disciplines have been identified during the compilation of this assessment.

13.13 DIFFICULTIES ENCOUNTERED IN COMPILING INFORMATION

No difficulties were encountered during the compilation of this chapter.

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"* as well as

"A description of the likely significant effects of the proposed project on the environment resulting from "the risks to human health, cultural heritage or the environment (for example due to accidents or disasters)" (see EIA Directive, Annex IV(5)(d), implemented by the Planning and Development Regulations 2001, Schedule 6, §2(e)(IV)).

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. And, 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. (see EIA Directive, Annex IV(8), implemented by the Planning and Development Regulations 2001, Schedule 6, §2(h))"

This 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 was prepared by Thomas Carrigg, Civil Engineer, DBFL Consulting Engineers & John Carr, Chartered Civil Engineer [B.Eng MSc CEng], DBFL Consulting Engineers & Rory Kunz, BA (MOD), MScERM, MAT&CP, Dip EIA Mgmt.

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 residential development has been designed and will be constructed in line with best practice (standard construction methods) 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 Specific Site Flood Risk Assessment was carried out. Measures to control risks associated with Construction Phase activities are incorporated into the Preliminary Construction 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, and on professional judgement of the consultants with this responsibility in the construction and operation of the proposed development. Regard to the DHPLG's 'Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment' (August 2018), has also been given in the preparation of this chapter. 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."

The intent of the Directive 2009/71/Euratom 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 residential development on a greenfield site 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 include *"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 the Preliminary Construction Management Plan, which would deal with pollution risks during construction (See Chapters 5 Land & Soils, Chapter 6 Water and Chapter 7 Air Quality and Climate) and risk of accidents during construction, including traffic accidents. The risk of flooding is dealt with in Chapter 6; Water. The site is in Flood Zone C which is low risk and is appropriate for residential development. 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.

14.2.1 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), as follows:

Table 14.1 – Risk Classification

Table 2 - Classification of Likelihood

Ranking	Classification	Likelihood
1	Extremely Unlikely	May occur only in exceptional circumstances; Once every 500 or more years
2	Very Unlikely	Is not expected to occur; and/or no recorded incidents or anecdotal evidence; and/or very few incidents in associated organisations, facilities or communicates; and / or little opportunity, reason or means to occur; May occur once every 100-500 years.
3	Unlikely	May occur at some time; and /or few, infrequent, random recorded incidents or little anecdotal evidence; some incidents in associated or comparable organisations worldwide; some opportunity, reason or means to occur; may occur once per 10-100 years.
4	Likely	Likely to or may occur; regular recorded incidents and strong anecdotal evidence and will probably occur once per 1-10 years
5	Very Likely	Very likely to occur; high level of recorded incidents and/or strong anecdotal evidence. Will probably occur more than once a year.

14.2.2 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 14.2 – Risk Likelihood

Category	Risk Factor Type	Likelihood
Weather	Storms, snow	3
Hydrological	Risk from flooding	1
Excavation work	Collapse	3
Road	Traffic accident	4
Industrial accident	General housebuilding construction	1
Explosion	Works in the vicinity of the Gas Transmission main running parallel to the R113	3
Fire	Hot works close to timber frame structures.	3
Building Collapse	Structural failure during construction. There are no existing buildings and no demolition works.	1
Hazardous substance escape	General housebuilding construction products.	2
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, South Dublin City County 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.

Table 14.3 – Risk Matrix

Likelihood Rating							
	Very likely	5					
	Likely	4					
	Unlikely	3					
	Very unlikely	2					
	Extremely Unlikely	1					
			Minor	Limited	Serious	Very Serious	Catastrophic
			1	2	3	4	5
			Consequence Rating				

14.3 RECEIVING ENVIRONMENT

The existing site and surrounding lands are predominately greenfield and agricultural lands. The R113 borders the proposed development to the east and the Kildare/Cork Railway is located north of the site. These do not include any man-made industrial processes (including SEVESO II Directive sites (96/82/EC & 2003/105/EC) which would be likely to result in a risk to human health and safety or the proposed development. The receiving environment affected by the different aspects of this development are dealt with separately in the individual chapters of this report.

Article 3 of the Environmental Impact Assessment (EIA) Directive 2014/52/EU, requires the assessment of expected effects of major accidents and/or disasters within an EIA. Article 3(2) of the Directive states that *"The effects referred to in paragraph 1 on the factors set out therein shall include the expected effects deriving from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned".*

14.4 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

14.4.1 Health & Safety/ Risks of Major Accidents and/or Disasters in General

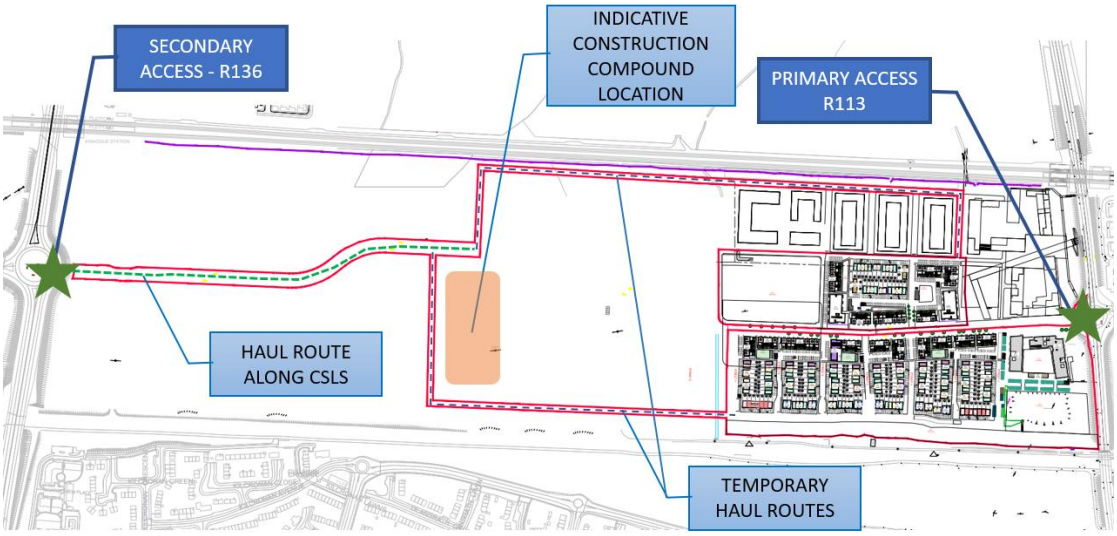
14.4.1.1 Construction Phase

It is considered that the main risks associated with the proposed development will arise during the 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.

There may be certain times when access from this location is constrained due to works as part of the CSLS, for example during works to modify the existing roundabout to a signalised junction. Therefore alternative routes to access the site are provided via haul routes from the west. The haul routes initially follow the route of the permitted CSLS from the R136 before diverging to provide a route to both the northern and southern development parcels. This results in potential risk of collision between vehicles involved in the two developments. The routes are generally designed to follow the future road network identified in the SDZ to minimise environmental impacts.

Figure 14.4 – Site Access



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 Preliminary 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 relevant Health & Safety Regulations during the construction of the project.

14.4.2 Operational Phase

The proposed development comprises of 569 no. dwellings consisting of 173 no. houses, 148 no. duplex units, 248 no. apartments with all associated infrastructure, including surface car parking, landscaping and open space as well as a crèche with a community/civic space above.

The main risk identified during operation is the potential leak or explosion while works are carried out in the vicinity of the gas transmission main running north/south parallel to the R113 along the eastern border of the site. In order to mitigate this risk a 14.0m wayleave around the transmission main in which no excavation works are to take place has been agreed with Gas Networks Ireland. Where infrastructure works (roads, footpaths, utilities etc..) are required to cross this gas main, a detailed design in compliance with GNI code of practice will be submitted for approval and all works will be carried out with supervision from the relevant authorities.

Another major risk identified during the operational phase is the potential for fire. It should be noted that the proposed uses are considered normal hazard fire risks as would be encountered in most residential developments and do not include any hazards which would be regarded as presenting an exceptional environmental fire hazard.

Further details on risks associated with the operational phase of this development are dealt with separately in the individual chapters of this report.

14.4.3 '*Do Nothing*' Scenario

In the do-nothing scenario, the potential risk of the proposed development causing, or being affected by a disaster and / or accident would be low, given that the site is currently an undeveloped greenfield site.

14.5 MITIGATION MEASURES

The Construction Management Plan and associated Health and Safety Plan, as well as good housekeeping practices will limit the risk of accidents during construction. Fire safety will be dealt with under the Fire Safety Code at design and construction stage. The estate management company will have responsibility for fire safety during operations.

The proposed development will involve ground works to facilitate the proposed development. Site investigations have been carried out and have not identified any hazardous material. Further testing will be carried out in the coming weeks to inform the detailed design. In the event that any hazardous material is identified the appropriate measures will be taken in accordance with the requirements of the EPA. The excavation and movement of soil from the site will

be undertaken by a registered specialist contractor and removed to a licensed facility. The following mitigation measures are outlined:

- 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 below. The risks identified include traffic management, and fire strategy.

- During the construction stage, the risk of accidents associated with the proposed development are not predicted to cause unusual, significant or adverse effects to the existing public road network. The vast majority of the works are away from the public road in a controlled environment. The objective of which is to minimise the short term disruption to local residents, and reduce the potential for accidents.

- There is a risk of accidents associated with CSLS road to be constructed in conjunction with the proposed development as stated above. In order to manage interactions between the two sites a Project Liaison Group will be established. This group will have regular meetings to ensure a co-ordinated approach to design interfaces, works programmes and environmental management activities for both sites

- Furthermore, is expected that the risk of accidents would be low during the construction of the proposed development considering the standard construction practices which are to be used.

- No Excavations are to be carried out within the 14.0m wayleave around the transmission gas main running north/west parallel to the R113. Where infrastructure works (roads, footpaths, utilities etc..) are required to cross this gas main, a detailed design in compliance with GNI code of practice will be submitted for approval and all works will be carried out with supervision from the relevant authorities.

- With reference to natural disasters (e.g. flooding), the proposed development has undergone a Site Specific Flood Risk Assessment, prepared by DBFL Consulting Engineers. The main area of the site where development is proposed is low risk of fluvial, pluvial or groundwater flooding.

- A Health and Safety Plan will be prepared (required by the *Safety, Health and Welfare at Work (Construction) Regulations 2013*) to address health and safety issues from the design stages through to the completion of the construction and maintenance phases. The Health and Safety Plan will comply with the requirements of the Regulations and will be reviewed as the development progresses.

- Safety on site will be of paramount importance. Only contractors with the highest safety standards (Health and Welfare at Work (Construction) Regulations 2013) and training will be selected. During the selection of the relevant contractor and the respective subcontractors their safety records will be investigated.

- Prior to working on site, each individual will receive a full safety briefing and will be provided with all of the safety equipment relevant to the tasks the individual will be required to perform during employment on site.

- Safety briefings will be held regularly and prior to any onerous or special task. *'Toolbox talks'* will be held to ensure all workers are fully aware of the tasks to be undertaken and the parameters required to ensure the task will be successfully and safely completed.

- All visitors will be required to wear appropriate personal protective equipment prior to going on to the site and will undergo a safety briefing by a member of the site safety team.

- Regular site safety audits will be carried out throughout the construction programme to ensure that the rules and regulations established for the site are complied with at all times.

Table 14.5 – Strategy for tackling potential risks – Clonburris Phase 1A

1. BASIC RISK INFORMATION			2. RISK ASSESSMENT INFORMATION		3. RISK RESPONSE MITIGATION/INFORMATION
Risk Number	Risk Description / Risk Event Statement	Responsible	Impact H / M / L	Probability H / M / L	Actions
Provide a unique identifier for risk	A risk event statement states (I) what might happen in the future and (ii) its possible impact on the project.	Name or title of team member responsible for risk	Enter H (High); M (Medium); or L (Low) according to impact definitions	Enter H (High), M (Medium) or L (Low) according to probability definitions	List, by date, all actions taken to respond to the risk. This does not include assessing the risk
C01	Traffic Accidents	Project Supervisor Construction Stage (PSCS)	M	M	PSCS to develop Traffic Management Plan (implemented from mitigation as set out in PCEMP and Traffic Chapter). All material is within the site boundary. All parking is within the site boundary to limit any interaction with local areas or estates. This will avoid back up of traffic on approach, consideration of allocation of holding area. The road access to the site is mainly off secondary roads and as such a booking system should be considered whereby contractor deliveries and collections can be managed to avoid traffic delays. The PSCS to provide an internal traffic management plan. The plan to include segregation of vehicles from staff and visitors that will be present on the site. PSCS to liaise with Construction Project Manager involved with the CSLS works to manage interaction between the two projects.
C02	Scaffolding/risk of injury	PSCS	H	M	Working at height required throughout the project. Installation of scaffolding for all working at height activities to be subject to a full temporary works design submission. In order to fully Co-Ordinate any temporary works submission the Project Supervisor for the Design Process must receive the

1. BASIC RISK INFORMATION			2. RISK ASSESSMENT INFORMATION		3. RISK RESPONSE MITIGATION/INFORMATION
					following items before reviewing any submission; A full design submission, Calculations for the design, Design Risk Assessment, Copy of designer's PI insurances, Designers CV. This submission can then be reviewed by the Permanent Works Engineer to ensure the design will not impact on the permanent structure.
C03	Fire Risks	PSCS/ PSDP / Fire SC.	H	M	Fire strategy must be put in place in advance of start on site which must take into consideration the requirement for hot works and the provision of Hot Works Permit systems to manage Hot works when needed. A fire marshal will be required - full co-operation from site supervisors and contractors will be required.
CO4	Crane Lifting Operations	PSCS / PSDP	H	M	Lifting operations using cranes will be a requirement during the project. The PSDP must identify this as a risk factor ensuring the ground conditions are tested and appropriate to point loading from mobile cranes. The PSCS must ensure there is a fully risk assessed lift plan to manage all lifting operations on site.
C05	ESB Utilities disruption	PSCS / PSDP	H	M	The PSDP must highlight the existence of live overhead ESB cables on site. The sequence of work to be planned to avoid working in close proximity to the lines. The PSCS to arrange for the relocation of the lines prior to working around them. The PSCS must follow the ESB code of practice and provide a risk assessed RAMS document to manage this hazard.
C06	Gas Transmission Main disruption	PSCS / PSDP		M	The PSDP must highlight the existence and location of the transmission gas main on site, particularly the high pressure GNI gas line located along the eastern

1. BASIC RISK INFORMATION			2. RISK ASSESSMENT INFORMATION		3. RISK RESPONSE MITIGATION/INFORMATION
					side of the proposed development. The sequence of work to be planned to avoid working within the wayleave around this main agreed with GNI. A detailed design for any works required within this wayleave to be submitted to GNI for approval prior to commencement of works. The PSCS must follow the GNI code of practice.

14.5.1 Operational Phase

The fire risk mitigation for the project will comprise all fire safety measures necessary to comply with the requirements of Building Regulations. 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 South Dublin County Council.

The measures will include inter alia:

- Provision of fire-rated materials in accordance with relevant building regulations.
- Provision of early warning fire detection systems where required under building regulations;
- Use of materials which do not support fire spread with particular reference, inter alia, to internal wall and ceiling linings and external wall cladding.
- Facilities to assist the fire service including fire tender access proximate to all units, dry rising mains, and external fire hydrants
- A bespoke Fire Emergency Evacuation Plan [FEEP] will be prepared by a fire consultant at detailed design stage.

14.6 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 14.6 – Risk Register

Risk No.	Risk Event	Possible Cause
1	Accidents during construction	Traffic accident Interaction with moving plant. Gas leak/explosion from interaction with gas transmission main Working at height /scaffolding Risk of fire Groundwater pollution Noise Dust
2	Fire during Construction	Work with timber frame construction. Hot works requirements for gas installation, balconies and roof work.
3	Lifting Operations	High winds Poor ground conditions Untrained personnel.

		Failures in lifting gear.
4	Fire following occupation	Inappropriate use of electrical devices / cooking etc.
5	Falls	Falling from communal gardens Window cleaning Falls on water feature during cold weather events

14.6.1 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 14.7 – 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
2a	Fire during Construction	Hot Works	Loss of life	3	Type of construction	3	Fire could result in loss of life	3
3a	Lifting Operations	Poor planning	Loss of life	3	Construction Statistics.	3	Poor planning could result in failure of lifting gear or cranes	
4a	Fire following occupation	Electrical equipment / cooking	Injury or loss of life	1	Causes of fire statistics	3	Could result in loss of life	3
4b	Falls	Loss of balance	Injury or loss of life	1	CSO statistics	3	Could result in loss of life	3
5a	Explosion	Transmission Gas Main	Injury or loss of life	2	GNI Statistics	4	Interactions with the gas main could cause an explosion resulting in loss of life to those within the vicinity	6

14.6.2 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 14.8 – Risk Evaluation

Likelihood Rating							
	Very Likely	5					
	Likely	4					
	Unlikely	3			1a – 9, 1b – 9 1c – 9, 1d - 3		
	Very Unlikely	2				2b - 3	
	Extremely Unlikely	1				2a – 3, 4a, 4b, 5a	
			Minor	Limited	Serious	Very Serious	Catastrophic
			1	2	3	4	5
			Consequence Rating				

14.6.3 Main risks

The main risks arise during the construction period. Consequences may be limited but severe for the individuals concerned but considered unlikely. Geographical widespread environmental consequences are not anticipated. Further details on risks associated with the proposed development are dealt with separately in the individual chapters of this report.

14.7 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. However, subject to implementation of mitigation measures, good working practices and codes, the interactions between these areas have been sufficiently considered in relation to risk management.

14.8 RESIDUAL IMPACTS

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 likely lead to significant residual impacts or environmental effects. No residual impacts arise from the construction phase.

14.9 CUMULATIVE IMPACTS

The proposed development represents, Phase 1a of the Cairn Homes lands within the Clonburris South West Sector (CSW). This is the first phase to be carried out within the CSW. No cumulative impact or consequences are anticipated between the proposed development and future phases.

Subject to implementation of mitigation measures, good working practices and codes, the interactions between Risk Management and Traffic and Transport, and surface water, have been sufficiently considered in relation to risk management.

15.0 INTERACTIONS OF THE FORGOING AND CUMULATIVE IMPACTS

15.1 INTRODUCTION

The purpose of this chapter of the EIAR is to draw attention to significant interaction and interdependencies in the existing environment. In preparing the EIAR each of the specialist consultants have and will continue to liaise with each other and will consider the likely interactions between effects predicted as a result of the proposed development during the preparation of the proposals for the subject site and this ensures that mitigation measures are incorporated into the design process.

This approach is considered to meet with the requirements of Part X of the Planning and Development Act 2000 and Part 10, and schedules 6 and 7 of the Planning and Development Regulations 2001 as amended.

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 Rory Kunz, BA (MOD), MScERM, MAT&CP, Dip EIA Mgmt., Executive Director with John Spain Associates who has a Masters in Environmental Resource Management and a Diploma in EIA Management (both from UCD) as well as a Masters in Town and Country Planning. In addition, Rory is a corporate member of the of the Irish Planning Institute and has 18 years of experience of Environmental Impact Assessment and urban development.

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.

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.

Table 15.1 – Matrix of summary of interactions between the environmental factors

Interaction	Population & Human Health	Biodiversity	Land and Soils	Water	Air Quality/Climate	Noise/Vibration	Landscape and Visual	MA-Traffic	MA-Waste/Utilities	Cultural Heritage	Risk Mgmt
Population & Human Health		✗	✗	✗	✓	✓	✓	✗	✓	✗	✗
Biodiversity	✗		✓	✓	✗	✗	✗	✗	✓	✗	✗
Land and Soils	✗	✓		✓	✓	✗	✗	✗	✗	✓	✗
Water	✗	✗	✓		✗	✗	✗	✗	✓	✗	✗
Air Quality/Climate	✓	✓	✗	✓		✗	✗	✓	✗	✗	✗
Noise/Vibration	✓	✓	✗	✗	✗		✗	✗	✗	✗	✗
Landscape and Visual	✓	✓	✗	✗	✗	✓		✗	✗	✗	✗
MA-Traffic	✓	✓	✓	✓	✓	✓	✗		✓	✗	✗
MA-Waste/Utilities	✓	✓	✓	✓	✓	✓	✗	✓		✗	✗
Cultural Heritage	✗	✗	✗	✗	✗	✗	✗	✗	✗		✗
Risk Mgmt	✓	✗	✓	✓	✓	✓	✗	✓	✗	✗	

✓ = Interaction envisaged; ✗ = no interaction envisaged

15.2 INTERACTIONS

The following provides the interactions anticipated from the proposed development:

15.2.1 Population and Human Health

The potential significant impacts on population and human health arising from these interactions have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant permanent residual negative impacts will occur.

15.2.1.1 Population and Human Health - Air Quality/Climate

The completed development will generate additional emissions to the atmosphere due to associated with the development, and due to plant equipment within the development. However, air quality in the region of the site is expected to be within the limits set by the air quality standard.

During construction there may be potential for slight dust nuisance in the immediate vicinity of the site. However, dust control measures, as set out in the *Dust Control Management Programme* which include a range of measures such as wheel washes and covering of fine materials will minimise the impact on air quality.

The effect of construction on air quality will not be significant following the implementation of the proposed mitigation measures. It is proposed to adhere to good working practices and dust mitigation measures to ensure that the levels of dust generated will be minimal and are unlikely to cause an environmental nuisance. There will be no significant impact from dust once the development is completed. Overall, it is envisaged that the proposed development will not have a significant impact on air quality. This is dealt with in Chapter 7.

15.2.1.2 Population and Human Health - Noise/Vibration

The greatest potential for noise and vibration impact arising from the proposed development will be in the construction phase. However, following the implementation of the proposed mitigation measures in relation to noise, the impact associated with the construction phase of the proposed development is predicted to be moderate, transient and temporary. No significant impacts on the local noise and vibration climate are predicted during the operational phase of the proposed development. This is dealt with in Chapter 8.

15.2.1.3 Population and Human Health - Landscape and visual

The proposal has the potential to impact on the landscape and visual environment perceived by Human Beings. The high-quality landscape proposals will mitigate the perceived impacts. This is dealt with in Chapter 9.

15.2.1.4 Population and Human Health - Material Assets – Utilities

The operational stage increased population will create greater demand on built services, placing greater demand on water requirements and the public sewer. Irish Water have confirmed capacity. This is dealt with in Chapter 12.

15.2.2 Biodiversity

The potential significant impacts on biodiversity arising from these interactions have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation, there are expected to be no residual negative effects to biodiversity which can be considered to be significant.

15.2.2.1 Biodiversity – Land and Soils

Excavation and soil works (site clearance and re-profiling) during the construction phase has the potential to cause impacts on the biodiversity of the site. Mitigation has been incorporated to reduce impacts. This is dealt with in Chapter 4.

15.2.2.2 Biodiversity – Water & Hydrology

Any negative impact on water quality arising from accidental spillages etc. may impact biodiversity. Mitigation has been incorporated to reduce impacts. This is dealt with in Chapter 4. No residual, negative effects are predicted during the operational phase.

15.2.3 Land and Soils

15.2.3.1 Land and Soils – Biodiversity

Excavation and soil works (i.e. through site clearance, re-profiling etc.) during the demolition and construction stage have the potential to cause impact on the biodiversity of the site, for example through disturbance of the available habitats, dust and noise. Mitigation has been incorporated to reduce impacts. This is dealt with in Chapter 5.

15.2.3.2 Land and Soils – Water

There are interactions between land and soils and water, with changes in depth and type of overburden impacting the protection provided to aquifers. The likely impact will be neutral, permanent and slight. This is dealt with in chapters 5 and 6.

There are interactions between land and soils and water, with some surface water conveyed and stored in SuDS features replicating the existing greenfield site drainage as closely as possible. The likely impact will be permanent, slight and neutral.

The potential significant impacts on land and soils arising from these interactions in the construction and operational phases have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant permanent residual negative impacts will occur.

15.2.3.3 Land and Soils – Air Quality

Excavation works and exposure of soil during the construction phase can influence the microclimate in an area. The construction phase may result in the spread of dust onto surrounding land uses and public roads. The air quality assessment indicates that there is no significant impact associated with these matters. The implementation of the dust management and dust control measures will ensure that the proposed development will not give rise to the generation of any significant quantities of dust. This is dealt with in Chapter 7.

The potential significant impacts on land and soils arising from these interactions have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant permanent residual negative impacts will occur.

15.2.3.4 Land and Soils – Material Assets

There are interactions between lands and soils and material assets, with the construction of drainage and utilities impacting the soil and subsoil as these materials will be removed to facilitate construction. The likely impact will be permanent slight, permanent and negative.

There are interactions between lands and soils and material assets, with the delivery of stone fill under buildings and roads and footpaths resulting in additional construction vehicles on roads adjacent to the site. The likely impact will be negative, temporary and slight.

15.2.4 Water, Surface Water / Groundwater

15.2.4.1 Water, Surface Water / Groundwater - Material Assets/Waste Management

There is an interaction between the water environment and waste management as there may be the requirement for removal of contaminated soil off site to a suitable licensed facility to prevent contamination of water. This is dealt with in Chapter 11 Waste Management.

15.2.4.2 Water, Surface Water / Groundwater - Soils/geology/Waste Management

Impacts on the geological environment will also affect the agricultural environment. The removal of soils during the proposed construction project is inevitable.

Waste Management and dust management is also considered in interactions as soil removal will be required for this development. Interactions between soils/geology will be mainly limited to the construction phase due to material excavation. This is dealt with in Chapter 6.

There are interactions between water and land and soils, with changes in depth and type of overburden impacting the protection provided to aquifers. The likely impact will be neutral, permanent and slight.

There are interactions between water and land and soils, with some surface water conveyed and stored in SuDS features such as soakaway's and discharging to the ground where possible, replicating the existing greenfield site drainage as closely as possible. The likely impact will be permanent, slight and neutral.

The potential significant impacts on water and hydrology arising from these interactions have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant permanent residual negative impacts will occur.

15.2.5 Air Quality & Climate

15.2.5.1 Air Quality & Climate - Population and Human Health

An adverse impact on air quality has the potential to impact upon human health, cause dust nuisance and cause disturbance to fauna. However, the risk to air quality as a result of the proposed development would not be considered significant, both at the local community level and on a broader national / global scale.

The interactions between Air & Climate impacts and Population and Human Health have been addressed in Chapter 7. Section 7.6 describes in detail the mitigation measures that shall be implemented to ensure that human health, residential amenity and livestock welfare are not adversely impacted by any aspect of the construction or operational phases of the development. Residual impacts are considered in Section 7.7.

During the construction phase the potential impact of dust would be temporary, given the transient nature of construction works. Dust control will be an integral part of construction management, with mitigation measures implemented where required, including sweeping of roads and hardstand areas, appropriate storage and transport of material and dust suppression measures where required. This is dealt with in Chapter 7.

15.2.5.2 Air Quality & Climate - Traffic

The interactions between Traffic and Air & Climate have been considered in chapter 7 and the traffic data used was obtained from the traffic and transport consultant, for the proposed development which is set out in Chapter 12 of this EIAR.

15.2.5.3 Air Quality & Climate - Biodiversity

There is also the potential for interactions with Biodiversity in terms of flora and fauna. similarly, the mitigation measures have also been designed to minimise the potential impact that the construction and operational phases of the development may have on the receiving environment which includes flora and fauna.

During construction there are potential issues for biodiversity if the trees were to be covered in dust during construction. However, this will be mitigated by the implementation of a proposed dust minimisation plan and then there should be no significant impacts on nearby trees is anticipated.

The concept of control and attenuation at source of potential emission sources that may impact the receiving environment is the principle that has been adapted in the design, construction and operational phases of the development. The potential significant impacts on air quality and climate arising from these interactions have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant residual negative impacts will occur.

However, given the transient nature of construction works, and given that standard dust control measures will be implemented, no significant impact is anticipated. This is dealt within Chapter 7.

15.2.5.4 Air Quality & Climate - Surface Water / Groundwater

The interactions between Air & Climate and surface water and groundwater will be mainly limited to the construction phase and are mitigated by the drainage design and proposed mitigation measures. This is dealt with in chapter 7.

15.2.6 Noise/Vibration

15.2.6.1 Noise/Vibration - Population and Human Health/Biodiversity

The principal interactions between Noise & Vibration impacts and Human Beings have been addressed in this chapter. The mitigation measures described shall be implemented to ensure that human health and residential amenity are not adversely impacted by any aspect of the construction or operational phases of the development.

Increased noise levels during the construction phase will be temporary only and are not expected to have a long-term significant adverse effect upon Population and Human Health in the general area. Furthermore, the application of binding noise limits and hours of operation, along with the implementation of appropriate noise and vibration control measures, will ensure that noise and vibration impact is kept to a minimum. There will be no significant increase in ambient noise levels arising during the operational phase of the proposed development.

Noise generated during the construction and operational phases of the proposed development has the potential to impact upon Population and Human Health and fauna within the vicinity of the site.

During the construction phase, noise may be generated due to increased vehicle movements and the operation of construction plant. It is anticipated that there would be a moderate impact, for limited periods of time, on the nearest local residences and fauna within the vicinity of the development. Control and mitigation measures detailed in Chapter 8 will be implemented to reduce noise and vibration, including measures relating to equipment operation and timing of activities. Given the transient nature of construction works, and provided mitigation measures are implemented, noise from construction would not be considered to pose a significant impact upon human beings or Biodiversity. During the operational phase the noise impact generated by additional traffic movements associated with the development is predicted to be of a long-term not-significant to slight impact on existing ambient noise levels at receptors along the local road network.

The potential significant impacts on noise and vibration arising from these interactions have been considered within Chapter 8 and mitigation measures outlined where required. With mitigation measures in place, no significant residual negative impacts will occur.

15.2.7 Landscape and Visual

The potential significant impacts on landscape and visual arising from these interactions have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant permanent residual negative impacts will occur.

The effects described are typically interactive and arise from the combined action of several environmental factors. There are a number of topic areas where interaction can occur with the Landscape and Visual Effects. These are as follows:

15.2.7.1 Landscape and Visual - Population and Human Health

Changes to the landscape character of the site itself will include the development of new buildings and associated landscape works. The landscape and visual impact associated with Population and Human Health focuses on the effects to dwellings. The proposed development generates visual effects, and the effects and associated amelioration of these effects are discussed in chapter 9.

15.2.8 Material Assets – Traffic and Transportation

The potential significant impacts on traffic and transport arising from these interactions have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant residual negative impacts will occur.

15.2.8.1 Interaction of Traffic and Transportation & Population and Human Health

Construction and operational stage traffic and traffic management measures have the potential to affect journey amenity or economic activity as a result of increased congestion or access restrictions. The upgraded infrastructure provided as part of the scheme can facilitate growth in population and increased infrastructure for sustainable travel modes can contribute towards modal shift in travel patterns and increased physical activity. The scheme provides increased access to local attractions by virtue of reduced congestion. Additionally, employment and economic activity will be generated during the construction stage of the project. Chapter 3 further describes the effect of the proposed scheme on Population and Human Health.

15.2.8.2 Interaction of Traffic and Transportation & Biodiversity

The presence of the proposed development and new traffic flows can have impacts on biodiversity including physical land take of habitat, severance of commuting or feeding routes and direct mortality. Chapter 4 Biodiversity sets out a range of mitigation measures to reduce the impact.

15.2.8.3 Interaction of Traffic and Transportation & Land & Soils

The volumes of surplus soils generated by the scheme and the earthworks import requirement will affect construction stage traffic generation. Remedial measures are proposed for Construction and Operational phases in section 10.7 of this chapter. During Construction, The Construction Management Plan will ensure that construction traffic impacts are minimised through the control of site access / egress routes and site locations and any temporary lane closure requirements. During Operation, a low level of car parking provision will be reflected in less use of land.

Measures to optimise design and minimise material generation are detailed in Chapter 2, Chapter 5 & Chapter 11. Further measures to mitigate against construction stage traffic impacts are detailed in Chapter 2 and section 10.7 of this chapter.

15.2.8.4 Interaction of Traffic and Transportation & Water and Hydrology

Construction and operational stage traffic have the potential to impact on water quality via hydrocarbon spills and leaks and via increased sediment/particle loading on trafficked surfaces. Measures to mitigate against impacts are detailed in Chapter 5 and Chapter 14.

15.2.8.5 Interaction of Traffic and Transportation & Air and Climate

The interaction between air quality and traffic is considered important. The proposed development will result in a change in traffic levels causing a change in ambient air pollution levels in certain areas along the scheme. However, ambient pollutant concentrations will increase in areas that did not experience high volumes of traffic prior to the scheme resulting in a negative impact. Overall, the impact of the interaction between air quality and traffic is considered temporary, low and not significant. Refer to the Chapter 7 for additional information.

15.2.8.6 Interaction of Traffic and Transportation & Noise and Vibration

The noise emission sources from the proposed development during the construction and operational stages is assessed in Chapter 8. The noise impact assessment has been prepared in consultation with the design team and traffic engineers. Noise emissions have the potential to negatively impact on human beings, population and human health. The mitigation measures required to reduce traffic noise levels are specified in Chapter 8.

15.2.8.7 Interaction of Traffic and Transportation & Waste Management

Construction and operational stage traffic have the potential to be impacted by waste generation and resource management on site. Measures to mitigate against impacts are detailed in Chapter 2, Chapter 6 and Chapter 11.

Refer to the relevant chapters for additional information.

15.2.9 Material Assets – Waste Management

The potential significant impacts on Material Assets – Waste Management arising from these interactions have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant residual negative impacts will occur.

15.2.9.1 Material Assets – Waste Management/Traffic and Transportation/Soils and Geology

Waste management interacts with traffic and transportation, soils and geology. The direct and indirect effects of waste-related transport are considered in Chapter 10, Traffic and Transportation and the geotechnical characterisation of the scheme is considered in Chapter 5, Soils and Geology.

15.2.9.2 Material Assets – Waste Management & Water

Should waste be incorrectly handled or stored at the development site during construction works, it has the potential to cause an adverse impact upon water quality in the area through leaching of materials to groundwater or surface water. However, as mentioned above, waste will be segregated and stored in suitably contained waste receptacles at the site compound, considerably reducing the potential risk of pollution to water. It is not considered that there would be any significant risk to water quality as a result of waste management during the operational phase, given that waste will be collected by private, licensed waste contractors and recovered, recycled or disposed of at appropriately licensed waste facilities, which would have environmental controls in place as standard. This is dealt with in Chapter 11.

15.2.9.3 Material Assets – Waste Management & Biodiversity/Land and Soils/Water

Waste has the potential to impact upon biodiversity during the construction phase, by causing pollution to soils and water and by potentially attracting pests / vermin to the site. However wastes will be stored in suitably contained waste receptacles at the site compound, reducing the potential of pollution to soils and water. Furthermore, the majority of wastes generated during the construction phase would be inert materials, which would reduce the potential for issues regarding pests / vermin. It is not considered that there would be any significant impact upon biodiversity due to waste management during the operational phase, given that waste will be collected by licensed waste contractors and recovered, recycled or disposed of at appropriately licensed waste facilities, which would have environmental controls in place as standard. This is dealt with in Chapter 11.

15.2.9.4 Material Assets – Waste Management & Population and Human Health

Should waste be incorrectly handled or stored at the development site, it has the potential to cause an adverse impact upon human beings through nuisance, including visual, odour and pests, and pollution to soils and water.

It should also be noted that given the inert nature of the majority of C&D waste types, it is unlikely that issues regarding odour or pests would arise. During the operational phase, suitably contained wheelie bins / waste receptacles will be provided to the residential area and childcare facility by private waste contractors, thus there would be no significant risk of pollution to soils. Waste will be collected on a regular basis, typically on a two-weekly basis alternating between recyclables and municipal waste. Therefore, waste would not be envisaged to accumulate to high enough volumes to cause nuisance. This is dealt with in Chapter 11.

15.2.9.5 Material Assets – Waste Management & Landscape and Visual

Waste and litter have the potential to adversely affect the appearance of the landscape. However, as waste management measures will be implemented as part of the proposed development, it is considered that there would be no significant adverse impact upon the landscape. This is dealt with in Chapter 11.

15.2.10 Material Assets – Utilities

The potential significant impacts on Material Assets – Utilities arising from these interactions have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant residual negative impacts will occur.

15.2.10.1 Material Assets – Utilities & Land and Soils

There are interactions between utilities and lands and soils, with the construction of drainage and utilities impacting the quantity of soil and subsoil as these materials will be removed to facilitate construction. The likely impact will be permanent slight, permanent and adverse.

15.2.11 Risk Management

There are interactions with Population and Human Health, Land, Soils, Geology and Hydrogeology, Surface Water, Noise, Climate and Air, Material Assets, Traffic and Transport. However, subject to implementation of mitigation measures, good working practices and codes, the interactions between these areas have been sufficiently considered in relation to risk management.

The potential significant impacts on risk management arising from these interactions have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant permanent residual negative impacts will occur.

15.3 CUMULATIVE IMPACTS

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. As outlined in Chapter 2 of this EIAR where relevant the EIAR also takes account of other development within the area. Cumulative, secondary and indirect impacts have been addressed in the content of this EIAR document. The EC EIA Guidance (2017) document states: Annex IV, point 5 (e) of the EIA Directive requires that the cumulation of effects with other existing and/or approved Projects are described in the EIA Report. Each Chapter of the EIAR includes a cumulative impact assessment of the proposed development with other relevant existing and/or approved projects in the area.

For example, to determine traffic impacts in Chapter 10 the traffic generated by the proposed development is combined with the baseline traffic generated by the traffic on the road network in the area. The potential traffic impacts from other developments were also considered in the assessment. The Noise and Air Quality chapters of the EIAR take into account the AADT figures provided by DBFL, which include the relevant cumulative impacts.

With reference to the LVIA, the cumulative impacts have been taken into account in the cumulative assessment.

Each of the relevant specialists has considered the potential for cumulative impact in preparing their assessments. While there is the potential for negative impacts to occur during the construction stage of the scheme, with the implementation of the appropriate mitigation outlined in the EIAR, the residual cumulative impact is not considered to be significant across the environmental topics. In terms of the operational phase, the residual cumulative impact is not considered to be significant across the environmental topics.

16.0 SUMMARY OF EIA MITIGATION AND MONITORING MEASURES

16.1 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. 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. This chapter of the EIAR was prepared by Rory Kunz, BA (MOD), MScERM, MAT&CP, Dip EIA Mgmt., Executive Director with John Spain Associates.

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.

16.2 MITIGATION STRATEGIES

16.2.1 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).

16.2.2 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.

16.2.3 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.

16.2.4 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.

16.2.5 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).

16.2.6 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.

16.2.7 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.

16.3 PROJECT DESCRIPTION & ALTERNATIVES EXAMINED

16.3.1 Construction Management Strategy

It is envisaged that the development of the lands subject of the proposed development will occur over a 48-54 week period. Given the nature of the project and the need for flexibility to respond to market demand, the development phases are indicative. An Outline Construction Management Plan has been prepared by DBFL Consulting Engineers, has been reviewed by the relevant EIAR consultants and is included in the application.

Construction Traffic Management Plan

A Construction Traffic Management Plan (CTMP) will be prepared by the main contractor and agreed with the Planning Authority prior to commencement of development in the event of a grant of permission.

16.4 POPULATION AND HUMAN HEALTH

In order to protect the amenities enjoyed by nearby residents, premises and employees a Construction Environment Management Plan shall be submitted by the contractor and implemented during the construction phase.

With reference to the construction phase of the proposed development, the objectives of the Construction Waste By Products Management Plan prepared by Byrne Environmental Consulting Ltd (and also Chapter 11 of the EIAR) is to ensure that waste generated during the proposed construction and operation phases will be managed and disposed of in a way that ensures the provisions of the Waste Management Acts 1996 - 2013 are complied with.

For the operational phase, no further specific mitigation is required having regard to the mitigation included within the other chapters of this EIAR.

16.5 BIODIVERSITY

Construction and operational controls will be incorporated into the proposed development project to minimise the potential negative impacts on the ecology within the Zone of Influence (ZoI) as follows:

Table 16.1 – Sensitive Receptors/Impacts and mitigation measures.

Sensitive Receptors	**Potential Impacts**	**Designed-in Mitigation**
Downstream impacts.	• Habitat degradation • Dust deposition • Pollution • Silt ingress from site runoff • Downstream impacts • Negative impacts on aquatic and bird fauna • Impacts from concrete works	• Local silt traps established throughout site. • Mitigation measures on site include dust control, stockpiling away from watercourse and drains • Stockpiling of loose materials will be kept to a minimum of 20m from drains. • Stockpiles and runoff areas following clearance will have suitable barriers to prevent runoff of fines into the drainage system. • Fuel, oil and chemical storage will be sited within a bunded area. The bund will be at least 50m away from drains, ditches, excavations and other locations where it may cause pollution.

		• Bunds will be kept clean and spills within the bund area will be cleaned immediately to prevent groundwater contamination. Any water-filled excavations, including the attenuation tank during construction, that require pumping will not directly discharge to the surface water network. Prior to discharge of water from excavations adequate filtration will be provided to ensure no deterioration of water quality. • Concrete works will be mitigated to prevent concrete or cement from entering drains or pathways to watercourses/marine environment. • Mitigation measures on site include dust control, stockpiling away from drains • During the construction works silt traps will be put in place in the vicinity of all runoff channels to prevent sediment entering the surface water network. • Petrochemical interception and bunds in refuelling area • Maintenance of any drainage structures (e.g. de-silting operations) must not result in the release of contaminated water to the surface water network. • No entry of solids to the drainage network during the connection of pipework to the public water system • Dewatering of excavations may be necessary. Appropriate monitoring of groundwater levels during site works will be undertaken. Construction phase filtering of surface water for suspended solids will be carried out in compliance with Water Pollution legislation. • Concrete trucks, cement mixers or drums/bins are only permitted to wash out in designated wash out area greater than 50m from sensitive receptors including drains and stream.
Biodiversity	• Habitat Degradation • Dust deposition • Pollution • Silt ingress • Potential downstream impacts.	**Air & Dust** Mitigation measures will be carried out reduce dust emissions to a level that avoids the possibility of adverse effects. The main activities that may give rise to dust emissions during construction include the following: • Excavation of material; • Materials handling and storage; • Movement of vehicles (particularly HGV's) and mobile plant. • Contaminated surface runoff *Mitigation measures to be in place:* • Maintain a 10m buffer from drains and drainage ditches with a double layer of silt fences • Road sweeping to clean roads proximate to the site • Wheel wash on site. • Consultation will be carried with an ecologist throughout the construction phase; • Trucks leaving the site with excavated material will be covered so as to avoid dust emissions along the haulage routes.

		• Speed limits on site (15kmh) to reduce dust generation and mobilisation. *Site Management* • Regular inspections of the site and boundary should be carried out to monitor dust, records and notes on these inspections should be logged. • Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken. • Make the complaints log available to the local authority when asked. • Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book. *Monitoring* • Undertake daily on-site and off-site inspection. This should include regular dust soiling checks of surfaces within 100 m of site boundary, integrity of the silt control measures, with cleaning and / or repair to be provided if necessary. *Operations* • Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems. • Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate. • Use enclosed chutes and conveyors and covered skips. • Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate. • Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods. *Waste* • Avoid bonfires and burning of waste materials. *Measures Specific to Earthworks* • Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable. • Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable. • Only remove the cover in small areas during work and not all at once. • During dry and windy periods, and when there is a likelihood of dust nuisance, a bowser will operate to ensure moisture content is high enough to increase the stability of the soil and thus suppress dust. *Storage/Use of Materials, Plant & Equipment* • Materials, plant and equipment shall be stored in the proposed site compound location;

		• Plant and equipment will not be parked within 50m of the Dawson's Demesne Stream at the end of the working day; • Hazardous liquid materials or materials with potential to generate run-off shall not be stored within 50m of the drains. • All oils, fuels and other hazardous liquid materials shall be clearly labelled and stored in an upright position in an enclosed bunded area within the proposed development site compound. The capacity of the bunded area shall conform with EPA Guidelines – hold 110% of the contents or 110% of the largest container whichever is greater; • Drip trays will be turned upside down if not in use to prevent the collection of rainwater; • Waters collected in drip trays must be assessed prior to discharge. If classified as contaminated, they shall be disposed by a permitted waste contractor in accordance with current waste management legal and regulatory requirements; • Plant and equipment to be used during works, will be in good working order, fit for purpose, regularly serviced/maintained and have no evidence of leaks or drips; • No plant used shall cause a public nuisance due to fumes, noise, and leakage or by causing an obstruction; • Re-fuelling of machinery, plant or equipment will be carried out in the site compound as per the appointed Construction Contractor re-fuelling controls;
Birds (National Protection)	• Removal nesting habitat. • Removal foraging habitat. • Destruction and/or disturbance to nests (injury/death). • Predation • Disturbance	• Retain hedgerows and trees where possible. No works will be carried out outside the redline. • "Relevant guidelines and legislation (Section 40 of the Wildlife Acts, 1976 to 2012) Should this not be possible, a pre-works check by a qualified ecologist should be undertaken to ensure nesting birds are absent. • Removal of potential nesting habitats outside of bird breeding season (March to August inclusive). Should this not be possible, a pre-works check by a qualified ecologist should be undertaken to ensure nesting birds are absent. If nesting birds are present a derogation licence will be sought from NPWS. If this is not forthcoming works to remove the nesting habitats will not commence within bird nesting season. • An ecologist will be on site during site clearance to minimise impact on foraging/roosting bird species. The ecologist will have the ability to cease works on site that could cause disturbance, in the event of significant disturbance impacts being possible.
Hedgerows and Treelines (Local importance)	• Loss of commuting habitat. •Injury/death during construction and operation	• An ecologist will be on site during site clearance to minimise impact on foraging/roosting bird species. The ecologist will have the ability to cease works on site that could cause disturbance, in the event of significant disturbance impacts being possible.

Bats	• Loss of commuting habitat. • Injury/death during construction and operation	• Erection of an alternative roosting sites are required to be erected prior to the removal of trees. These will be erected prior 6 months to tree felling to allow local bat populations to become aware of it prior to removal of the structure. Rocket Bat Box (x3) – free-standing chamber on free standing pole (See appendices). • The PBR Tree proposed to be removed, should be felled on mild days during the autumn months of September, October or November or Spring months of February and March (felling during the spring or autumn months avoids the periods when the bats are most active). • Luminaire design for any street lighting or lighting on buildings is extremely important to achieve an appropriate lighting regime. Luminaires come in a myriad of different styles, applications and specifications which a lighting professional can help to select. The following should be considered when choosing luminaires. This is taken from the most recent BCT Lighting Guidelines (BCT, 2018). • Inspection of bat boxes within one year of erection of bat box scheme/rocket box and alternative roosts for Natterer's bat and brown long-eared bats. Register bat box scheme, rocker bat boxes and supplementary roosts with Bat Conservation Ireland. This should be undertaken for a minimum of 2 years in relation to bat boxes/rocket bat boxes. • Monitoring of any bat mitigation measures. All mitigation measures should be checked to determine that they were successful. A full summer bat survey is recommended post-works
Terrestrial Fauna	• Injury/death during construction and operation	• Pre construction surveys will be carried out for terrestrial fauna including frogs and badgers. If species of conservation importance relevant licencing will be acquired from NPWS prior to construction commencing in the area.

16.6 LAND AND SOILS

An Outline Construction Management Plan (prepared by DBFL Consulting Engineers) is included with the planning application. A Construction & Environmental Management Plan will be put in place by the Contractor to implement the mitigation measures from the EIAR. The plan will be resubmitted to the planning authority prior to construction to incorporate any conditions and/or modifications imposed by the local authority and the plan will be maintained by the contractor during the construction phase. The Outline Construction Management Plan includes a range of site-specific measures which will include the following mitigation measures in relation to geology, soils, and land:

- Stripping of topsoil will be carried out in a controlled and carefully managed way and coordinated with the proposed staging for the development.
- At any given time, the extent of topsoil strip (and consequent exposure of subsoil) will be limited to the immediate vicinity of active work areas. Topsoil stripping will not take place during inclement weather.
- Topsoil stockpiles will be protected for the duration of the works and not located in areas where sediment laden runoff may enter existing surface water drains. Topsoil stockpiles will also be located so as not to necessitate double handling.

- The design of site levels have been carried out in such a way as to minimize the interaction with rock. Rock will likely be encountered during the installation of drainage due to topography of the subject site and levels of drainage outfalls.
- The duration that rock layers are exposed to the effects of weather will be minimized by back filling excavations as soon as practicable after construction.
- Stockpiles of excavated and crushed rock will be protected for the duration of the works.
- Measures will be implemented to capture and treat sediment laden surface water runoff (e.g. sediment retention ponds, surface water inlet protection and earth bunding adjacent to water bodies).
- Earthwork's plant and vehicles exporting soil and delivering construction materials to site will be confined to predetermined haul routes around the site.
- Vehicle wheel wash facilities will be installed in the vicinity of any site entrances and road sweeping implemented as necessary in order to maintain the road network in the immediate vicinity of the site.
- Dust suppression measures (e.g. dampening down) will be implemented as necessary during dry periods.
- In order to mitigate against spillages contaminating underlying soils and geology, all oils, fuels, paints and other chemicals will be stored in a secure bunded hardstand area.
- Refueling and servicing of construction machinery will take place in a designated hardstand area which is also remote from any surface water inlets (when not possible to carry out such activities off site).
- An Emergency Response Plan detailing the procedures to be undertaken in the event of a spillage of chemical, fuel or hazardous wastes will be prepared prior to construction.
- Pouring of concrete including wash down and washout of concrete from delivery vehicles will be controlled in an appropriate facility to prevent contamination.
- Regular samples will be taken from soils affected by earthworks which shall be analysed for contamination
- All materials exported from site to be in accordance with the Waste Management Acts.
- Imported materials to be suitably separated to avoid contamination or mixing.
- For imported materials, the use of local quarries or locally available material should be prioritised.
- Any potential for use of surplus material within local sites shall be pursued at construction and detailed design stage (subject to compliance with Waste Management Acts). If any material is to be reused on another site as a by-product (and not as waste), this will be done in accordance with Article 27 of the Waste Directive Regulations.

16.6.1 Operational Phase

Once the development is completed, risks to the geology, soil and land will be from loss of soil value and pollution of soils/subsoils due to accidental spills. The following mitigation measures will be implemented:

- A detailed landscape plan will be prepared and constructed for the development to ensure all areas are planted and established.
- Earthworks will be designed and constructed in accordance with good practice and design standards to ensure slope stability.
- All new drainage on site will be pressure tested and have a CCTV survey carried out prior to being made operational to ensure it is adequately constructed.
- Oil interceptors will be installed on all surface water drainage networks.
- Vegetated Sustainable urban drainage systems will be installed to treat run-off.

16.6.2 Monitoring measures – construction

Proposed monitoring during the construction phase in relation to the geology, soil and land are as follows:

- Adherence to the Construction & Environmental Management Plan.
- Construction monitoring of the works (e.g. inspection of existing ground conditions on completion of cut to road sub-formation level in advance of placing capping material, stability of excavations etc.).
- Inspection of fuel / oil storage areas.
- Monitoring cleanliness of adjacent road network, implementation of dust suppression and provision of vehicle wheel wash facilities.
- Monitoring of contractor's stockpile management (e.g. protection of excavated material to be reused as fill)
- Monitoring sediment control measures (sediment retention ponds, surface water inlet protection etc.)

16.6.3 Monitoring measures – operational phase

Proposed monitoring during the operational phase in relation to the geology, soil and land are as follows:

- Regular inspection and maintenance of the drainage system and oil interceptors.

16.7 WATER

16.7.1 Incorporated Design Mitigation

The project layout has evolved in order that the design avoids conflict with the water environment. Design evolution to minimise environmental impact has been prioritised throughout the various design stages to prevent significant adverse impacts on the local water environment/hydrology. These measures will seek to avoid or minimise potential effects in the main through the implementation of best practice construction methods and adherence to all relevant legislation.

All new foul drainage lines will be constructed in accordance with Irish Water Standards. Foul sewers will be pressure tested and will be subject to a CCTV survey in order to identify any possible defects prior to being made operational. The design of proposed site levels (roads, buildings etc.) has been carried out in such a way as to replicate existing surface gradients where possible, therefore replicating existing overland flow paths, and not concentrating additional surface water flow in a particular location.

Surface water runoff from the site will be attenuated to the greenfield runoff rate as part of the greater SDZ as outlined in the SWMP prepared for the overall Clonburris SDZ. Surface water discharge rates will be controlled by a Hydrobrake flow control device in conjunction with attenuation storage.

SuDS features such as swales and filter drains to provide additional storage and promote infiltration of and treatment of surface water run-off have been provided in landscaped areas.

All new surface water drainage on site will be pressure tested and will have a CCTV survey carried out prior to being made operational. The site is attenuated to mimic the greenfield scenario as part of the overall Clonburris SDZ.

Due to the inter-relationship between surface water and soils, hydrogeology and ecology the mitigation measures discussed will are also considered applicable to these sections and this chapter should be read in conjunction with Chapter 4 Biodiversity and Chapter 5 Land and Soils.

16.7.2 Construction Phase Mitigation

The nature of the proposed development dictates that the greatest potential impact on surface waters associated with the development will be in the construction phase. In order to prevent / minimise potential impacts, it is necessary to devise mitigation measures to be adopted as part of the construction works on site.

Erosion and Sediment Control

The following measures are proposed for erosion and sediment control:

- Measures will be implemented to capture and treat sediment laden surface water runoff (e.g. sediment retention ponds, surface water inlet protection, fencing and signage around specific exclusion zones and earth bunding adjacent to open drainage ditches) prior to discharge of surface water at a controlled rate.
- Groundwater pumped from excavations will be directed to on-site settlement ponds.
- Discharge from any vehicle wheel wash areas will be directed to on-site settlement ponds.
- On-site settlement ponds will include geotextile liners and riprapped inlets and outlets to prevent scour and erosion.
- Surface water discharge points during the construction phase will be agreed with South Dublin County Council's Environment Section prior to commencing works on site
- Weather conditions and seasonal weather variations will be taken account of when planning stripping of topsoil and excavations, with an objective of minimizing soil erosion.

Accidental Spills and Leaks

The following measures are proposed for accidental spills and leaks:

- In order to mitigate against spillages contaminating underlying soils and geology, all oils, fuels, paints and other chemicals will be stored in a secure bunded hardstand area.
- Refuelling and servicing of construction machinery will take place in a designated hardstand area which is also remote from any surface water inlets (when not possible to carry out such activities off site).
- An Emergency Response Plan detailing the procedures to be undertaken in the event of a spillage of chemical, fuel or hazardous wastes will be prepared prior to construction.
- Pouring of concrete including wash down and washout of concrete from delivery vehicles will be controlled in an appropriate facility to prevent contamination.
- Regular samples will be taken from soils affected by earthworks which shall be analysed for contamination.

Human Health

An Emergency Response Plan prepared by the contractor will contain measures to ensure that accidental spillages will be appropriately dealt with, which includes a response procedure to deal with any accidental pollution events. Spillage kits will be available and construction staff will be familiar with the emergency procedures and use of the equipment.

16.7.3 Operational Phase

The operational phase of this development is unlikely to have any significant adverse impacts on the local water environment/hydrology due to the environmental design considerations incorporated into the development. These measures will seek to avoid or minimise potential effects in the main through the implementation of best practice construction methods and adherence to all relevant legislation.

16.7.4 Monitoring

16.7.4.1 Construction Phase

Proposed monitoring during the construction phase in relation to the water environment are as follows:

- Adherence to the Construction & Environmental Management Plan.
- Construction monitoring of the works (e.g. inspection of drainage installation etc, inspections of works adjacent to existing watercourses).
- Monitoring in relation to the surface water. Monitoring sediment control measures (sediment retention ponds, surface water inlet protection etc.).
- Monitoring of discharge from sediment retention ponds (e.g. pH, sediment content).

16.7.4.2 Operational Phase

Proposed monitoring during the operational phase in relation to the water environment are as follows:

- Regular inspection and maintenance of the drainage and attenuation systems.

16.8 AIR QUALITY AND CLIMATE

16.8.1 Construction Phase

In order to ensure that adverse air quality impacts are minimised during the construction phase and that the potential for soiling of property and amenity and local public roads is minimised, the following mitigation measures shall be implemented during the course of all construction activities:

AQ CONST 1: Air Quality Mitigation Measures

- Avoid unnecessary vehicle movements and manoeuvring, and limit speeds on site so as to minimise the generation of airborne dust.

- Use of rubble chutes and receptor skips during construction activities.
- During dry periods, dust emissions from heavily trafficked locations (on and off site) will be controlled by spraying surfaces with water and wetting agents.
- 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 only.
- Re-suspension in the air of spillages material from trucks entering or leaving the site will be prevented by limiting the speed of vehicles within the site to 10kmh and by use of a mechanical road sweeper.
- The overloading of tipper trucks exiting the site shall not be permitted.
- Aggregates will be transported to and from the site in covered trucks.
- Where the likelihood of windblown fugitive dust emissions is high and during dry weather conditions, dusty site surfaces will be sprayed by a mobile tanker bowser.
- Wetting agents shall be utilised to provide a more effective surface wetting procedure.
- Exhaust emissions from vehicles operating within the construction site, including trucks, excavators, diesel generators or other plant equipment, will be controlled by the contractor by ensuring that emissions from vehicles are minimised by routine servicing of vehicles and plant, rather than just following breakdowns; the positioning of exhausts at a height to ensure adequate local dispersal of emissions, the avoidance of engines running unnecessarily and the use of low emission fuels.
- All plant not in operation shall be turned off and idling engines shall not be permitted for excessive periods.
- 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.
- Material stockpiles containing fine or dusty elements including top soils shall be covered with tarpaulins.
- Where drilling or pavement cutting, grinding or similar types of stone finishing operations are taking place, measures to control dust emissions will be used to prevent unnecessary dust emissions by the erection of wind breaks or barriers. All concrete cutting equipment shall be fitted with a water dampening system.
- A programme of air quality monitoring shall be implemented at the site boundaries for the duration of construction phase activities to ensure that the air quality standards relating to dust deposition and PM_{10} are not exceeded. Where levels exceed specified air quality limit values, dust generating activities shall immediately cease and alternative working methods shall be implemented.
- A complaints log shall be maintained by the construction site manager and in the event of a complaint relating to dust nuisance, an investigation shall be initiated.
- Dust netting and site hoarding shall be installed along the north, south, east and western site boundaries to minimise fugitive windblown dust emissions falling on third party lands and existing residential areas.

16.8.2 Operational Phase

The Operational Phase of the development site will not generate air emissions that would have an adverse impact on local ambient air quality or local human health and as such there are no mitigation measures specified for the Operational Phase.

The elements of the development designed to minimise the impact of the operational phase of the development on air quality and climate are as follows:

AQ OP1: Climate Impact Mitigation Measures

- Energy Efficiency - All proposals for development shall seek to meet the highest standards of sustainable design and construction with regard to the optimum use of sustainable building design criteria such as passive solar principles and also green building materials.
- All residential units shall be designed and constructed in accordance with The Irish Building Regulations *Technical Guidance Document L – Conservation of Fuel & Energy – Dwellings* amended in 2017 includes requirements for all residential dwellings to be “Nearly Zero Energy Buildings” (NZEB’s) by 31st December 2020.
- In order to reduce energy consumption, the following key design features have been considered in the design process and will be incorporated into the construction of the residential units:
  - Passive solar design including the orientation, location and sizing of windows
  - The use of green building materials: low embodied energy & recycled materials
  - Energy efficient window units and frames with certified thermal and acoustic insulation properties
  - Building envelope air tightness

- Installation of Mechanical Ventilation & Heat Recovery systems in all apartment units which operate by extracting warm air from kitchens and bathrooms, cleaning it and distributing it to other rooms in the unit.
- Thermal insulation of walls and roof voids of all units

AQ OP2: Air Quality Mitigation Measures

- Natural Gas heating in all units
- Inclusion of electric car charging points to encourage electric vehicle ownership
- Proximity of Irish Rail, Bus Eireann and private bus operator's commuter services
- Bicycle parking and cycle routes
- Provision of open landscaped areas, to encourage residents to avail of active lifestyle options

16.8.3 Construction Phase Monitoring

This section describes the dust monitoring methodologies that shall be implemented at the site during the construction phases to ensure that the principal pollutant, dust generated by site activities does not cause nuisance or cause adverse health effects to residential areas and other receptors located in the vicinity of the site boundaries.

7.12.2 Dust Deposition Monitoring Methodology

Dust deposition levels will be monitored at the construction site boundaries (4 locations, North, South, East and West) to assess the impact that site construction site activities may have on the local ambient air quality and to demonstrate that the environmental control measures in place at the site are effective in minimising the impact of construction site activities on the local receiving environment including existing residential developments and lands bordering the site. The following procedure shall be implemented at the site on commencement of site activities:

The dust deposition rate will be measured by positioning Bergerhoff Dust Deposit Gauges at strategic locations near the boundaries of the site for a period of 30 +-2 days. Monitoring shall be conducted on a monthly basis during the construction phase.

The selection of sampling point locations will be completed after consideration of the requirements of *Method VDI 2119* with respect to the location of the samplers relative to obstructions, height above ground and sample collection and analysis procedures. The optimum locations will be determined by a suitably qualified air quality expert to ensure that the dust gauge locations are positioned in order to best determine potential dust deposition in the vicinity of the site boundaries and existing on-site buildings.

After each (30 +-2 days) exposure period, the gauges will be removed from the sampling location, sealed and the dust deposits in each gauge will be determined gravimetrically by an accredited laboratory and expressed as a dust deposition rate in mg/m^2-day in accordance with the relevant standards.

Technical monitoring reports detailing all measurement results, methodologies and assessment of results shall be subsequently prepared and maintained by the Site Manager. Monitoring reports shall be made available to the Local Authority as requested.

A dust deposition limit value of 350 mg/m^2-day (measured as per German Standard Method VDI 2119 – Measurement of Particulate Precipitations – Determination of Dust Precipitation with Collecting Pots Made of Glass (Bergerhoff Method) or Plastic) is commonly specified by Local Authorities and by the EPA to ensure that no nuisance effects will result from specified activities and it is to this Best Practice standard method that this programme of dust monitoring and control has been prepared.

The *German Federal Government Technical Instructions on Air Quality Control - TA Luft* specifies an emission value for the protection against significant nuisances or significant disadvantages due to dustfall. This limit value is 350 mg/m^2-day and it is to this limit value that all measured dust deposition levels shall be assessed. This limit value is commonly specified by Local Authorities at construction sites.

16.8.4 Operational Phase Monitoring

Monitoring will not be required during the operational phase of the development.

16.9 NOISE AND VIBRATION

16.9.1 Construction Phase Noise & Vibration mitigation

The following noise management measures shall be implemented at the site from the outset of site activities to control and manage noise levels during the construction phase of the proposed development:
Noise complaints shall be investigated by site management.

N&V CONST 1 Construction Works Noise Control & Mitigation
Noise-related mitigation methods are described below and will be implemented for the project in accordance with best practice. These methods include:

- no plant used on-site will be permitted to cause an ongoing public nuisance due to noise;
- the best means practicable, including proper maintenance of plant, will be employed to minimise the noise produced by on-site operations;
- all vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the contract;
- compressors will be attenuated models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers;
- machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use;
- during construction, the appointed Contractor will manage the works to comply with noise limits outlined in *BS 5228-1:2009+A1 2014. Part 1 – Noise;*
- all items of plant will be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures;
- limiting the hours during which Site activities which are likely to create high levels of noise or vibration are permitted; and
- monitoring levels of noise and vibration during critical periods and at sensitive locations.

Furthermore, it is envisaged that a variety of practicable noise control measures will be employed. These may include:

- selection of plant with low inherent potential for generation of noise and/or vibration;
- erection of good quality site hoarding to the site perimeters which will act as a noise barrier to general construction activity at ground level;
- erection of barriers as necessary around items such as generators or high duty compressors; and situate any noisy plant as far away from sensitive properties as permitted by site constraints.
-

N&V CONST 2 Vibration Mitigation Measures
The following specific vibration mitigation and control measures shall be implemented during the construction phase:

- Choosing alternative, lower-impact equipment or methods wherever possible
- Sequencing operations so that vibration causing activities do not occur simultaneously
- Isolating the equipment causing the vibration on resilient mounts
- Keeping equipment well maintained.

16.9.2 Operational Phase Noise & Vibration Mitigation

N&V OPERA 1: External noise can enter rooms within dwellings through windows, ventilators, walls, roof and doors. In most cases, however, windows provide the main path and therefore, mitigation by design has focused on this building element to ensure that their insulation is adequate. Specific units along the northern and eastern aspects of the site shall have acoustically rated windows to prevent breakthrough of external transportation noise. In addition, Heat Recovery and Mechanical Ventilation systems will be incorporated into the design thus there will be no requirement for passive air vents.

Residential Units located fronting onto the Northern (Dublin-Cork Rail Line) and Eastern (Fonthill Road) site boundaries will require appropriately performing acoustically rated glazing with to achieve the required *BS8233* internal noise criteria. The minimum Weighted Sound Reduction Index for glazing units shall be no less than 39Rw.

Ventilation Systems

The ventilation strategy for the development will be in accordance with Part F of the Building Regulations. The apartment units shall include mechanical heat recovery ventilation systems which will negate the requirement for passive wall vents in bedrooms and living spaces which would otherwise allow the transfer of external noise into the building through the air gaps in the passive vents. However, windows may remain openable for rapid or purge ventilation, or at the occupant's choice.

The operational phase of the development is predicted not to have an adverse outward noise impact on the receiving environment or on existing residential developments adjacent to the site during the operational phase of the scheme. Therefore, no mitigation measures additional to those set out above are proposed.

16.9.3 Internal Noise Control – Residential Units

At the earliest stage during the construction phase, test apartments and houses shall be constructed to their finished level and shall be tested by a suitably qualified independent Acoustic Engineer to ensure that they comply with *Department of the Environment, Building Regulations 2014, Technical Guidance Document E – Sound.* Table 8.13 provides detail on the recommended sound insulation values that shall be achieved to ensure acoustic privacy between adjoin residential units.

Table 16.2 – Recommended sound insulation values for internal party walls / floors

Dwellings	Airborne Sound Insulation D_{nTw} (dB)	Impact Sound Insulation L_{nTw} (dB)
Floors and Stairs	53	58
Walls	53	N/A

16.9.4 Construction Phase Noise Monitoring

This section describes the noise and vibration monitoring methodologies that shall be implemented at the site to ensure that construction site activities do not cause excessive nuisance at local receptors and to demonstrate how live monitoring systems will assist construction management to comply with noise and vibration limit criteria.

A programme of continuous noise monitoring at the closest receptors to the site shall be undertaken to assess and manage the impact that site activities may have on ambient noise levels at local noise sensitive receptors.

These surveys will establish the noise impact of site activities at the closest noise sensitive receptors to assess compliance with the specified construction noise limit criteria and to ensure that mitigation and control measures are being implemented as required.

All noise monitoring data will be compiled into a monthly technical monitoring report which will include a full assessment of the potential noise impacts arising from site construction activities.

The environmental noise measurements will be completed in accordance with the requirements of *ISO 1996-1: 2017: Acoustics – Description, measurement and assessment of environmental noise and with regard to the EPA's 2016 Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4).* The measurement parameters to be recorded include L_{Aeq}, L_{A90}, L_{A10} and L_{Amax} , and 1/3 Octave Frequency analysis to allow tonal noise to be identified.

All live noise monitoring systems shall be programmed to include audio recording to allow construction management identify the source of high noise. The systems shall be capable of transmitting live text and email alerts to nominated construction staff should a noise limit be approached or exceeded.

Noise monitoring shall be conducted in proximity to the closest residential receptors to the site.

16.9.5 Construction Phase Vibration Monitoring

In order to ensure that site construction activities are conducted to minimise the vibration impacts on the receiving environment, it is proposed that structural vibration monitoring shall be implemented during the course construction works. It is proposed that vibration monitoring will be conducted at the closest adjacent residential properties using live data logging vibration monitors and geophones with live text and email alert functionality to ensure that if vibration levels approach or exceed the specified warning and limit values, nominated construction staff shall be instantly

alerted to cease at the earliest instance and appropriate mitigation measures may then be implemented to minimise the ongoing impact on the monitored structures.

The monitoring points chosen for locating the geophone of the vibration measuring instrument will be determined according to the guidelines in British Standard BS 7385:, Evaluation and measurement for vibration in buildings, Part1 1990 Guide for measurement of vibrations and evaluation of their effects on buildings and Part 2 1993 Guide to damage levels arising from groundborne vibration.

16.9.6 Summary of Mitigation & Monitoring

Table 16.2 below summarises the proposed construction phase mitigation and monitoring measures.

Table 16.3 – Summary of Mitigation and Monitoring

Likely Significant Effect	Mitigation	Monitoring
Site preparation, piling works, general construction works	Best Practice Noise Mitigation in accordance with BS5228 Part 1	Continuous live noise surveys for duration of construction phase
Site preparation, piling works, general construction works	Best Practice Noise Mitigation in accordance with BS5228 Part 2	Continuous live vibration surveys for duration of construction phase

16.9.7 Operational Phase Monitoring

No monitoring required during the operational phase of the development.

16.10 LANDSCAPE AND VISUAL

16.10.1 Construction Phase

During the construction phase, site hoarding will be erected to restrict views of the site during construction. Hours of construction activity will also be restricted in accordance with local authority guidance. Tree protection measures will be installed to the existing trees and hedges identified on site.

16.10.2 Operational Phase

The primary proposed ameliorative, remedial, or reductive measures can be seen on Murray and Associates Drawing No. 1738_PL_P_01 (and subsequent landscape plans) and are as follows:

- The retention of the trees and vegetation where possible, particularly within the 30m pNHA boundary buffer zone
- Planting of native trees, shrubs and meadow to the pNHA buffer zone enhancing and strengthening the ecological connectivity and the existing green infrastructure corridor, and reducing the visual mass of the development, softening and screening it over time.
- Native trees, shrubs and wildflowers will be used where possible, particularly in the buffer spaces surrounding the development site.
- Street Tree planting and SuDS measures within the development contribute towards biodiversity

Mitigation measures are shown on the submitted landscape drawings. At time of planting, the proposed standard trees in the landscaped buffer zones will be at least 3.0m in height. The trees will reach a mature height of at least 7 to 15 metres, dependant on species within the medium term.

16.10.3 Monitoring

16.10.3.1 Construction Phase

Landscape tender drawings and specifications will be produced to ensure that the landscape work is implemented in accordance with best practice. This document will include tree work procedures, soil handling, planting and maintenance. The contract works will be supervised by a suitably qualified landscape architect.

The planting works will be undertaken in the planting season after completion of the main civil engineering and building work.

16.10.3.2 Operational Phase

This will consist of weed control, replacement planting, pruning etc. All landscape works will be in an establishment phase for the initial three years from planting. A landscape management plan accompanies the planning application. Prior to completion of the landscape works, a competent landscape contractor should be engaged and a detailed maintenance plan, scope of operation and methodology be in place.

16.10.3.3 Summary of Mitigation & Monitoring

The Table below summarises the Construction Phase mitigation and monitoring measures.

Table 16.4 – Construction: Mitigation & Monitoring Measures

Likely Significant Effect	Mitigation	Monitoring
Visual: - Construction Traffic/Cranes	Site Hoarding	Regular site visits as per the Inspection Plan
Landscape: Site Clearance, Change from agricultural landscape to light industrial	Mitigation measures for landscape only applicable in operational phase	Inspection of tree and hedge protection measures to southern boundary

The Table below summarises the Operational Phase mitigation and monitoring measures.

Table 16.5 – Operation: Mitigation & Monitoring Measures

Likely Significant Effect	Mitigation	Monitoring
Visual: Negative effect on adjacent visual receptors	Proposed tree planting will mature over time, contributing to the visual softening of the development.	Initial Defects period applicable as per regular planning grant. Landscape Management plan detailing maintenance of trees etc included as part of planning application.
Landscape: Change in landscape character	Retention of existing boundary hedgerows. Proposed planting within development of new native standard trees, native woodland, native wildflower meadow.	Regular maintenance regime by experienced landscape contractor

16.11 MATERIAL ASSETS – TRAFFIC

16.11.1 Overview

A package of integrated mitigation measures has been identified to off-set the additional local demand that the proposed mixed-use development could potentially generate as a result of the forecast increase in vehicle movements by residents, commuters and visitors of the development. The strategy includes specific measures for both the construction and operational stages of the proposed development.

16.11.2 Construction phase

The Construction Management Plan (which is a standalone report and included in the planning documentation) and the associated Construction Traffic Management Plan (CTMP) in addition to the application's accompanying Construction and Waste Management Plan will incorporate a range of integrated control measures and associated management initiatives with the objective of mitigating the impact of the proposed development's on-site construction activities.

The CTMP will be prepared prior to the commencement of construction work on site. This plan will be prepared in consultation with SDCC and submitted for approval in order to agree on traffic management and monitoring measures (in advance of works commencing) some of which are outlined below:

- All works on site will be undertaken during hours of the day in accordance with SDCC requirements.
- During the pre-construction phase, the site will be securely fenced off from adjacent properties, public footpaths and roads.
- The surrounding road network will be signed to define the access and egress routes for the development including dedicated 'haul' routes to/from the development site.

- The traffic generated by the construction phase of the development will be strictly controlled in order to minimise the impact of this traffic on the surrounding road network and local properties. All HGV trips could potentially be restricted from traveling to / from the development during the local road network's peak hours.
- All road works will be adequately signposted and enclosed to ensure the safety of all road users and construction personnel.
- All employees and visitors' vehicle parking demands will be accommodated by a permeable hardstand carparking area within the construction compound. The exact location of the construction compound is to be confirmed in advance of commencement of the works. On-street parking of construction vehicles and construction personnel vehicles will be discouraged.
- A programme of street cleaning across the local street and identified 'haul' routes' will be implemented.
- A construction Mobility Management Plan will be developed by the appointed contractor to encourage all construction personnel to utilise the vast range of sustainable travel options available when travelling to/from the subject proposed development site.

Construction of the proposed scheme will cause temporary short-term traffic impacts on the local road network. Enforcement of a Construction Management Plan will ensure that construction traffic impacts are minimized through the control of site access / egress routes and site access locations and any necessary temporary lane closure requirements.

16.11.3 Operational phase

A management regime will be implemented by the development's management company to control access to the on-site car parking spaces thereby actively managing the availability of on-site car parking for residents of the development.

Infrastructure measures identified to reduce reliance of private vehicles include the provision of ample secure cycle parking on site and ensuring a design which promotes permeability for pedestrians and cyclists to, through and from the development. The high level of high-frequency public transport facilities (Dublin Bus, Irish Rail) will also act as a powerful mobility management measure, as residents can rely on public transport over the private vehicle.

With the objective of mitigating the potential impact of the proposed development as predicted in section 10.6 above during its operational stage, and with the objective of promoting sustainable travel for all residents, workers, and visitors to the development; the following initiatives have been identified and subsequently form an integral part of the subject development proposals.

- Strategic Employment Centres – The location of the subject development adjoining the R113 Fonthill Road North corridor provides the unique ability for many of Dublin's strategic employment zones to achieve many of their sustainability obligations particularity in regard to staff accessibility, health and sustainable modes of travel. Beyond the obvious ease of access to Dublin City Centre and Dublin Docklands provided by both LUAS and bus services, the proximity of the proposed development to a number of strategic employment areas has the potential to address existing staff access and recruitment issues at the following locations. Accordingly, a specific focus of the development's mobility strategy will be encouraging the uptake of sustainable travel options for the development's residents' 'commuter' trips to / from the local employment centres:
    - Clondalkin Industrial Estate / Fonthill Retail Park – both located within convenient walking and cycling distance of the subject site; and
    - Park West / Liffey Valley / Western Industrial Estate / JFK Industrial Estate / Cherry Orchard Industrial Estate / Grange Castle Business Park / Cookstown Industrial Estate / Tallaght / Ballymount Industrial Estate / Greenogue Business Park– All located within cycling distance and with direct public transport connections to / from the subject site.
- Management – A Mobility Management (MMP) is to be rolled out with the aim of guiding the delivery and management of a range of coordinated initiatives by the scheme promotor. The MMP ultimately seeks to encourage sustainable travel practices for all journeys to and from the proposed development site. It is proposed that two land use specific MMP's are developed under the framework of a 'parent' MMP for the entire site. These two associated MMPs will be developed in partnership with SDCC to specifically consider the opportunities of shaping all journeys and promoting sustainable transport habits at both the proposed (i) residential units, and (ii) the office element of the proposed mixed-use scheme.
- Management – A Car Park Management Strategy. The availability of parking spaces is a key determinant of mode choice and car usage. With the objective of minimizing travel by car and encouraging the use of sustainable modes instead, it is proposed to limit the car parking provision and promote a 'car lite' scheme. This is considered an appropriate approach considering the site's excellent accessibility characteristics (e.g.

walking, cycling, bus, coach, LUAS and rail opportunities) to places of work, education and essential services. This 'car lite' approach will help to reduce car dependency in Dublin, reduce traffic congestion and pollution levels, improve the quality of the environment and help tackle climate change in addition to encouraging sustainable travel.

- Facilities - In addition to facilitating and encouraging bicycle use, increasing the number of cycle parking provision on-site is considered best practice in situations such as when reducing car parking spaces. A total of 672 no. cycle spaces are proposed within the development site as long term and short term facilities. With 396 no. apartment / duplex units being proposed, this equates to approximately 1.49 cycle spaces per residential unit with 592 no. cycle spaces for residents of the development. Although this ample level of cycle parking is being proposed within the development, it is noted that there is an opportunity to provide additional cycle parking specifically for the use of the relatively new 'BLEEPER bike' scheme, which is a stationless bike sharing scheme. This scheme uses a phone application and bikes can be picked up and left anywhere that traditional bike parking is permitted, thereby not requiring custom built docking bays.
- Infrastructure (by others) - Planning infrastructure investment that will further enhance the sites sustainable accessibility credentials include:
    - The latest BusConnects network redesign include a number of routes that will benefit the subject site and provide access to locations including, Dublin City Centre, Clongriffin, Liffey Valley Shopping Centre, Clondalkin, Blanchardstown Shopping Centre and Tallaght. The routes in close proximity to the subject site include orbital routes W2 and W4 as well as branch routes C1, D1, D3 and G2.
    - The Clonburris SDZ Transport Assessment and Transport Strategy – September 2017 proposes a number of bus services that will serve the Clonburris SDZ including, two orbital bus services operating from Tallaght to Blanchardstown and two local bus routes, Lucan – Park West and Grange Castle – Liffey Valley.
    - The Clonburris SDZ Transport Assessment and Transport Strategy – September 2017 proposes the existing Grand Canal and Griffeen Valley Greenways will be complemented by a series of interconnecting and dedicated cycle routes linking the residential areas to key attractions, both internal and external to Clonburris.
    - The proposed GDA cycling network plan will also encourage a greater uptake in walking and cycling amongst residents, staff and visitors.
    - The DART Expansion Programme will see the DART system expanded, providing fast, high-frequency electrified services to Drogheda on the Northern Line, Hazelhatch on the Kildare Line, Maynooth and M3 Parkway on the Maynooth Line and to Greystones on the South-Eastern Line. The subject site is ideally located to access these DART services via the existing Clondalkin-Fonthill Station and the new Kishoge Station.
    - The SDZ lands can be potentially served by the Lucan Luas that is currently planned under the NTA's Transport Strategy for the Greater Dublin Area 2016 – 2035. Under this strategy, the future Lucan Line would serve Lucan, Liffey Valley and Ballyowen, however, the Luas Line could extend towards the Clonburris SDZ lands and would in turn expand the Luas transport users including the residents and employees in Clonburris.

Mode specific measures could be promoted to encourage the best choice of travel other than private car. These mode specific measures include:

- Car Sharing – Car sharing is also known as lift-sharing, car-pooling or ridesharing. Car sharing offers people a cost effective and a more sustainable way of travelling by car when other forms of transport are not viable. Car sharing schemes encourage individuals to share private vehicles for particular journeys. Car sharing can be both formal and informal. Informal car sharing operates between individuals and neighbours and formal car sharing is defined by a more elaborate approach to trip matching, often focussed on the commuting journey. Car sharing has the aim of reducing the number of car trips made and participants have the opportunity to meet other members in the community. A National Car Sharing database is now available at www.carsharing.ie. It is an all-island service for the public and is free of charge to use. Car sharing has a number of benefits including reduces transport costs, reduces the number of cars on the road which results in less pollution, less congestion and fewer parking issues and reduces the need for a private car. The proposed development website would have a section dedicated to the car share scheme and the staff / residents would have an option to register. To encourage take up of the car sharing, the MMP Coordinator would host events to introduce prospective car sharers to each other and would help 'break the ice' as it is always more likely that people will share, particularly for the journey 'home', with somebody that they have met rather than a complete stranger.
- Car Clubs – Car Clubs are membership-based schemes providing shared cars for hire. A Car Club can play an important role in reducing costs, congestion and environmental impact. Members have flexible access to the hire of a vehicle. Vehicles are parked in reserved parking spaces close to homes, town centres or workplaces

and can be used and paid for on an hourly rate, daily or weekly basis. Individuals can join a car club; alternatively, an organisation may have a corporate package with one of the car club providers. Car sharing clubs in Dublin have experienced significant growth in recent years. The facility allows members' access to a shared car in the local area for an hourly fee. This facility could be an attractive option for those who choose to start walking or cycling to work but may require access to a car at short notice. Residents can obtain further information at www.gocar.ie and also www.yuko.ie.

- Walking – The development has been designed to ensure that there are a number of access points / gateways to facilitate permeable walking through the site. The feasibility of measures that promote walking will be influenced by factors such as the safety and ease of walking to and from the site and the age profile of commuters. Generally speaking, a distance of up to 3km is considered reasonable for walking. This distance is only indicative but can help to define target groups. The health benefits of walking are a key element in promoting Mobility Management Plans. Walking improves cardiovascular fitness and burns calories. Walking will also increase your muscle tone, boost metabolism, ease stress, raise energy levels and improve sleep, which combined can also help with weight loss. Regular walking can also reduce the risk of coronary heart disease, diabetes, strokes, high blood pressure, cancer, osteoporosis and arthritis. Walking will mainly be self-promoting, and initiatives should focus on making people aware of the routes available to them. A map showing the walking routes should be prepared and placed at key locations within the development. These could be stand-alone signs or maps on notice boards. This information would also be available on the community website. It is important to ensure that pedestrians are safe and are satisfied with the facilities available and their maintenance. It should be noted that: -
    - Walking is truly the most-sustainable form of transportation.
    - All trips, regardless of mode, both begin and end on foot.
    - Walking needs to have a greater level of priority in most cities, like walk-signal times, safer well-lit / marked crosswalks and pedestrian zones.
    - Walking is an easy mode of travel for distances under 2km. Most people are prepared to walk between 800m to 1km to a train station or bus stop.
- Cycling – The proposed development is well located for cycling journeys and this mode of travel should be encouraged with the provision of a wide range of routes within the development and new links to existing and future major routes in the local area. A distance of up to 10km is considered reasonable for cycling. This distance is only indicative but can help to define target groups. A total of 672 cycle spaces are proposed within the development to accommodate residents and visitors to the site. The on-site cycle facilities will be linked to the existing off-site cycle routes. Also, improved cycle infrastructure is proposed under the Greater Dublin Area Cycle Network Plan routes which runs in close proximity to this site. As with many measures relating to cycling, the aim is a mixture of support, through incentives and facilities, and encouragement, through information and marketing. Incentives and facilities at both trip origin and destination / place of work, education, worship etc. can include some of the following. The MMP will highlight that many of these are available at trip end destinations:
    - the provision of "pool" bicycles for short distance travel and Bleeper bikes for example serving the site
    - the provision of well-located high-quality cycle parking facilities
    - storage, changing and shower facilities for cyclists
- Public Transport (Bus) – The proposed development will be well served by Dublin Bus services, with bus routes available along New Nangor Road, Grange Castle Road, Adamstown Avenue, Ninth Lock Road and Fonthill Road as well as BusConnects proposals for new routes which are proposed to pass close to the subject site along Grange Castle Road, Ninth Lock Road, St. Cuthbert's Road and New Nangor Road. At Present, the bus stops are located in close proximity with the closest bus stops are located along New Nangor Road, Grange Castle Road, Adamstown Avenue, Ninth Lock Road and Fonthill Road which offers the subject site a variety of frequent services operating daily. The subject site is located close to the proposed Bus Connects C1, D1, D3, G2, W2 and W4 routes which will provide enhanced levels of accessibility and mobility.
- Public Transport (Rail) – The proposed development is situated on the Kildare railway line and has two railway stations in close proximity, the Clondalkin-Fonthill Station and the completed but not yet operational Kishoge Railway Station. Clondalkin-Fonthill Station is served by commuter services to Heuston Station and following the recent upgrading of the Phoenix Park Tunnel, services calling at Clondalkin-Fonthill Station now offer connections to Drumcondra, Connolly, Tara Street, Pearse and Grand Canal Dock. The DART Expansion Programme will see the DART system expanded, providing f electrified services to locations such as Drogheda, Hazelhatch, Maynooth and Greystones. The proposed development can be potentially served by the Lucan Luas, which could extend towards the Clonburris SDZ lands and would in turn expand the Luas transport users including the residents and employees in Clonburris.

16.12 MATERIAL ASSETS – WASTE MANAGEMENT

16.12.1 Construction Phase Waste Management Plan

The Construction Waste Management Plan prepared by Byrne Environmental (included with the application) specifically addresses the following aspects:

Waste materials generated by construction activities will be managed according to the Department of the Environment, Heritage and Local Government's 2006 Publication - *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects.*

- Analysis of waste arisings / material surpluses;
- Specific Waste Management objectives for the Project including the potential to re-use existing on-site materials for further use in the construction phase;
- Methods proposed for Prevention, Reuse and Recycling;
- Waste Handling Procedures;
- Waste Storage Procedures;
- Waste Disposal Procedures;
- Record Keeping.

Waste minimisation and prevention shall be the primary responsibilities of the Construction Project Manager who shall ensure the following:

- Materials will be ordered on an *"as needed"* basis to prevent over supply;
- Materials shall be correctly stored and handled to minimise the generation of damaged materials;
- Materials shall be ordered in appropriate sequence to minimise materials stored on site;
- Sub-contractors will be responsible for similarly managing their wastes.

16.12.2 Programme of Waste Management for Construction Works

It is proposed that the construction Contractor as part of regular site inspection audits will determine the effectiveness of the waste management statement and will assist the project manager in determining the best methods for waste minimisation, reduction, re-use, recycling and disposal as the construction phase progresses and waste materials are generated.

16.12.3 Construction Waste Disposal Management

It is proposed that from the outset of construction activities, a dedicated and secure compound containing bins, and/or skips, and storage areas, into which all waste materials generated by construction site activities, will be established within the active construction phase of the development site.

In order to ensure that the construction contractor correctly segregate waste materials, it is the responsibility of the site construction manager to ensure all staff are informed by means of clear signage and verbal instruction and made responsible for ensuring site housekeeping and the proper segregation of construction waste materials.

It will be the responsibility of the Project Construction Manager to ensure that a written record of all quantities and natures of wastes exported -off site are maintained on-site in a Waste File at the Project office.

It is the responsibility of the Project Manager or his/her delegate that all contracted waste haulage drivers hold an appropriate Waste Collection Permit for the transport of waste loads and that all waste materials are delivered to an appropriately licensed or permitted waste facility in compliance with the following relevant Regulations:

- *Waste Management (Collection Permit) Regulations 2007 (SI No. 820 of 2007);*
- *Waste Management (Collection Permit) Amendment Regulations 2008 (SI No. 87 of 2008;)*
- *Waste Management (Facility Permit and Registration) Regulations S.I.821 of 2007 and the Waste Facility Permit under the Waste Management (Facility Permit and Registration) Amendment Regulations S.I.86 of 2008.*

Prior to the commencement of the Project, the Construction / Project Manager shall identify a permitted Waste Contractor who shall be employed to collect and dispose of all wastes arising from the project works. In addition, the Construction / Project Manager shall identify and all waste licensed / permitted facilities that will accept all expected waste exported off-site and will maintain copies of all relevant Waste Permits / Licences as required.

All waste soils prior to being exported off-site, shall be classified as inert, non-hazardous or hazardous in accordance with the *EPA's Waste Classification Guidance – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* document dated 1st June 2015 to ensure that the waste material is transferred by an appropriately permitted waste collection permit holder and brought to an appropriately permitted or licensed waste facility.

16.12.4 On-Site Waste Reuse and Recycling Management

Construction waste material such as soils, damaged or broken concrete slabs, blocks, bricks and tiles generated that is deemed by the Project Engineer to be suitable for reuse on the Project site for ground-fill material and landscaping. This initiative shall provide a positive environmental impact to the construction phase as follows:

- Reduction in the requirement for virgin aggregate materials from quarries;
- Reduction in energy required to extract, process and transport virgin aggregates;
- Reduced HGV movements associated with the delivery of imported aggregates to the site;
- Reduced noise levels associated with reduced HGV movements;
- Reduction in the amount of landfill space required to accept C&D waste;
- Reduction in the volume of soils to be exported off-site.

16.12.5 Waste Storage Compound

A waste storage compound shall be set up on-site from the commencement of site activities. The compound shall include the following:

- Separate waste skips labelled with signage stating the nature of waste materials that can only be placed in the skips;
- Waste oils / containers shall be placed in dedicated mobile bunds units;
- Soils contaminated by accidental on-site spillages of oils / construction hydrocarbons shall be stored in clearly identified hazardous waste storage containers;
- Spill kits with instructions shall be located in the waste storage compound.

16.12.6 Soil Classification

Soils to be exported off-site the site shall be sampled and analysed to classify the soils with regard to *The Landfill Directive (2003/33/EC).*

16.12.7 Contaminated Soils

Where contaminated soils/materials are discovered or occur as a result of accidental spillages of oils or fuels during the construction phase, these areas of ground will be isolated and tested in accordance with the *2002 Landfill Directive (2003/33/EC)* for contamination, and pending the results of laboratory WAC testing, will be excavated

16.12.8 Invasive Species listed on the Third Schedule of S.I. 477/2011 (as amended)

An ecological assessment of the site prepared by Altemar has concluded that there are no invasive plant species on the subject site.

16.12.9 Top-Soil Reuse

Approximately 29,500m^3 of top soils shall be stripped and maintained on-site to facilitate the construction phase. This soil shall be re-used for landscaping purposes. Approximately 1,500m^3 of excess top soils shall be exported off-site to an appropriately permitted/licensed facility.

16.12.10 Record Keeping

It is the responsibility of the Project Manager or his/her delegate that a written record of all quantities and natures of all wastes reused / recycled and exported off-site during the construction phase are maintained in a Waste File at the site project office.

The following information shall be recorded for each load of waste exported off-site:

- Waste Type EWC Code and description;
- Volume of waste collected;
- Waste collection contractor's Waste Collection Permit Number and collection receipt including vehicle registration number;
- Destination of waste load including Waste Permit / Licence number of facility;
- Description of how waste at facility shall be treated: disposal / recovery / export;
- The waste records shall be issued to South Dublin County Council as required / requested.

16.12.11 Waste Management Auditing

In order to ensure that construction wastes generated during the course of the development are being effectively managed and recorded, a waste management audit shall be conducted on a routine basis by an independent waste management consultant to determine compliance with the Construction Waste Management Plan.

16.12.12 Operational Phase Waste Management Plan

An Operational Waste Management Plan (OWMP) has been prepared as a stand-alone report to accompany the application. The OWMP has been prepared to demonstrate how the required infrastructure will be incorporated into the design and operational management of the development to ensure that domestic wastes will be managed and monitored with the objective of maximizing the quantity of waste segregated at source and maximizing the volume of clean recyclable materials generated by the residents of the development.

The Goal of the OWMP is to achieve a compliance with *The Eastern-Midlands Region Waste Management Plan* 2015-2021 which defines the following Waste Targets:

- *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.*
- *Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill.*

The Operational Waste Management Plan has been prepared with regard to the strategy, policy and objectives and design standards of the South Dublin County Council Development Plan 2016 – 2022.

Chapter 7.5.0 – Waste Management of the South Dublin County Council Development Plan 2016 – 2022 includes the following Objectives and Actions relating to Domestic Waste Management:

- IE5 OBJ1 To support the implementation of the Eastern-Midlands Region Waste Management Plan 2015-2021 by adhering to overarching performance targets, policies, and policy actions.

- IE5 OBG 8 To secure appropriate provision for the sustainable management of waste within developments including the provision of facilities for the storage, separation and collection of such waste.

Actions

Support and facilitate the separation of waste at source into organic and non-inorganic streams or other waste management systems that divert waste from landfill and maximise the potential for each waste type to be re-used, recycled or composted and divert organic waste from landfill.

The Operational Phase of the Waste Management Plan is defined by the following stages of waste management for both the residential and commercial aspects of the development:

- Stage 1 Occupier Source Segregation;
- Stage 2 Occupier Deposit and Storage;
- Stage 3 Bulk Storage and On-Site Management;

- Stage 4 On-site treatment and Off-Site Removal;
- Stage 5 End Destination of wastes.

The OWMP has been prepared with regard to *British Standard BS 5906:2005 Waste Management in Buildings-Code of Practice* which provides guidance on methods of storage, collection, segregation for recycling and recovery for residential building.

The apartments which will include a 3 - bin waste segregation at source system together with the communal waste storage areas have been designed with regard to *Section's 4.8 and 4.9 Refuse Storage of The Department of Housing, Planning and Local Government – Sustainable Urban Housing: Design Standards for New Apartments – Guidelines for Planning Authorities. 2020.*

The proposed residential development shall be designed and managed to provide residents with the required waste management infrastructure to minimise the generation of un-segregated domestic waste and maximise the potential for segregating and recycling domestic waste fractions.

The **Objective** of the OWMP is to maximise the quantity of waste recycled by residents by providing sufficient waste recycling infrastructure, waste reduction initiatives and waste collection and waste management information services to the residents of the development.

The **Goal** of the OWMP is to achieve a residential recycling rate of 50% of managed municipal waste by 2020 (and future targets in subsequent Regional Waste Management Plans).

All residential units will have a 3-bin system (non-recyclable, organic and recyclable) in each kitchen to encourage residents to segregate waste at source.

Apartment residents will be provided with waste recycling and waste disposal information by the development's Facility Management Company who will be responsible for providing clean, safe and mobility impaired accessible communal waste storage areas for the apartment blocks.

The Facility Management Company shall maintain a register of all waste volumes and types collected from the development each year including a break-down of recyclable waste and where necessary, shall introduce initiatives to further encourage residents to maximise waste segregation at source and recycling. They shall also provide an annual bulky waste and WEEE and waste battery collection service for all residents.

The development shall be designed to provide adequate domestic waste storage areas for each apartment blocks. This will promote the appropriate segregation at source of domestic generated waste from all residential units at the development. Communal waste bin storage areas shall be designed in a manner to ensure that appropriate signage for the correct disposal and recycling of waste is available for residents.

16.12.13 Construction Phase Waste Monitoring

The Construction Manager will maintain a written record of all quantities and types of construction wastes generated, reused / recycled and exported off-site during the construction phase.

The following information shall be recorded for each load of waste exported off-site:

- Waste Type EWC Code and description.
- Volume of waste collected.
- Waste collection contractor's Waste Collection Permit Number and collection receipt including vehicle registration number.
- Destination of waste load including Waste Permit / Licence number of facility.
- Description of how waste at facility shall be treated i.e. disposal / recovery / export

Waste Management Auditing

In order to ensure that construction wastes generated during the course of the development are being effectively managed and recorded, a waste management audit shall be conducted on a routine basis to determine compliance with the Construction Waste Management Plan.

16.12.14 Operational Phase Waste Monitoring

The Facility Management Company shall prepare an annual report for the Local Authority and residents of the development on the quantities of waste generated within the development to demonstrate how waste reduction and recycling targets are being achieved with regard to the targets defined in The Eastern-Midlands Region Waste Management Plan 2015-2021.

16.12.15 Summary of Mitigation & Monitoring

The Table below summarises the proposed construction phase mitigation and monitoring measures.

Table 16.6 – Summary of Construction Phase Mitigation and Monitoring

Likely Significant Effect	Mitigation	Monitoring
Additional construction Waste generation	Implementation of Site-Specific Construction & Demolition Waste Management Plan	Recording of all waste generated and exported off-site Waste auditing

The Table below summarises the proposed operational phase mitigation and monitoring measures.

Table 16.7 – Summary of Operational Phase Mitigation and Monitoring

Likely Significant Effect	Mitigation	Monitoring
Additional domestic waste generation	Implementation of Site-Specific Operational Waste Management Plan	Recording of all waste generated.

16.13 MATERIAL ASSETS – UTILITIES

An Outline Construction Management Plan (prepared by DBFL Consulting Engineers) is included with the planning application. A detailed Construction & Environmental Management Plan will be put in place by the Contractor to implement the mitigation measures from the EIAR. The plan will be resubmitted to the planning authority prior to construction to incorporate any conditions and/or modifications imposed by the local authority and the plan will be maintained by the contractor during the construction phase. The Construction & Environmental Management Plan includes a range of site-specific measures which will include the following mitigation measures in relation infrastructure, services and public utilities:

- Surface water runoff from areas stripped of topsoil and surface water collected in excavations will be directed to on-site settlement ponds where measures will be implemented to capture and treat sediment laden runoff prior to discharge of surface water at a controlled rate.
- The construction compound will include adequate staff welfare facilities including foul drainage and potable water supply. Foul drainage discharge from the construction compound will be tinkered off site to a licensed facility until a temporary connection to the public foul drainage network has been established.
- The construction compound's potable water supply shall be located where it is protected from contamination by any construction activities or materials.
- A competent contractor will be appointed to undertake the works and protect existing systems from damage during construction.

16.13.1 Operational Mitigation

The operational phase will employ the following mitigation measures in relation infrastructure, services and public utilities:

- Refer to Chapter 6 (Water) for mitigation measures associated with the surface water treatment and measures to reduce flood risk.
- All new foul drainage lines will be constructed in accordance with Irish Water Standards. Foul sewers will be pressure tested and will be subject to a CCTV survey in order to identify any possible defects prior to being made operational.
- No specific mitigation measures are proposed in relation to water supply, however water conservation should be included in future developments
- An Emergency Response Plan prepared by the contractor will contain measures to ensure that accidental spillages will be appropriately dealt with, which includes a response procedure to deal with any accidental

pollution events. Spillage kits will be available and construction staff will be familiar with the emergency procedures and use of the equipment.

16.13.2 Construction Phase

Proposed monitoring during the construction phase in relation to infrastructure, services and public utilities are as follows:

- Adherence to the Construction & Environmental Management Plan.
- Construction monitoring of the works (e.g. inspection of drainage, watermain and utility installation etc, inspections of works adjacent to existing infrastructure).
- Monitoring in relation to the surface water. Monitoring sediment control measures (sediment retention ponds, surface water inlet protection etc.).
- Monitoring of discharge from sediment retention ponds (e.g. pH, sediment content).

16.13.3 Operational Phase

Proposed monitoring during the operational phase in relation to the infrastructure, services and public utilities are as follows:

- Regular inspection and maintenance of the drainage system and oil interceptors.

16.14 ARCHAEOLOGY, ARCHITECTURE, AND CULTURAL HERITAGE

16.14.1 Construction Phase

16.14.1.1 Archaeology

It is recommended that a programme of archaeological testing be carried out within the proposed development area in order to fully assess the archaeological potential of the site prior to the commencement of construction. If any features of archaeological potential are discovered during the course of the works further archaeological mitigation may be required, such as preservation in-situ or by record. Any further mitigation will require approval from the National Monuments Service of the DoHLGH.

It is noted that due to the level of scrub across the development area, along with the presence of abandoned vehicles and dumped material, that geophysical survey is not a suitable form of investigative survey.

16.14.1.2 Architectural

As there are no predicted impacts on the architectural resource, no mitigation is deemed necessary.

16.14.1.3 Cultural Heritage

All works along townland boundaries will be subject to archaeological monitoring in order to ensure a record of each boundary and their characteristics is compiled during the construction of the proposed development.

16.15 RISK MANAGEMENT

The Construction Management Plan and associated Health and Safety Plan, as well as good housekeeping practices will limit the risk of accidents during construction. Fire safety will be dealt with under the Fire Safety Code at design and construction stage. The estate management company will have responsibility for fire safety during operations.

The proposed development will involve ground works to facilitate the proposed development. Site investigations have been carried out and have not identified any hazardous material. Further testing will be carried out in the coming weeks to inform the detailed design. In the event that any hazardous material is identified the appropriate measures will be taken in accordance with the requirements of the EPA. The excavation and movement of soil from the site will be undertaken by a registered specialist contractor and removed to a licensed facility. The following are outlined:

- 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 below. The risks identified include traffic management, and fire strategy.

- During the construction stage, the risk of accidents associated with the proposed development are not predicted to cause unusual, significant or adverse effects to the existing public road network. The vast majority of the works are away from the public road in a controlled environment. The objective of which is to minimise the short term disruption to local residents, and reduce the potential for accidents.

- There is a risk of accidents associated with CSLS road to be constructed in conjunction with the proposed development as stated above. In order to manage interactions between the two sites a Project Liaison Group will be established. This group will have regular meetings to ensure a co-ordinated approach to design interfaces, works programmes and environmental management activities for both sites

- Furthermore, is expected that the risk of accidents would be low during the construction of the proposed development considering the standard construction practices which are to be used.

- No Excavations are to be carried out within the 14.0m wayleave around the transmission gas main running north/west parallel to the R113. Where infrastructure works (roads, footpaths, utilities etc..) are required to cross this gas main, a detailed design in compliance with GNI code of practice will be submitted for approval and all works will be carried out with supervision from the relevant authorities.

- With reference to natural disasters (e.g. flooding), the proposed development has undergone a Site Specific Flood Risk Assessment, prepared by DBFL Consulting Engineers. The main area of the site where development is proposed is low risk of fluvial, pluvial or groundwater flooding.

- A Health and Safety Plan will be prepared (required by the *Safety, Health and Welfare at Work (Construction) Regulations 2013*) to address health and safety issues from the design stages through to the completion of the construction and maintenance phases. The Health and Safety Plan will comply with the requirements of the Regulations and will be reviewed as the development progresses.

- Safety on site will be of paramount importance. Only contractors with the highest safety standards and training will be selected. During the selection of the relevant contractor and the respective subcontractors their safety records will be investigated.

- Prior to working on site, each individual will receive a full safety briefing and will be provided with all of the safety equipment relevant to the tasks the individual will be required to perform during employment on site.

- Safety briefings will be held regularly and prior to any onerous or special task. *'Toolbox talks'* will be held to ensure all workers are fully aware of the tasks to be undertaken and the parameters required to ensure the task will be successfully and safely completed.

- All visitors will be required to wear appropriate personal protective equipment prior to going on to the site and will undergo a safety briefing by a member of the site safety team.

- Regular site safety audits will be carried out throughout the construction programme to ensure that the rules and regulations established for the site are complied with at all times.

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Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan (TII);

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