Environmental Impact Assessment Report (EIAR)
Volume 1 Main Statement

Strategic Housing Development at Cooldown Commons Phase 3, Fortunestown Lane, Citywest, Dublin 24.

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Contents

Volume 1 – Main Statement

Chapter 8 Noise and Vibration

Chapter 9 Air and Climate

Chapter 10 Landscape and Visual

Chapter 11 Traffic and Transportation

Chapter 12 Material Assets

Chapter 13 Waste

Chapter 14 Cultural Heritage and Archaeology

List of Figures

Chapter 2 Alternatives Considered

Chapter 3 Description of Development

Chapter 4 Population and Human Health

Chapter 5 Biodiversity

Chapter 6 Land, Soil and Geology

Chapter 7 Hydrology and Water Services

Chapter 8 Noise and Vibration

Chapter 9 Climate and Air Quality

Chapter 10 Landscape and Visual

Chapter 11 Traffic and Transportation

Chapter 12 Material Assets

Chapter 14 Cultural Heritage and Archaeology

Chapter 16 Schedule of Mitigation Measures

List of Tables

Chapter 1 Introduction and Methodology

Chapter 2 Alternatives Considered

Chapter 3 Description of Development

Chapter 4 Population and Human Health

Chapter 5 Biodiversity

Chapter 7 Hydrology and Water Services

Chapter 8 Noise and Vibration

Chapter 9 Air and Climate

Chapter 10 Landscape and Visual

Chapter 11 Traffic and Transportation

Chapter 13 Waste

Chapter 14 Cultural Heritage and Archaeology

Chapter 15 Interactions

List of Plates

Chapter 14 Cultural Heritage and Archaeology

1. INTRODUCTION AND METHODOLOGY

1.1 PROPOSED DEVELOPMENT

This Environmental Impact Assessment Report (EIAR) has been prepared on behalf of Cairn Homes Properties Ltd to accompany a Strategic Housing Development application to An Bord Pleanála for a new residential development on lands located at Cooldown Commons Phase 3, Fortunestown Lane, Citywest, Dublin 24.

The site is located immediately north of the Fortunestown Lane Luas stop and the Luas line bounds the site to the south and east. The adjacent lands to the north, north-east and west of the site are currently under construction or have planning permission. The small triangular site to the southeast of the site is currently undeveloped. The Citywest Shopping Centre is located south of the subject site, on the opposite side of Fortunestown Lane and the Luas tracks and also benefits from a recent grant of permission for additional development.

The subject site is irregularly shaped and extends to c. 3.404ha. It is undeveloped and currently consists of a temporary compound that is being used for the construction of the adjacent site to the west. As a result, there is very little vegetation existing on the site.

The proposed development will consist of the construction of a residential scheme comprising 421 no. residential units, offices (c.376sqm), retail units (3 no. of c.285sqm, c.252sqm and c.182sqm) and a residential amenity area (c.555sqm), within 9 no. blocks ranging in height from 1 – 13 storeys. The residential component will include 126 no. 1 bed units, 267 no. 2 bed units, 28 no. 3 beds all with associated private balconies/terraces to the north/south/east/west elevations.

The proposal will include 289 no. car parking spaces (181 no. at basement and 108 no. at surface level) along with 650 no. cycle parking spaces. The development will provide public and communal open spaces throughout including a public plaza adjoining Fortunestown Luas stop. Provision of vehicular, pedestrian, and cyclist accesses to the site, including pedestrian bridge to the public park (under construction) to the east.

The application includes for all landscaping, ESB substations, plant areas, bin storage, surface water attenuation and all other site development works, and site services required to facilitate the proposed development.

The proposed development seeks to amend SHD permission ABP-302398 -18 (under construction to the west), replacing 32 no. permitted duplex apartments along with associated amendments to internal roads and open spaces. The current proposal also replaces permission SD16A/0078 previously granted on this site.

A detailed description of the development is provided in Chapter 3.

1.2 LEGISLATIVE CONTEXT

Certain public and private projects that are likely to have significant effects on the environment are subject to EIA requirements derived from EIA Directive 85/337/EC (as amended by Council Directive 97/11/EC, Directive 2003/35/EC, Directive 2009/31/EC, Directive 2011/92/EU and Directive 2014/52/EU.

The EIA Directives have been transposed into the Irish land use planning consent system by way of the Planning & Development Acts 2000 (as amended), and the Planning & Development Regulations 2001-20.

The most recent amendment to the Regulations - the European Union (Planning and Development)(Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018) - transposed Directive 2014/52/EU into Irish law.

Complementary to the legislation is a range of guidelines produced by the EU and government agencies to inform the carrying out of EIA:

- EU Guidance on EIA Screening (DG Environment 2001).
- Guidance on EIA Scoping (DG Environment 2001).
- EIA Review Checklist (DG Environment 2001).
- Guidelines on Information to be Contained in an Environmental Impact Statement (EPA 2002).
- Study on the Assessment of Indirect & Cumulative Impacts as well as Impact Interaction (DG Environment 2002).
- Environmental Impact Assessment (EIA), Guidance for Consent Authorities Regarding Sub-Threshold Development (DoEHLG 2003).
- Advice Notes on Current Practice (in preparation of Environmental Impact Statements) (EPA 2003).
- Development Management Guidelines (DoEHLG, 2007).
- Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA 2017)
- Transposition of 2014 EIA Directive (2014/52/EU) in the Land Use Planning and EPA Licencing Systems - Key Issues Consultation Paper (Department of Environment, Community and Local Government, 2017).
- Circular letter PL 1/2017 - Advice on Administrative Provisions in Advance of Transposition (Department of Housing, Planning and Local Government, 2017).
- Environmental Impact Assessment of Projects – Guidance on the Preparation of the Environmental Impact Assessment Report (European Commission 2017)
- Environmental Impact Assessment of Projects – Guidance on Screening (European Commission 2017)
- Environmental Impact Assessment of Projects – Guidance on Scoping (European Commission 2017)
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning and Local Government, 2018).

1.3 DEFINITION OF EIA

Article 1(1)(g) of Directive 2014/52/EU , defines *"Environmental Impact Assessment"* (EIA) as 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.'*

Article 171A of the 2018 Regulations defines *'environmental impact assessment' as:*

"… 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;

1.4 EIA SCREENING

Section 176(A) of the Act, as amended by S.I. 296/2018, defines *'screening for environmental impact assessment'* as

".. a determination—
(a) as to whether a proposed development would be likely to have significant effects on the environment, and
(b) if the development would be likely to have such effects, that an environmental impact assessment is required."

Section 172 of the Act states that an EIA shall be carried out respect of an application for consent for proposed development where either of the following are relevant:

(a) the proposed development would be of a class specified in—
(i) Part 1 of Schedule 5 of the Planning and Development Regulations 2001, and either—
I) such development would exceed any relevant quantity, area or other limit specified in that Part, or
II) no quantity, area or other limit is specified in that Part in respect of the development concerned,
or
(ii) Part 2 of Schedule 5 of the Planning and Development Regulations 2001 and either—
I) such development would exceed any relevant quantity, area or other limit specified in that Part, or
II) no quantity, area or other limit is specified in that Part in respect of the development concerned,
or
(b) (i) the proposed development would be of a class specified in Part 2 of Schedule 5 of the Planning and Development Regulations 2001 but does not exceed the relevant quantity, area or other limit specified in that Part, and
(ii) the planning authority or the Board, as the case may be, determines that the proposed development would be likely to have significant effects on the environment.

The subject site does not fall within any development classes set out in Part 1 of Schedule 5.

The following development classes set out in Part 2 of Schedule 5 are noted:

- *10(b)(i) Construction of more than 500 units*
- *10(b)(iv) Urban development which would involve an area greater than 2 hectares in the case of a business district, 10 hectares in the case of other parts of a built-up area and 20 hectares elsewhere. (In this paragraph, "business district" means a district within a city or town in which the predominant land use is retail or commercial use.)*

The gross area of the application site is c. 3.404ha, which is below the 10ha threshold for a built-up area.

The proposed development for 421 no. units, which is below the 500 no. units threshold.

Development Class 15 in Part 2 of Schedule 5 is also noted:

- *15 Any project listed in this Part which does not exceed a quantity, area or other limit specified in this Part in respect of the relevant class of development, but which would be likely to have significant effects on the environment, having regard to the criteria set out in Schedule 7.*

Schedule 7 of the Regulations lists the criteria for determining whether Development listed in Part 2 of Schedule 5 should be subject to an EIA. These are:

1. Characteristics of proposed development
The characteristics of proposed development, in particular—
(a) the size and design of the whole of the proposed development,
(b) cumulation with other existing development and/or development the subject of a consent for proposed development for the purposes of section 172(1A) (b) of the Act and/or development the subject of any development consent for the purposes of the Environmental Impact Assessment Directive by or under any other enactment,
(c) the nature of any associated demolition works,
(d) the use of natural resources, in particular land, soil, water and biodiversity,
(e) the production of waste,
(f) pollution and nuisances,

(g) the risk of major accidents, and/or disasters which are relevant to the project concerned, including those caused by climate change, in accordance with scientific knowledge, and
(h) the risks to human health (for example, due to water contamination or air pollution).

2. Location of proposed development
The environmental sensitivity of geographical areas likely to be affected by the proposed development, with particular regard to—
(a) the existing and approved land use,
(b) the relative abundance, availability, quality and regenerative capacity of natural resources (including soil, land, water and biodiversity) in the area and its underground,
(c) the absorption capacity of the natural environment, paying particular attention to the following areas:
(i) wetlands, riparian areas, river mouths;
(ii) coastal zones and the marine environment;
(iii) mountain and forest areas;
(iv) nature reserves and parks;
(v) areas classified or protected under legislation, including Natura 2000 areas designated pursuant to the Habitats Directive and the Birds Directive and;
(vi) areas in which there has already been a failure to meet the environmental quality standards laid down in legislation of the European Union and relevant to the project, or in which it is considered that there is such a failure
(vii) densely populated areas;
(viii) landscapes and sites of historical, cultural or archaeological
significance.

3. Types and characteristics of potential impacts
The likely significant effects on the environment of proposed development in relation to criteria set out under paragraphs 1 and 2, with regard to the impact of the project on the factors specified in paragraph (b)(i)(I) to (V) of the definition of 'environmental impact assessment report' in section 171A of the Act, taking into account—
(a) the magnitude and spatial extent of the impact (for example,
geographical area and size of the population likely to be affected),
(b) the nature of the impact,
(c) the transboundary nature of the impact,
(d) the intensity and complexity of the impact,
(e) the probability of the impact,
(f) the expected onset, duration, frequency and reversibility of the impact,
(g) the cumulation of the impact with the impact of other existing and/or development the subject of a consent for proposed development for the purposes of section 172(1A) (b) of the Act and/or development the subject of any development consent for the purposes of the
Environmental Impact Assessment Directive by or under any other enactment, and
(h) the possibility of effectively reducing the impact.

Notwithstanding that the size of the site and the proposed number of residential units in this instance are below the thresholds set out in Development Class 10 of Part 2 of Schedule 5 of the Planning & Development Regulations; having regard to Development Class 15 and Schedule 7 of the Regulations and to Section 172 of the Act, it was deemed prudent to prepare an EIAR due to the cumulation with other existing development and/or development the subject of a consent for proposed development within the immediate area.

Furthermore, it is noted that under Article 299A of the Regulations, where a planning application for a sub-threshold development is accompanied by an EIAR and a request for a determination under section 7(1)(*a*)(i)(I) of the Act of 2016 was not made, the application shall be dealt with as if the EIAR had been submitted in accordance with section 172(1) of the Act.

1.5 EIA SCOPING

Section 173(2) (a) of the Planning and Development Act 2000 (as amended) provides that a formal request for scoping may be submitted to the planning authority. However, the 'Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports' (2017), confirm that **this is not mandatory.**

The EIAR team carried out a scoping exercise to identify the key issues that may be considered likely to have a significant effect on the environment. Regard was also had to EIAR carried out for other developments in the neighbourhood.

In accordance with the draft EPA Guidelines (2017), those issues that do not meet the threshold of significance have been 'scoped out'. The following issues have been identified in the context of the proposed development:

- Population & Human Health
- Biodiversity
- Lands, Soils & Geology
- Hydrology & Water Services
- Noise & Vibration
- Air & Climate
- Landscape & Visual
- Traffic & Transportation
- Material Assets
- Waste Management
- Cultural Heritage

1.6 EIAR OBJECTIVES

The EIA process is based on the following four principles:

- *Pursuing Preventative Action*

An assessment of anticipated likely and significant impacts was undertaken during the screening and the considerations of alternatives stages of the EIA process. This involved forming a preliminary opinion with respect to the approximate magnitude and character of the likely environmental impacts. This assessment was based on the knowledge, experience and expertise of the EIA team with reference to EIA guidance material and local information.

- *Maintaining Environmental Focus and Scope*

The EIA process has focussed on those issues where environmental impact is likely to occur and have significant effects.

- *Informing the Decision*

The EIAR has been developed and is presented in such a way as to facilitate the authority decision on the acceptability of the proposed development in the full knowledge of the project's likely significant impacts on the environment, if any.

- *Public & Stakeholder Participation*

Participation is provided 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.

1.7 EIAR FORMAT AND CONTENT

This EIAR is sub divided as follows:

- Environmental Impact Assessment Report (Volume 1)
- Appendices to Environmental Impact Assessment Report (Volume 2)
- Non-Technical Summary (Volume 3).

The EIAR has been prepared in the Grouped Format as set down in the EPA "Guidelines on Information to be contained in an EIS" (2002) and the 'Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports' (2017). In general, the EIAR follows the framework presented in the EPA "Advice Notes on Current Practice in the Preparation of Environmental Impact Statements" (September 2003).

The structure and responsibility of the EIAR chapters is outlined below:

Chapter	Title	Consultant
1.	Introduction & Methodology	McGill Planning Ltd.
2.	Examination of Alternatives	McGill Planning Ltd.
3.	Description of Development	McGill Planning Ltd.
4.	Population & Human Health	McGill Planning Ltd.
5.	Biodiversity	Openfield Ecological Services
6.	Land, Soils & Geology	DBFL
7.	Hydrology and Water Services	DBFL
8.	Noise and Vibration	Byrne Environmental
9.	Climate and Air Quality	Byrne Environmental
10.	Landscape and Visual	Modelworks
11.	Traffic & Transportation	DBFL
12.	Material Assets	DBFL
13.	Waste Management	Byrne Environmental
14.	Cultural Heritage	IAC
15.	Interactions	McGill Planning Ltd.
16.	Summary of Mitigations Measures	McGill Planning Ltd.

Table 1-1 Structure of EIAR

1.8 METHODOLOGY

The preparation of this EIAR requires the co-ordination and synthesis of associated yet diverse elements of the overall assessment. To facilitate this process, a schematic structure is proposed in order to provide a coherent documentation of the varied aspects of the environment considered. The grouped format structure of the Environmental Impact Statement is listed below with a brief outline of each specific stage.

Methodology

The specific approach or techniques used to analyse impacts or describe environments.

Receiving Environment (Baseline Situation)

Dynamic description of the specific environment into which the proposal will fit, taking account of other developments likely to occur. The context, character, significance and sensitivity of the baseline is described. The likely evolution of baseline environmental characteristics without implementation of the proposed project.

Characteristics of the Proposed Development

Description of the physical characteristics of a project having regard to:

- the site location
- the size, design and appearance of the proposed project
- the cumulation with other proposed projects
- the use of natural resources
- the production of waste
- emissions and nuisances
- The potential risk of accidents.

The description of the development should take account of the full 'life-cycle' including construction, commissioning (if relevant), operation, changes to the project and potential decommission.

Potential Impacts

The potential impact of the proposal comprises a general description of the possible types of impacts which proposals of this kind would be likely to produce. Impact assessment addresses direct, indirect, secondary, cumulative, transboundary, short, medium and long term, permanent, temporary, positive and negative effects as well as impact interactions. This includes consideration of a 'Do Nothing' impact which describes the environment as it would be in the future if the development is not carried out.

Mitigation Measures

A description of any specific remedial or reductive measures considered necessary and practicable resulting from the assessment of potential impacts described above.

Predicted Impacts

An assessment of the net specific impact of the proposal, noting the direct, indirect, secondary, cumulative, transboundary, short, medium and long term, permanent, temporary, positive and negative effects as well as impact interactions which the proposed development may have. The predicted impact assumes all mitigation measures are fully and successfully applied. A 'Worst Case' impact is also considered. A 'Worst Case' impact is an impact arising where a development or its mitigation measures substantially fail.

Monitoring

A description of any post development monitoring of effects of the environment which might be necessary.

Reinstatement

A description of any post development reinstatement measures which might be necessary.

1.9 COMPETENCY

For the preparation of this EIAR, the applicant engaged McGill Planning Ltd. to project manage and coordinate the preparation of the EIAR with a team of qualified specialists engaged to prepare individual chapters, as listed in the table below. Details of the competency, qualifications and experience of the authors is also outlined:

Chapter	Consultancy	Lead Consultant	Qualifications
Introduction & Methodology	McGill Planning	Brenda Butterly	BSc Surv, MRUP, MAUD, MIPI, MRTPI
Examination of Alternatives			
Description of Development			
Population & Human Health			
Material Assets			
Interactions			
Summary of Mitigations Measure			
Biodiversity	Openfield Ecological Services	Pádraic Fogarty	BSc in Zoology PhD in Ecology
Soils & Geology	DBFL	Deirdre Walsh	BA BAI MSc MIEI CEng
Water Services	DBFL	Deirdre Walsh	BA BAI MSc MIEI CEng
Traffic & Transportation	DBFL	Mark McKenna	BEng (Hons) MSc MIEI
Noise	Byrne Environmental	Ian Byrne	Dip Applied Chemistry MSc Environmental Protection Dip Environmental & Planning Law Member of the Institute of Acoustics
Air Quality & Climate Impact			
Waste Management			
Landscape & Visual Assessment	Modelworks	Richard Butler	BL Arch, MSc Sp Planning, MILI, MIPI)
Cultural Heritage	IAC Archaeology	Grace Corbett	MA in Landscape Archaeology,

Table 1-2 Competencies of Consultants

1.10 DIFFICULTIES IN COMPILING THE SPECIFIED INFORMATION

There were no significant difficulties in completing the Environmental Impact Assessment Report. (Any minor difficulties are presented in each of the respective chapters).

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

Please note that any red line site boundary shown in this document is for illustrative purposes only. The architect's drawings should be consulted for an accurate red boundary line.

1.11 AVAILABILITY OF THE EIAR

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 at a fee not exceeding the reasonable cost of reproducing the document.

Additionally, prior to lodging this application, the required information has been issued for the Department of Housing, Planning and Local Government's EIA Portal.

2 ALTERNATIVES CONSIDERED

2.1 TERMS OF REFERENCE

This section of the EIAR has been prepared by McGill Planning Ltd and provides a description of the proposed development and also explains the evolution of the scheme design through the reasonable alternatives examined.

It is 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 INTRODUCTION

The Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment (2018) state the following:

> *"The Directive requires that information provided by the developer in an EIAR shall include a description of the reasonable alternatives studied by the developer. These are reasonable alternatives, which are relevant to the project and its specific characteristics. The developer must also indicate the main reasons for the option chosen taking into account the effects of the project on the environment.*
>
> *Reasonable alternatives may relate to matters such as project design, technology, location, size and scale."*

This section of the EIAR document provides an outline of the main alternatives examined throughout the design and consultation process under the following headings:

- Alternative Locations
- Alternative Uses
- Alternative Designs and Layouts
- Alternative Processes

This serves to indicate the main reasons for choosing the development proposed, taking into account and providing a comparison of the environmental effects. The type of alternatives depends on the nature of the project proposed and the characteristics of the receiving environment.

The 2018 Guidelines also note that it is generally sufficient for the developer to provide a broad description of each main alternative studied and the key environmental issues. Furthermore, a 'mini- EIA' is not required for each alternative studied.

2.3 ALTERNATIVE LOCATIONS

The 2018 Guidelines note that some projects may be "site specific" so the consideration of alternative sites may not be relevant or warranted.

This point is also stated in the Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2017), which states that in some instances alternative locations may not be applicable or available for a specific project which is identified for a specific location. With regard to locations, the considerations of alternatives in many cases will already have been addressed and decided at strategic planning level during the adoption of city/county/local developments plans. Furthermore, these plans will have been subject to Strategic Environmental Assessment which will have taken into account the environmental considerations associated with, for example, the cumulative impact of an area zoned for industry on a sensitive landscape. The Guidelines also state that the statutory development plans can establish project-level objectives or other mitigation that a subsequent site project and its EIAR should be cognisant of.

In this regard, we note that the subject site is located within South Dublin County Council administrative area and is zoned for new residential development in the South Dublin County Development Plan 2016-2022. The proposed development is in accordance with the zoning and other relevant policies and objectives of the Development Plan. It is also noted that several other residential developments have been granted in the area under the current Development Plan on lands subject to the same zoning. As this site is zoned for residential development within an emerging residential area, it was not considered necessary to consider other sites.

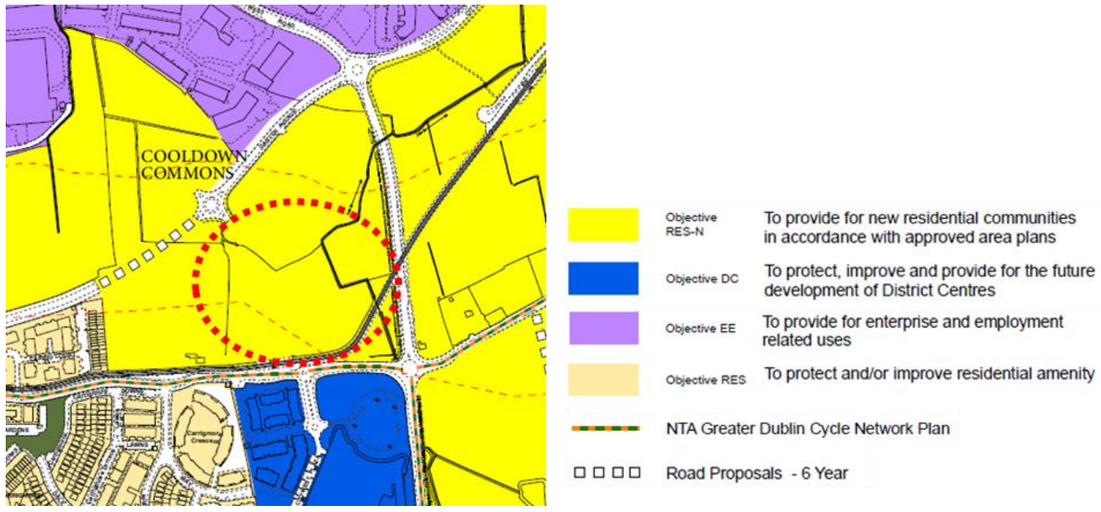

Figure 2.1 Site location on South Dublin County Development Plan 2016-2022 Zoning Map.

2.4 DO-NOTHING ALTERNATIVE

As highlighted above the site is zoned for new residential development under the South Dublin County Development Plan 2016-2022, and as such, consideration of alternative sites is not necessary. The consideration of an alternative location would equate to a 'do-nothing' alternative for the subject site and the site would become overgrown and unkept. This would mean that these residential zoned lands would not be developed in accordance with the objectives of the County Development Plan. This in turn would have the knock-on impact of the development plan not being implemented in an appropriate planned manner, creating pressures to develop unzoned, unserviced or remote sites that would not support sustainable development. This is not in line with National, Regional or Local plan policies which require the efficient use of zoned land such as these. Furthermore, these lands are considered highly sustainable and suitable for development due to its proximity to a wide range of existing public transport facilities, services and community facilities within the area which are key considerations for the development of any site.

2.5 ALTERNATIVE USES

The proposed residential, and small-scale retail and employment uses accord with the landuse zoning set out in the *South Dublin County Development Plan 2016-2022*.

The proposed residential units will add to the local population and support existing services and facilities in the area. This increased population will result in increased demand for local retail, childcare and facilities.

Other uses (such as large-scale employment, industrial or institutional) were not considered, as they would not accord with the land-use zoning for this site.

2.6 ALTERNATIVE DESIGNS AND LAYOUTS

This is a greenfield site in an emerging residential area. The following are the key site constraints and opportunities that informed the layouts.

- The adjacent lands to the north, west and east are subject to permitted applications. A key consideration was to ensure seamless integration between theses permitted developments and proposed development.
- A watercourse defines the eastern boundary, which will separate the proposed development from a possible neighbourhood park.
- The Fortunestown Luas Stop is located along the southern boundary.
- There is ground level change across the site.
- There are some trees located along the southern boundary, adjacent to the Luas stop, which have been identified by the arborist.

The site is located within the Fortunestown Local Area Plan 2012 area which has guided the different alternatives considered.

Figure 2.2 Extract from Fortunestown Local Area Plan with site location indicated.

Seven different layouts and designs (Alternatives A-G) were considered for this site.

It is worth nothing that the adjacent site to the east is under the applicant's ownership. Therefore, the site boundary varies throughout these alternatives as different layouts and designed were considered. Construction has been recently completed on the site to the east and it is known as Cooldown Commons Phase 1 and 2.

Alternative Layout A

This alternative provides 302 no units (44 no. houses and 258 no. apartments) on a total site area of c.4ha which provides a density of c. 75 units per hectare.

The key elements of this layout are as follows:

- The apartments are provided in 6 no. apartment blocks to the west of the site.
- The houses are primarily provided in an urban block west of the apartment blocks.
- A linear public plaza is provided north of the Luas stop, a residential square is provided to the east to the connect with the adjacent site.
- Public open space is provided to the east of the site which acts as a buffer to the stream and connects with the permitted park on the adjacent site.
- A basement car park is provided under the apartment blocks with is accessed between Blocks B and C.
- This layout does not include for any retail or community facilities.

Figure 2.3 Alternative A Layout.

Environmental Effects

This layout is road dominated with a street surrounding the block of houses, a street along the southern boundary and a street through the site connecting to the Phase 1 and 2 lands in the north. This high provision of vehicular

access throughout the site would create a car dominated environment and would reduce the attractiveness of walking and cycling as modes of transport.

The density of c. 75 units per hectare is not in accordance with national policies for compact growth, particularly at transport nodes.

Alternative Layout B

This layout provides 311 no. units (268 no. houses and 43 no. apartments) on a site area of c. 4ha which provides a density of c. 78 units per hectare.

The key elements of this layout are as follows:

- The apartments are provided in 6 no. apartment blocks, located to the west and south of the site.
- The houses are provided in two urban blocks located to the north east of the site
- As with Alternative A, public open space is provided to the east providing a buffer to the stream.
- A linear public plaza is provided north of the Luas stop.
- This layout does not include any retail or community facilities.

Figure 2.4 Alternative B Layout.

Environmental Impacts

This layout is road dominated with a street looping around the urban block of houses and also around apartment block E. This would result in a car dominated scheme and would hinder the transition to more sustainable modes of transport.

The urban block of houses encroaches on the riparian buffer zone which would increase the likely hood of contamination during the construction phase and would reduce the available habitats in the operational phase.

The density of c. 78 units per hectare is not in accordance with national policies for compact growth, particularly at transport nodes. It is therefore not a sustainable use of land.

Alternative C

This layout provides 383 no. units (349 no. apartments and 34 no. houses/duplexes). The key elements of this layout are as follows:

- The apartments are provided in 5 no. apartments blocks ranging in height from 6-9 storeys.
- The houses and duplexes are located along the northern boundary providing a buffer between the taller apartment blocks and the permitted two storey houses in the adjacent site.
- Public open space is provided at that public plaza north of the Luas stop, in the park north of apartment block E1, and in the square that connects with the adjacent site to the west.
- The layout includes 3 no. retail units, and residential amenity space.
- A vehicular entrance is provided to the permitted scheme north of the site.
- 290 no. car parking spaces are provided – 235 no. in two basements and 55 no. on surface.
- The diagonal street through the site divides the public plaza in half and separates the public plaza from the linear park.

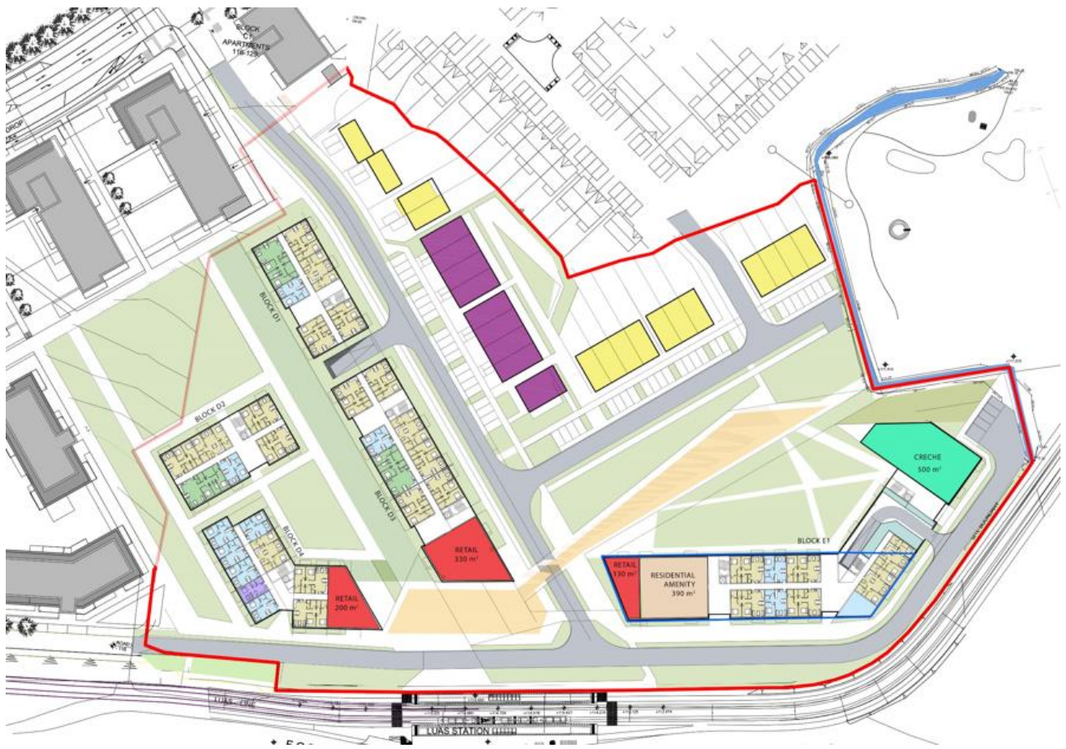

Figure 2.5 Alternative C Layout.

Environmental Impacts

This layout includes four duplex units in the north east corner which encroach into the riparian biodiversity buffer area. This would have a negative impact both in the construction and operational phases of development. During construction the location of these duplex units in close proximity to the stream would increase the possibility of

run-off and construction debris negatively impacting the stream. During the operational phase, the provision of a building in this location would reduce the available space for ecology and biodiversity to thrive.

The public plaza is divided in two by the street which connects the Luas stop with the Cooldown Commons Phase 1 and 2 lands to the north. This division of the public space by a vehicular route will reduce the sense of safety for pedestrians.

Alternative D – Submitted to SDCC at S247 Meeting

This alternative provides 358 no. residential units in 9 no. blocks ranging in height from 2-11 storeys on a site area of c. 3.8ha. This layout provides a density of c. 117.6 units per hectare. This layout developed from Alternative C with the following key changes

- The houses along the northern boundary are replaced with duplex blocks.
- One retail unit is provided in Block D4 and a residential amenity room is provided in Block D3. No retail or residential facilities are provided in Block E as these are separated from the main plaza area by the diagonal street through the site.
- 344 no. car parking spaces are provided, primarily at basement level.

Figure 2.6 Alternative D - Submitted to SDCC at S247 Meeting.

Environmental Impacts

Although the buildings and streets are pulled back from the eastern boundary the street east of the duplex units which connects to the permitted development north of the site encroaches slightly on the riparian buffer zone for the stream. This therefore has the potential to negatively impact the stream during the construction phase.

The high density adjacent to the Luas stop provided by this alternative would help achieve the aims of sustainable compact growth and the transition to more sustainable modes of transport.

Alternative Layout E – Presented to ABP at Pre-Application Consultation

This layout provides 417 no. units (377 no. apartments and 40 no. duplex units) on a site area of c. 3.4ha providing a density of 123.21 units per hectare. This layout developed from Alternative D with the following changes:

- The residential units are provided in 4 no. apartment blocks range in height from 2-11 storeys and 4 no. three storey duplex blocks. The 11 storey element marks the public plaza north of Luas stop and the duplex blocks provide a buffer between the taller buildings and the permitted two storey houses.
- A single-story café kiosk is included with the public plaza north of the Luas stop
- Block D2 is provided as one single block that frames a courtyard.
- Duplex Block G1 and the parking along the street connecting to the site to the north have been repositioned to provide more space to the riparian buffer.

Figure 2.7 Alternative E - Layout presented to ABP at pre-application consultation.

Environmental Impacts

The high density adjacent to the Luas stop provided by this alternative would help achieve the aims of sustainable compact growth and the transition to more sustainable modes of transport. The inclusion of a retail unit and café kiosk would help to ensure that some facilities are within a short walking distance of all the residential units and reduce the need for residents to travel by car.

Alternative F – Initial Layout

This layout provides 429 no. units on a site area of c. 3.404ha which provides a density of 126 units per hectare. This was submitted to An Bord Pleanala as an application but was subsequently withdrawn. This layout developed on from Alternative E with the following changes:

- The most northern duplex block has been removed to ensure the permitted houses are not overlooked by the proposed three storey duplex blocks.
- The apartment blocks around the public plaza have been pulled closer together to create a strong sense of enclosure and place.
- The street through the plaza has been rerouted to connect the streets at the east of the site.
- The 11 storey element of Block D4 has been increased to 15 storeys to create a clear landmark building at the Luas stop.
- The E Block along the southern boundary has been split into two blocks – E1 and E2 to allow sunlight into the open space.
- The D blocks framing the courtyard have been divided similar to as shown in Alternative D.
- The café kiosk has been removed from the plaza area.
- The ground floor of Block E1 provides a café unit, retail unit and office space.
- The parallel parking along the street connecting to the permitted site to the north has been removed to ensure the riparian buffer is not negatively impacted.

Figure 2.8 Alternative F – Withdrawn Application Layout.

Environmental Impacts

The rerouting of the street away from the public plaza has allowed the creation of a stronger focal point at this location with residential amenity, retail, café and office space provided in the ground floor of the blocks fronting onto the plaza. The plaza will become a key feature of the development providing key uses for the residents within the development while also placing the Luas stop and sustainable transport centrally within the scheme.

The street along the eastern boundary has been carefully designed to limit any potential impact to the stream and the riparian buffer.

Alternative G – Final Layout

This layout provides 421 no. residential units on a site area of c. 3.404ha which provides a density of 124 units per hectare. This layout developed on from Alternative F with the following changes:

- The 15 storey element has been decreased to 13 no. storeys to limit any potential impact on the Casement Aerodrome.
- The café unit in Block E1 has changed to a retail/ commercial space.
- The bin stores and bike stores have been relocated slightly.
- Further substations and plant areas have been provided as required to serve the proposed development.

Figure 2.9 Alternative G – Final Layout.

Criteria/Justification for Selecting Chosen Layout and Design

It is evident from the above that there has been a progressive evolution of design alternatives to arrive at the current proposal.

- The chosen layout is an efficient use of space, providing a high-density residential development with large areas of public and communal open spaces.
- The provision of a reduced car parking ratio reflects the site's well-connected location.
- The provision of the retail units will help to create a sustainable development with services and amenities provided within the scheme.
- The set back of the buildings from the eastern boundary allows for an ecological buffer zone alongside the watercourse.
- The altered street layout allows the public plaza to remain free from vehicles which will provide a safer and more comfortable environment for pedestrians while still providing vehicular access through the site.

Overall, the chosen layout provides a high-quality scheme that will add to the housing supply in the area.

2.7 ALTERATIVE PROCESSES

This is a residential development, which also includes three retail units and an office, located on lands specifically designated for residential development. Given the proposed use of the lands, which is in line with the Land Use Zoning in the Development Plan, it is not considered appropriate to assess other processes in the context of this EIAR.

2.8 SUMMARY TABLE OF ALTERNATIVE DESIGNS AND ENVIRONMENTAL IMPACTS

A comparison of the environmental effects of each of these alternative layouts is shown in table 2.1 below. This table compares the operational effects of each alternative on a variety of environmental factors. Each option is compared to the others and are assessed as follows:

✓	Is for those that are considered to have a more positive impact than others
=	Where the impact is considered similar for all options
X	Where a particular option is considered to have a more negative impact on a particular aspect of the environment compared to the majority of the others.

It is considered that the chosen design as per this planning application and EIAR in general achieves a better result in terms of impact on the environment than the other design options previously considered.

	A	B	C	D	E	F	G (Chosen Layout)
Population and Human Health	X	X	=	=	=	✓	✓
Biodiversity	X	X	X	=	✓	✓	✓
Soils and Geology	=	=	=	=	=	=	=
Hydrology	=	=	=	=	=	=	=
Air and Climate	=	=	=	=	=	=	=
Noise and Vibration	=	=	=	=	=	=	=
Traffic	X	X	X	X	X	✓	✓
Waste	=	=	=	=	=	=	=
Material Assets	X	X	✓	✓	✓	✓	✓

Table 2.1 Comparison of Effects

3 DESCRIPTION OF DEVELOPMENT

3.1 INTRODUCTION

This section of the EIAR has been prepared by McGill Planning Ltd. with input from the project design team. The section describes the nature of the proposed development in accordance with the requirements of the relevant EIA legislation and guidance on preparation and content of EIAR.

3.2 CHARACTERISTICS OF THE SITE

The site is located immediately north of the Fortunestown Luas stop and the Luas line bounds the site to the south and east. The adjacent lands to the north, and west of the site are currently under construction while to the land to the north east is the subject of a permitted residential development. The small triangular site to the southeast of the site is currently undeveloped. The Citywest Shopping Centre is located south of the subject site, on the opposite side of Fortunestown Lane and the Luas tracks. The Shopping Centre also has the benefit of a recent planning permission for additional development on site.

The subject site is irregularly shaped and extends to c. 3.404ha. It is undeveloped and currently consists of a temporary compound that is being used for the construction of the adjacent site to the west. As a result, there is very little vegetation existing on the site.

The site is free from any protected structures or monuments and it is not located within a Conservation Area or an Architectural Conservation Area. The site is also not within a Special Area of Conservation (SAC) or a Special Protection Area (SPA). The site is not designated for any nature conservation purposes and there are no habitats of conservation importance recorded within the site. There are no Natura 2000 sites located either within or directly adjacent to the lands. There are also no direct ecological links between the lands and any Natura 2000 sites.

Figure 3.1 Approximate Site Location.

The subject site is located within the administrative boundary of South Dublin City Council (SDCC) and is zoned New Residential within the *South Dublin County Development Plan 2016-2022*. The subject site is also with the Fortunestown Local Area Plan (LAP) boundary.

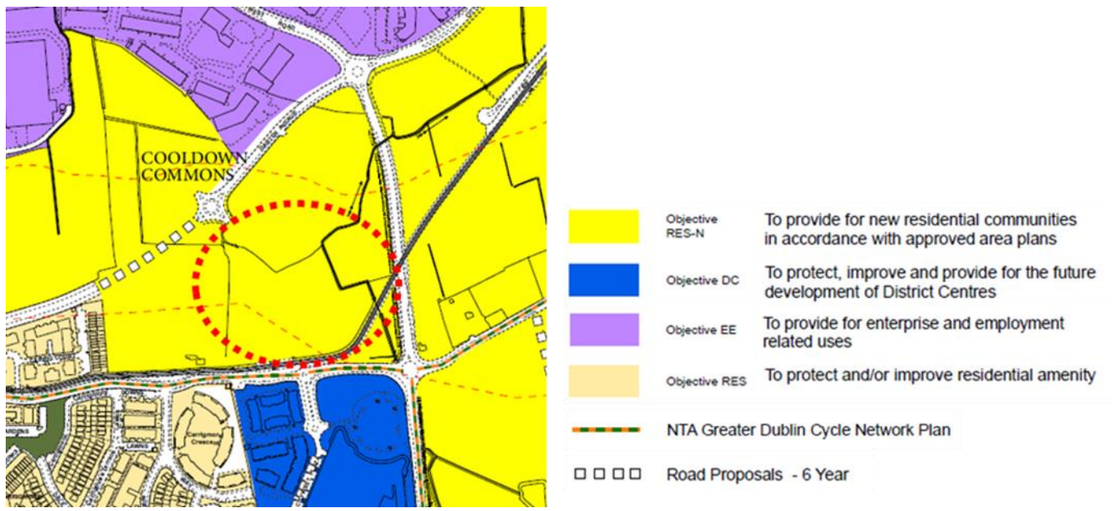

Figure 3.2 Extract from Map 8 of South Dublin County Development Plan 2016-2022 *with site location circled.*

Figure 3.3 Extract from Fortunestown LAP with site location circled in red.

3.3 PROPOSED DEVELOPMENT

Residential

The proposed development provides 421 no. residential units as follows:

- 126 no. 1 bed units
- 267 no. 2 bed units
- 28 no. 3 bed units

The 421 no. units provide a residential density of 124 uph.

The units will be provided in nine blocks – six apartment blocks (D1, D2, D3, D4, E1 and E2) and three duplex blocks (F1, F2 and G1) - ranging in height from 1-13 storeys.

Block D1 consists of 72 no. units over 6 storeys, Block D2 consists 56 no. units over 8 storeys, Block D3 consists of 64 no. units over 8 storeys and Block D4 consists of 60 no. units over 13 storeys, Block E1 provides 70 no. units over 9 storeys and Block E2 provides 63 no. units over 7 storeys, Blocks F1, F2 and G1 each provide 12 no. units over 3 storeys.

All of these units will have associated private open space in the form of terraces or balconies which will look east/ west/ north/ south. 59% of the proposed units are dual aspect. If the duplex units are excluded then 55% of the apartments are dual aspect.

Additional Facilities

In addition to residential units, the proposed development also provides three retail units (c. 285sqm, c. 182sqm and c. 252sqm) and an office space (c. 376sqm).

The office and two retail units will be located on the ground floor of Block E1. The third retail unit will be provided on the ground floor of Block D3. These units will both provide active frontage to the public plaza creating a safe environment for residents.

Communal Facilities

The proposal includes a residential amenity space (c. 555sqm) at the ground floor of Block D4. This amenity space will provide lounge areas, a multi-purpose room, a kitchen/tea room, a reception and offices

Communal open space is provided for each of the blocks and will be distinguishable from the private and public open spaces as demonstrated by the landscape drawings.

Site Development Works

All associated site development works, drainage and infrastructural works, servicing (including substations, heat pumps, plant, bin stores), landscaping, open spaces, and boundary treatment works.

Layout and Design

The proposed development consists of nine apartment blocks – six apartment blocks (D1, D2, D3, D4, E1 and E2) and three duplex blocks (F1, F2 and G1).

Block E1 and E2 are located to the south-east of the site and provide a strong urban frontage to the edge of the site overlooking the Luas track. These two blocks range in height from 7-9 storeys. The heights in Block E1 gradually increase from seven storeys at the eastern elevation to nine storeys at the west which overlooks the public plaza. Block E2 is seven storeys. These two blocks frame the communal and public open space north of these blocks. The gap between the blocks and the gradual increase in building height ensures that the open space will receive sufficient sunlight.

The three duplex blocks (Block F1, F2 and G1) are located to the north of the site. These blocks provide a strong urban frontage to the internal streets and clearly define the duplexes' communal open space. These units have been stepped back from the northern site boundary to ensure sufficient distance from the permitted but unbuilt houses north of the site.

The D Blocks are located to the west of the site. Block D1 and D4 provide a strong frontage along the internal street to the east while also overlooking the open spaces to the west. Block D3 provides frontage to the street along the south of the site and the public plaza to the east while also overlooking the open space north of the site, while D2 overlooks the space to the north. Blocks D1, D2 and D3 together frame the raise communal open space associated with these blocks. Combined these four blocks frame the space and help to create a legible and safe environment. D4 and D3 also directly overlook the proposed new plaza, creating a sense of enclosure to this important public square. These blocks range in height from 6-13 storeys. The changes in height have been strategically located to create nodes and focal points within the development and wider area, while also ensuring that all open spaces and buildings receive sufficient sunlight and daylight throughout the development.

Figure 3.4 Site Layout Plan. Source: Reddy Architecture + Urbanism

A total area of 10,482sqm of open space is provided within the development as public/communal open space. This equates to 31% of the site area. Each apartment/duplex is also provided with a private balcony or terrace in accordance with current standards. The terraces are clearly defined as private spaces through hard and soft landscaping.

There are three areas of communal open space, one space for each set of blocks:

- A communal area for the duplexes is provided north of the duplexes. The orientation of the duplex blocks and the use of tree planting clearly separate this space as for the use of the residents only.
- The D blocks frame a communal open space for these blocks within the centre of D2, D3 and D4. The change in levels and landscaping will be used to define this space as communal and as separate to the public plaza adjoining the space to the south.
- The communal open space for the E blocks is provided to the north of these blocks.

There are three key areas of public open space:

- A public plaza is provided north of the Luas stop will provide a focal point for the development. The space will be framed by blocks D4, D3 and E1. Active frontage to the public space is provided by the retail units and residential amenity space on the ground floors of these blocks. The vents have been carefully located in this space to ensure pedestrian permeability is not impacted. A pathway through this space connects the plaza to the wider area of the development, including earlier phases of the Cooldown Commons development to the north and west, the new local park on the opposite of the stream, and to the permitted site to the north, not yet under construction.
- A linear park is provided south of the duplex units and north of the communal open space for Blocks E1 and E2. This links to the riverside walk to the east of the site, connecting to the bridge linking this development to the new neighbourhood park to the east currently under construction.
- Blocks D1 and D2 frame a public open space to the west, which adjoins the earlier phases of Cooldown Common to the east, which is currently under construction and will provide a public open space for both developments.

A 10m biodiversity buffer has been provided to the east to protect and enhance the stream's biodiversity. This will be landscaped and will add to the visual amenity of the scheme. A new bridge is proposed as part of this application connecting to the public open space east of the stream.

Figure 3.4 Landscape Masterplan.

Access and Parking

Vehicular access to the site will provided from three points – two to the north and one from the west. These access points and the internal streets are located to match with the permitted and recently constructed streets surrounding the subject site, ensuring that a permeable layout is created within the wider area. Vehicular access to the underground car park is provided from the internal street, between Blocks D1 and D4.

The development has been designed to be highly permeable and walkable for pedestrians. As a result, there are a variety of access points and routes through the development for pedestrians.

The development will also be permeable for cyclists, who will also have multiple access points and routes through the site. The three streets will provide the main access for cyclists, but they will also be able to avail of the routes for pedestrians.

The proposed development includes a total of 289 no. car parking spaces. Car parking is provided primarily at basement level with 181 no. car parking spaces provided in the basement below the D blocks. There are also a total of 108 no. car parking spaces provided at surface level.

The proposal includes a total of 650 no. cycle parking spaces which are provided both at basement level and at surface level. 530 no. long-term secure cycle spaces are provided for the residents. A further 120 no. cycle parking spaces are provided for the retail units, office, Luas stop and visitors.

	Car Parking Spaces	Cycle Parking Spaces
Apartments	278 no.	530 no.
Retail Units	11 no.	120 no.
Office		
Luas		
Total	**289 no.**	**650 no.**

Table 3.1 Proposed Car Parking and Cycle Parking Spaces

3.4 CONSTRUCTION STAGE

This section of the EIAR summarises the construction of the proposed development. The Construction Management Plan submitted separately in the planning application, and the Construction and Demolition Waste and By Product Management Plan should also be consulted.

Hoarding, Site Set-up and Formation of Site Access/Egress

The site area will be enclosed with hoarding, details of which will be agreed with South Dublin County Council. This will involve erecting hoarding around the proposed site perimeter in line with the finished development extents. Hoarding panels will be maintained and kept clean for the duration of the works.

The available site footprint will enable the Contractor to set up the site compound within the site boundary. The exact location of the construction compound is to be confirmed in advance of commencement of the works (and agreed with South Dublin County Council). The site compound will be used as the primary location for the storage of materials, plant and equipment, site offices and worker welfare facilities.

The Contractor will be responsible for the security of the site. The Contractor will be required to:

- Install adequate site hoarding to the site boundary;
- Maintain site security at all times;
- Separate public pedestrian access from construction vehicular traffic.

As with the other construction activities that are being carried out within the South Dublin County Council local authority area, activities associated with the construction compounds will be subject to restrictions to the nature and timing of operations so that they do not cause undue disturbance to neighbouring areas and communities.

As required for all construction activities within the vicinity of an airport or aerodrome, The Irish Aviation Authority will be notified at least 30 days in advance of the use of any cranes on site.

Site Clearance

A Draft Construction Management Plan has been prepared which will guide the site clearance.

One basement will be provided to the west of the site, which will result in the removal of existing vegetation and soil. However, there is minimal vegetation or trees on site.

The Tree Assessment undertaken has identified existing trees on site along the southern boundary by the Luas Stop. These trees are currently outside the extent of the site hoarding and will be maintained as part of the proposed development. These trees will be appropriately protected during the construction works.

Car Parking Arrangements

Parking of construction workers vehicles will be limited to within the site extents. To minimise congestion, a traffic management plan will need to be developed by the Contractor to ensure that construction workers access the site using alternative means of transport (i.e. public transport) to negate/minimise any impacts on the local network.

Working Hours & Staff

The proposed hours of work on site will typically be 07:00 hrs to 19:00 hrs Monday to Friday and 08:00 hrs to 14:00 on Saturdays unless otherwise specified by planning conditions. Certain tasks may need to be undertaken outside of these hours. All outside of hours work will first be agreed in writing with the Local Authority.

Lighting

It is proposed to provide lighting within the communal areas and along all public pathways within the development. Appropriate lighting will be provided as necessary at construction compounds. All lighting will be installed so as to minimise light spillage from the site.

Delivery and Storage

The Contractor will ensure that the delivery of materials is coordinated to minimise impacts to adjacent properties. The Contractor will ensure that all materials are adequately stored and secured in their site compound. The Contractor will ensure the roads adjacent to the site are kept clean and free of debris.

Traffic Management Procedures / Generation

The contractor will prepare a site-specific Construction Traffic Management Plan (CTMP) prior to the construction works commencing. The contractor will be responsible for the implementation of all agreements between the developer and County Council with the objective that the transportation needs for the proposed development will have a minimal impact on the road network and local communities. Adequate signage as per Chapter 8 of the Traffic Signs Manual shall be installed on approach to the proposed site entrance location advising of the presence of a 'site access ahead' and 'construction traffic ahead'. The above signage shall be removed following completion of the construction phase.

Disposal of water, wastewater and sewage

All site facilities during construction will be located entirely within the site. The construction compound will include adequate welfare facilities such as washrooms, drying rooms, canteen and first aid areas, as well as foul drainage and potable water supply. These facilities will be connected to the local authority sewage system with local authority approval**.** Throughout the works, all surface water (water from excavations etc.) 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. Visual checks of the pumping and settlement system will be carried out on a routine basis.

Air Quality

There is the potential for a number of emissions to the atmosphere during the construction stage of the project. In particular, activities may generate quantities of dust. Construction vehicles, generators etc., will also give rise to some exhaust emissions. Vehicular movements to and from the site will make use of existing roads.

A dust minimization plan will be formulated for the construction phase of the project, as construction activities are likely to generate dust emissions. The potential for dust to be emitted depends on the type of activity being carried out in conjunction with environmental factors including levels of rainfall, wind speeds and wind direction.

The potential for impact from dust depends on the distance to potentially sensitive locations and whether the wind can carry the dust to these locations. The majority of any dust produced will be deposited close to the potential source and any impacts from dust deposition will typically be within several hundred metres of the construction area.

In order to ensure that no dust nuisance occurs, a series of measures will be implemented. Hard surface roads shall be swept to remove mud and aggregate materials from their surface. Furthermore, any road that has the potential to give rise to fugitive dust must be regularly watered, as appropriate, during dry and/or windy conditions. Vehicles delivering material with dust potential both on and off the site shall be enclosed or covered with tarpaulin at all times to ensure no potential for dust emissions.

All vehicles exiting the site shall make use of a wheel wash facility, if required, prior to entering onto public roads, to ensure mud and other wastes are not tracked onto public roads. Public roads outside the site shall be regularly inspected for cleanliness and cleaned as necessary. Material handling systems and site stockpiling of materials shall be designed and laid out to minimise exposure to wind. Water misting or sprays shall be used as required if particularly dusty activities are necessary during dry or windy periods.

At all times, the procedures put in place will be strictly monitored and assessed. In the event of dust nuisance occurring outside the site boundary, satisfactory procedures will be implemented to rectify the problem.

The dust minimisation plan shall be reviewed at regular intervals during the construction phase to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practice and procedures.

Further information on the dust minimisation plan is included in Chapter 9.

3.5 OPERATIONAL STAGE

The proposed development is a residential development on appropriately zoned lands at Citywest, Dublin 24. The development includes for retail units, an office and associated infrastructural works, connections and open spaces. It is anticipated that the primary direct significant environmental effects will arise during the construction stage.

Once the development is completed, and mitigation measures employed, it is expected to operate without creating any significant additional environmental impacts. The range of anticipated activities, materials/natural resources used, effects/emissions are not expected to result in a significant impact on the constituent environmental factors.

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.

There is potential for ocular impact of glint and glare emanating from sunlight reflections from the proposed rooftop solar photovoltaic panels. However, this potential is considered to be negligible to very low.

There is also the potential for cumulative, secondary and indirect impacts (for instance traffic) but are unlikely to be significant and have been addressed in the EIAR.

3.6 CHANGES, SECONDARY DEVELOPMENTS, CUMULATIVE IMPACTS

The potential for the specific proposed development as described to grow is considered to be limited within the residential area. The potential for the apartments to expand or increase in scale is limited to the confines of the permission sought and new planning permission will be required for further extensions to the blocks.

The potential for increased retail, office, commercial or community uses within the blocks would be subject to further planning permissions.

Committed Developments within the Wider Area

The surrounding area has seen significant development in recent years and numerous residential developments have received planning permission in recent years, shown in the map below. The developments have been granted planning permission by both An Bord Pleanála (ABP) and South Dublin County Council (SDCC).

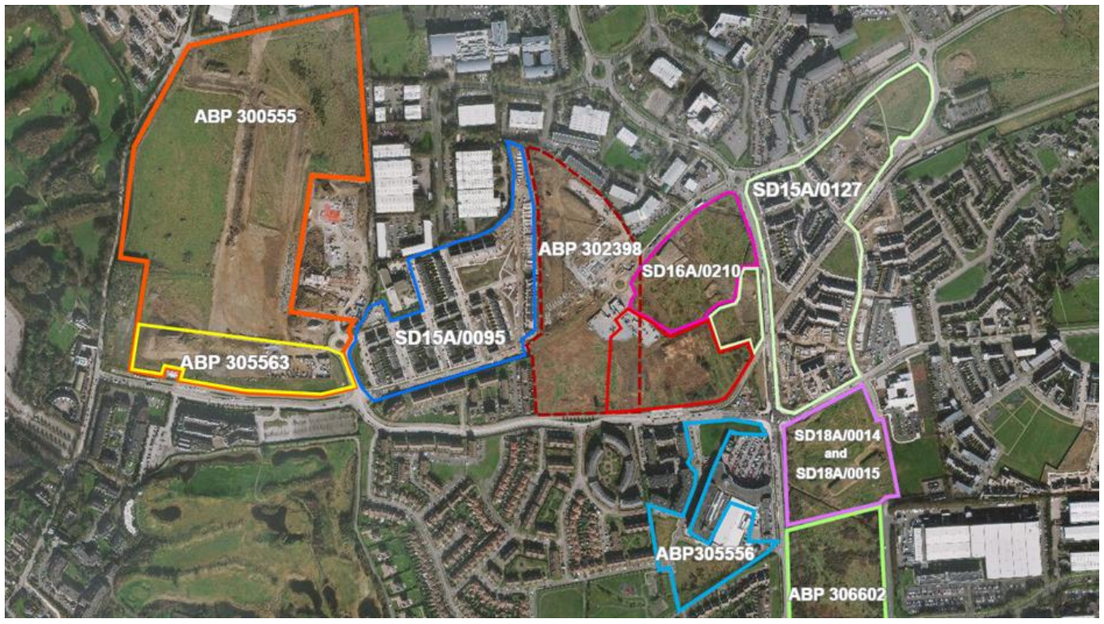

Figure 3.5 Locations of permitted developments in proximity to subject site

Cooldown Commons SHD (Ref: ABP 302398)

ABP granted planning permission for this Cooldown Commons SHD in December 2018. The development consists of 459 no. residential units and creche (327 sqm). This development has been recently constructed and is located immediately west of the subject site.

The proposed development on the subject site will replace 32 no. units permitted under ABP 302398 to facilitate a seamless integration of these two developments.

Fortunestown SHD 1 (Ref: ABP 300555)

Permission was granted by ABP in March 2018 for 524 no. residential units, located west of the subject site. Construction is currently underway on this development.

Fortunestown SHD 2 (Ref: ABP 305563)
Permission was granted by ABP in October 2019 for 488 no. residential units, a café and a creche. This site is located immediately south of ABP 300555 and forms phase 2 of the development.

Citywest Shopping Centre SHD (Ref: 305556)
ABP granted planning permission for this SHD in January 2020. The development will provide 290 no. apartments, 4 retail units, 2 no. café/restaurant units and a creche. Construction has not yet commenced on this development. This SHD site is located south of the subject site, south of the Luas track.

Citywest Road SHD (Ref: ABP 306602)
Permission was granted in May 2020 by ABP for 463 no. residential units and a creche. This development will be located to the south-east of the subject site. Construction has not yet commenced.

Airscape Development, Cooldown Commons (Ref: SD15A/0095)
SDCC granted planning permission for 224 no. residential units on this site located west of the subject site. This development is now complete.

Talarive Development, Citywest (Ref: SD15A/0127)
SDCC granted planning permission in November 2015 for 399 no. residential units, a creche, kiosk and retail unit. This development is located east and north-east of the subject site. Construction is underway on this development and is almost complete.

Citywest Homes Development, Garter Avenue (Ref: SD16A/0210)
SDCC granted planning permission for 111 no. residential units in July 2016 on this site located north-east of the subject site. Construction has commenced on this development.

Citywest Homes Development, Fortunestown Lane (Ref: SD18A/0014)
SDCC granted planning permission in July 2018 for 78 no. residential units on this site located to the south-east of the subject site.

Citywest Homes Development, Citywest Road (Ref: SD18A/0015)
SDCC granted planning permission in July 2018 for 52 no. residential units on this site located to the south-east of the subject site.

The cumulative impact of these developments is assessed, where appropriate, in the individual EIAR chapters.

Future Development
Any future planning applications relating to the development will be assessed separately and are outside the scope of this EIAR.

4 POPULATION AND HUMAN HEALTH

4.1 INTRODUCTION

This chapter, prepared by McGill Planning Ltd., addresses the impacts of the proposed strategic housing development at Fortunestown Lane, Citywest, Dublin 24 on population and human health.

4.2 METHODOLOGY

To establish the existing receiving environment/baseline for the subject site, the methodology included site visits to evaluate the location and likely significant potential impact upon the human sources in the area. Desk base study included an analysis of the Central Statistics Office Census (CSO) data, the ESRI Quarterly Economic Commentary, and national, regional and local planning policy, school and creche enrolment figures.

Different local catchment areas were established for analysing population data, creche demand and capacity, and school demand and capacity. These areas were chosen to gather the most relevant data for each factor. A general local catchment area of 1km from the subject site forms the basis of most areas of analysis.

4.3 RECEIVING ENVIRONMENT

Population

For the purpose of this population analysis a local catchment area was selected to include the Electoral Divisions (EDs) within 1km of the subject site. This area is shown in figure 4-1 and will be referred to as the *Local Area.* The EDs were chosen as a basis of analysis as, unlike the Settlement Area boundaries, the ED boundaries have remained unchanged and therefore can be used to compare population changes over time.

The subject site is located within the Tallaght-Fettercairn ED, on the ED boundary with the Tallaght-Jobstown ED. The 1km buffer from the site extends into the Saggart ED to the west, which has also been included within this analysis. This brings the total study area to three electoral divisions, which will be referred to throughout this section as the Local Area. These three EDs were also used as the study area within the Fortunestown LAP.

Combined these three EDs had a population of 30,844 in the 2016 census, an increase of 13.0% on the 2011 population. This is a much faster population increase compared to the national average, Leinster and Dublin. The census data shows that the population of Ireland increased by 3.8% from 2011 and 2016 to a total population of 4,761,865. Leinster and Dublin both experienced a higher population growth than the national average (5.2% and 5.8% respectively). The local area population increased a rate over twice as fast as Dublin and over three times as fast as the national increase.

These statistics are somewhat outdated, and a new census is due to take place next year (2021). The CSO provided an estimation of the population in April 2019. This indicated that the country's total population was likely c. 4,921,500 and that the Dublin population was c. 1,395,600. The local area population was 2.1% of Dublin's population in 2011 and 2.3% of Dublin's population in 2016 of the total Dublin population. Assuming this proportion remained the same in 2019, the local area's population in 2019 was likely c. 32,099. However, as the local area experienced a higher population growth between 2011 and 2016, it likely that this trend has continued and that the local area's population was higher in 2019. Applying the increase of 13% seen between 2011 and 2016 suggests that the local area population could have been as high as c. 34,854 in 2019.

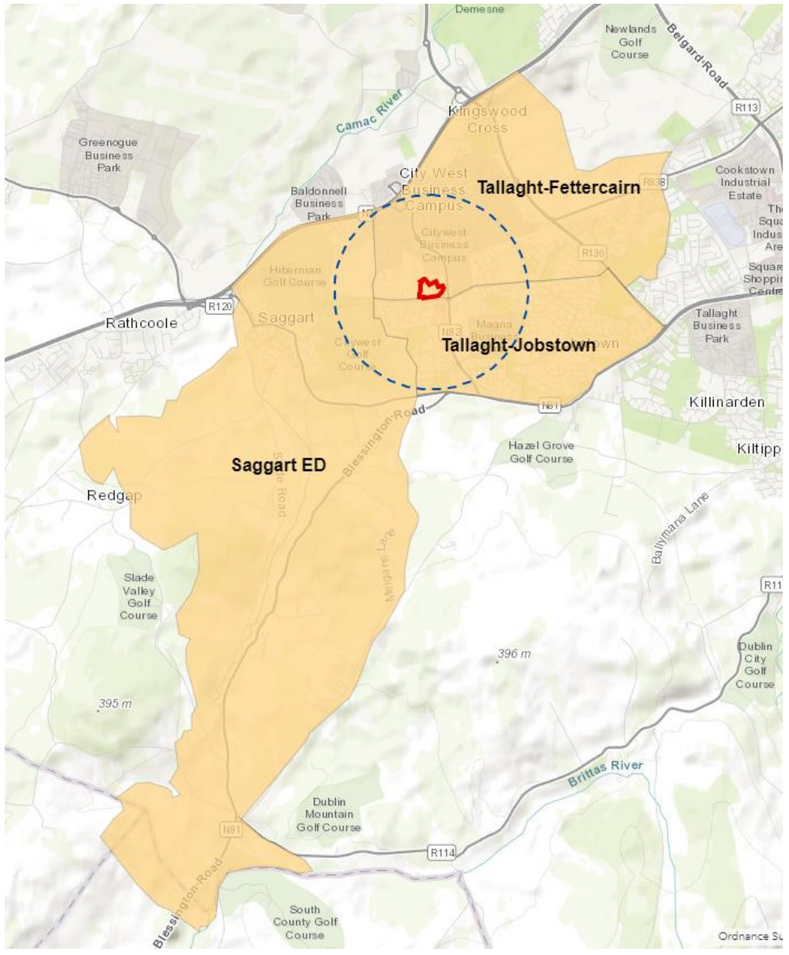

Figure 4.1 Electoral Divisions within 1km of Subject Site

Electoral Divisions	2011 Population	2016 Population
Saggart	3,060	4,640
Tallaght – Jobstown	16,630	17,824
Tallaght - Fettercairn	7,607	8,380
Total	27,297	30,844

Table 4.1 Census Population Data for Electoral Divisions in chosen catchment area. Data Source: CSO

Area	2011	2016	% Change 2011-2016
Ireland	4,588,252	4,761,865	3.8%
Leinster	2,504,814	2,634,403	5.2%
Dublin	1,273,069	1,347,359	5.8%
Local Area	27,297	30,844	13.0%

Table 4.2 2011 and 2016 Census Data for Ireland, Dublin and the Local Area. Data Source: CSO

Area	Estimated 2019 Pop	% Change 2016-2019
Ireland	4,921,500	3.5%
Dublin	1,395,600	3.6%
Local Area (2.5% of Dublin's estimated population)	32,099	4.1%
Local Area (13% increase on 2016)	34,854	13%

*Calculated by finding 2.3% of Dublin's estimated 2019 population (1,395,600*0.023)

Table 4.3 Estimated 2019 Population. Source: CSO

Since the 2016 census, SDCC and ABP have granted planning permission for several residential developments on the surrounding lands, as indicated in the map below.

Figure 4.2 Recently Permitted Planning Application in close vicinity to subject site

Once complete these permitted developments will increase the local area population. This increase in population can be estimated by multiplying the number of permitted units by the national average household size of 2.7 persons. The table below shows the number of units permitted by each application and the projected population from each.

Reg. Ref.	No. of Units	Projected Population	Status
Developments north of the Luas line			
SD15A/0127	399	1,077	Construction Commenced
SD16A/0210	112	302	Not yet commenced (an extension of duration application has been submitted Reg Ref SD16A/0210/EP)
SD15A/0095	224	605	Development nearing completion
ABP 300555	524	1,415	Construction Commenced
ABP 305563	488	1,318	Granted 3rd February 2020
ABP 302398	459	1,239	Construction Completed
Total	**1,747**	**4,717**	
Developments south of the Luas Line			
ABP 305556	290	783	Granted 20th January 2020
ABP 306602	463	1,250	Granted 26th May 2020
SD18A/0014	78	211	Construction Commenced
SD18A/0015	52	140	Construction Commenced
Total	**883**	**2,384**	
Total (north and south of Luas Line)	**3,089**	**8,340**	

Table 4.4 Permitted Units and the permitted developments' projected populations.

The projected population for these permitted developments suggests that the local area population would increase by c. 8,340 no. people which equates to an increase of 27% compared to the 2016 population. It is unlikely that this population increase will be seen in the 2021 census as not all of these permitted developments will be complete and fully occupied. Nonetheless, it can be expected that this increase in population will be seen in the local area over the next few years.

2016 Population	30,844
Projected Population of Permitted Developments	8,340
Projected Population added to 2016 Population	39,184
% increase	27%

Table 4.5 Projected Increase in local area population as a result of permitted developments.

It is worth noting that the SD15A/0095 application amended the units provided by a previous application (SD14A/0121). However, the childcare facility and open spaces were not affected by the new application.

Age Profile

The population pyramids show a relatively young population with 60.4% of the 2016 population under 35 and 38% under 20. In comparison, only 47% of the state's population was under 35 in 2016, and just 27.5% were under 20.

The Local Area has a strong representation (57.6%) of working age people (20-64) living in the area in 2016. This is in line with the national average of 59.1% people aged 20-64.

There has been an increase in all age groups from 35 and above. However, despite the increase in those aged 65+, the population is still relatively young as seen in the population pyramids for 2011 and 2016.

There has been a notable decrease in the 25-29 age group and the 30-34 age group. These decreases are likely due to out-migration as people move away for higher education, jobs etc.

There has also been a decrease in the number of children aged 0-4, which would indicate a decrease in the number of new young families in the area. However, the increase in age groups 35-39 and 40-44 has likely resulted in an increase in the 0-4 age group since 2016.

Considering the numerous recently constructed and permitted developments it can be expected that the age profile for the local area will be altered.

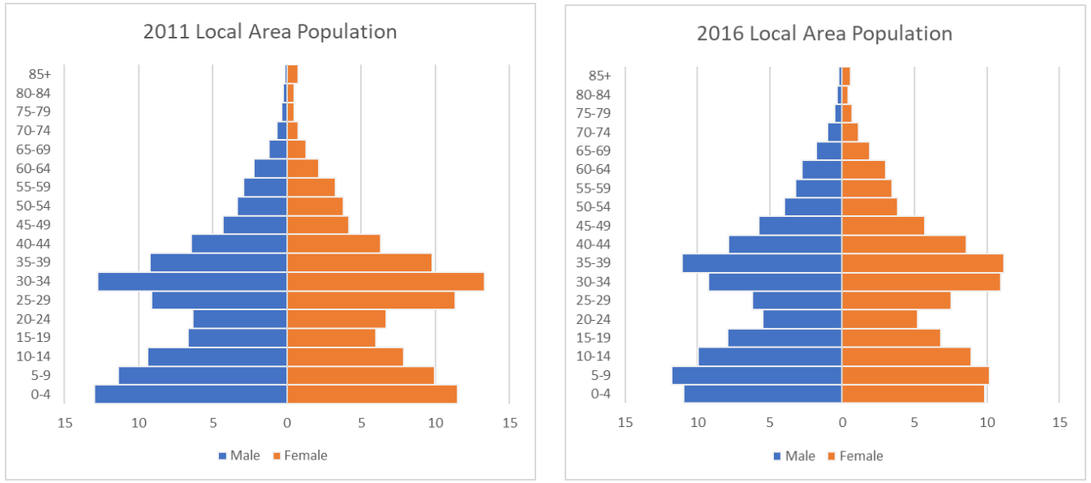

Figure 4.3 Local Area 2011 and 2016 Population Pyramids. Data Source: CSO

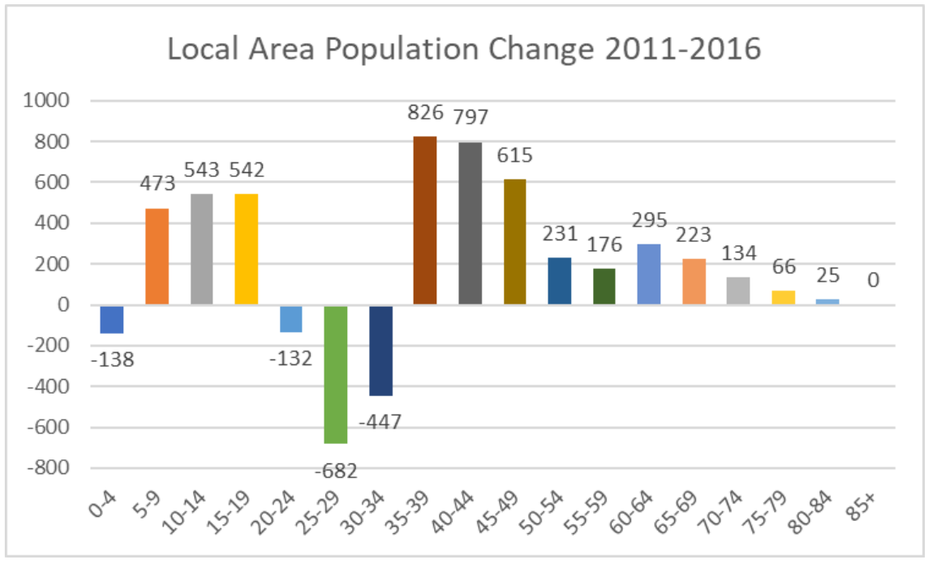

Figure 4.4 Raw Change in population from 2011-2016 by Age Group. Data Source: CSO

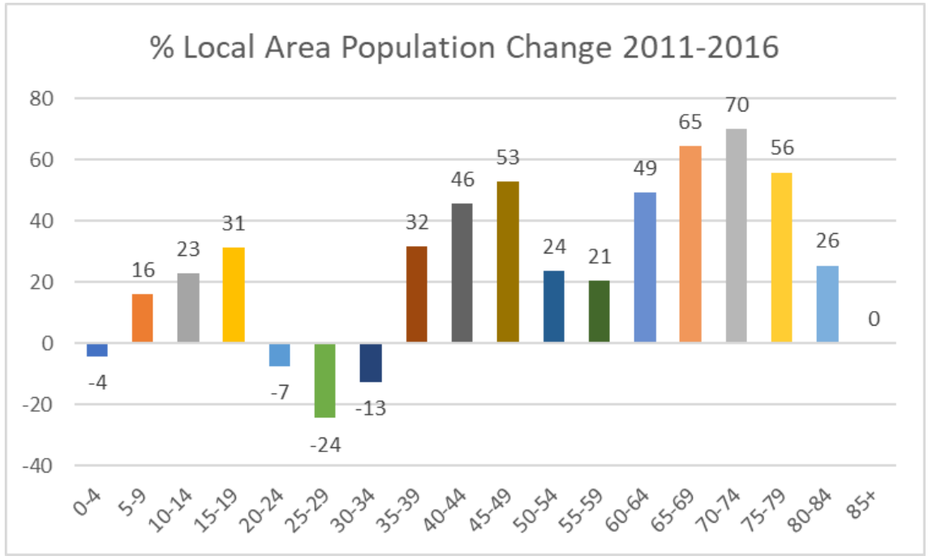

Figure 4.5 % Change in Population from 2011-2016 by Age Group. Data Source: CSO

Employment

The CSO's Quarterly Labour Force Survey provides information in relation to national employment levels, unemployment levels and current labour force participation rates. Data for Q1 of 2020 shows an increase in employment of 4.85% compared to Q1 of 2018, while unemployment decreased by 13.92% over the same period.

ILO Economic Status Ireland	Q1 2018	Q1 2019	Q1 2020	Annual Change	
All Persons				2018-2020	%
In Labour Force	2,353,700	2,416,300	2,467,900	114,200	4.85
In Employment	2,220,700	2,301,900	2,353,500	132,800	5.98
Unemployed	132,900	114,400	114,400	-18,500	-13.92
Not in Labour Force	1,470,300	1,480,200	1,490,500	20,200	1.37
Total Persons aged 15 or over	3,823,900	3,896,500	3,958,400	134,500	3.525
Unemployment Rate %	5.7	4.8	4.7		

Table 4.6 Employment Statistics Source: CSO

Employment increased in 10 of the 14 economic sectors over the year (excluding Not stated). The largest rate of increase was recorded in the Information and Communication sector, which saw an increase of 8.3% in Q1 of 2020 compared to Q1 of 2019.

It must be noted that the effects of Covid-19 are not fully reflected in the Labour Force Survey for Q1 2020. The Covid-19 measures only came into play during the last couple weeks of Q1. Therefore, the extent of Covid-19 on the workforce is not yet know.

Within the local catchment area, 53.88% of the population aged 15 and over were in work in 2016. Commerce and Trade was the most common industry in the area, followed closely by Other and Professional Services.

Retail and Community Facilities

A desktop survey of the existing retail and community services within a 1km buffer of the site was carried out. Particular attention was given to facilities and services within a 10 minute walk of the subject site, as this is the distance people will walk before turning to other modes of transport.

The key areas retail areas are identified as blue in figure 4-6 and are numbered 1-6. Tables 4-6 provides a list of these areas and the approximate walking time from the subject site.

South Dublin County Council Development Plan 2016-2022 identifies District Centres, Village Centres and Local Centres. Citywest Shopping Centre (number 1) is identified as a District Centre and is located immediately south of the subject site. Saggart (number 5) is identified as a Village Centre and is located c. 1.4km west of the subject site. Sundale Shopping Centre (number 6), located just over 1km east of the subject site, and Brookfield Enterprise Centre (number 7). Located c. 1.4km east of the subject site, are identified as a Local Centres.

Citywest Shopping Centre (number 1) provides the most services and facilities with a range of shops, pharmacy, a supermarket, medical centre, credit union, post office, and restaurants/cafes. Sundale Shopping Centre (number 6) includes a pharmacy, barbers, hair salon and takeaways. Saggart (number 5) provides a range of shops, restaurants, medical centres and a supermarket. Brookfield Enterprise Centre (number 7) provides a pharmacy, local shop and a medical centre.

In addition to these four centres, a Lidl (number 2) is located within a five minute walk east of the site and a Spar (number 3) and a Circle K (number 4) a relocated within a 10 minute walk south of the site.

Although slightly further away, Saggart and the Brookfield Enterprise Centre are both within a 20 minute walk of the subject site. Citywest Shopping Centre (number 1) and the Lidl (number 2) are both within a 5 min walk of the subject site and therefore will be the most convenient for the proposed development's future residents.

There are three doctors surgeries located within 1km of the subject site. One is located within the Citywest Shopping Centre and the other two are located to the west of the site on Fortunestown Lane. Further doctors and health centres are located both west and east of the site, in Saggart, Rathcoole and Tallaght.

There are numerous Business Parks and Industrial Estates with the Citywest Area. The Citywest Business Campus and the Magma Business Park are both within 1km and c. 10-15 minute walk of the subject site. These provide significant employment for both the local and wider area.

The only existing park within 1km of the subject is located south of the site at Carrigmore Green and comprises the Carrigmore Park and the Citywest Playground. However, other facilities and parks have been permitted under permitted schemes. These are discussed further below.

Figure 4.6 Retail clusters surrounding subject site

Map No.	Retail Cluster
1.	Citywest Shopping Centre
2.	Lidl
3.	Spar
4.	Circle K
5.	Saggart
6.	Sundale Shopping Centre
7.	Brookfield Enterprise Centre

Table 4.7 Retail clusters as shown in Figure 4.6

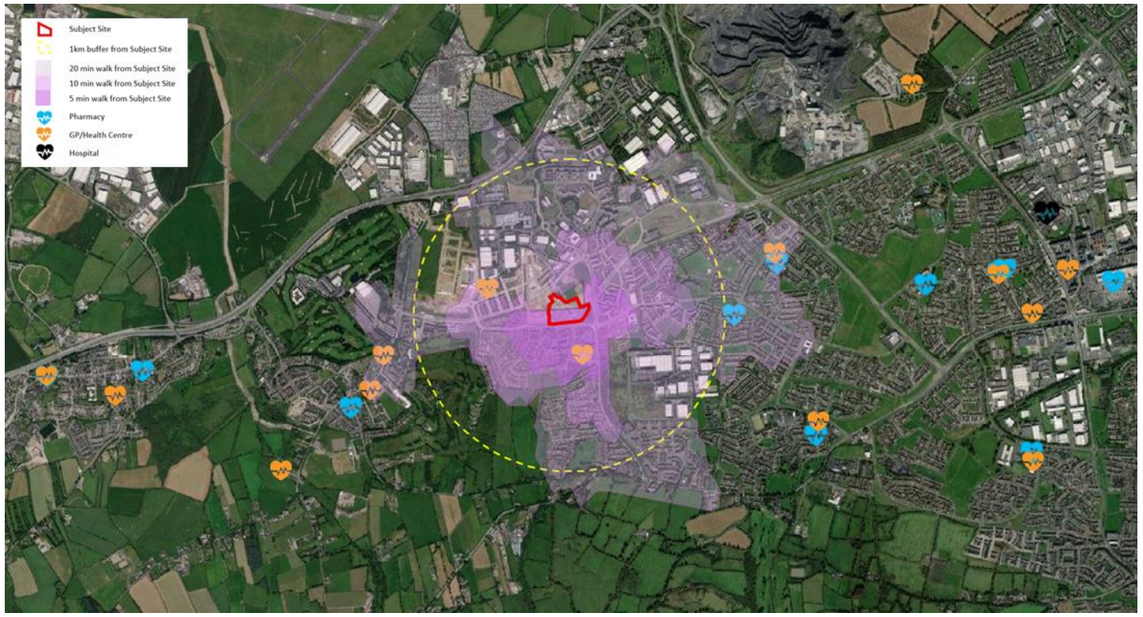

Figure 4.7 Health Services in relation to subject site

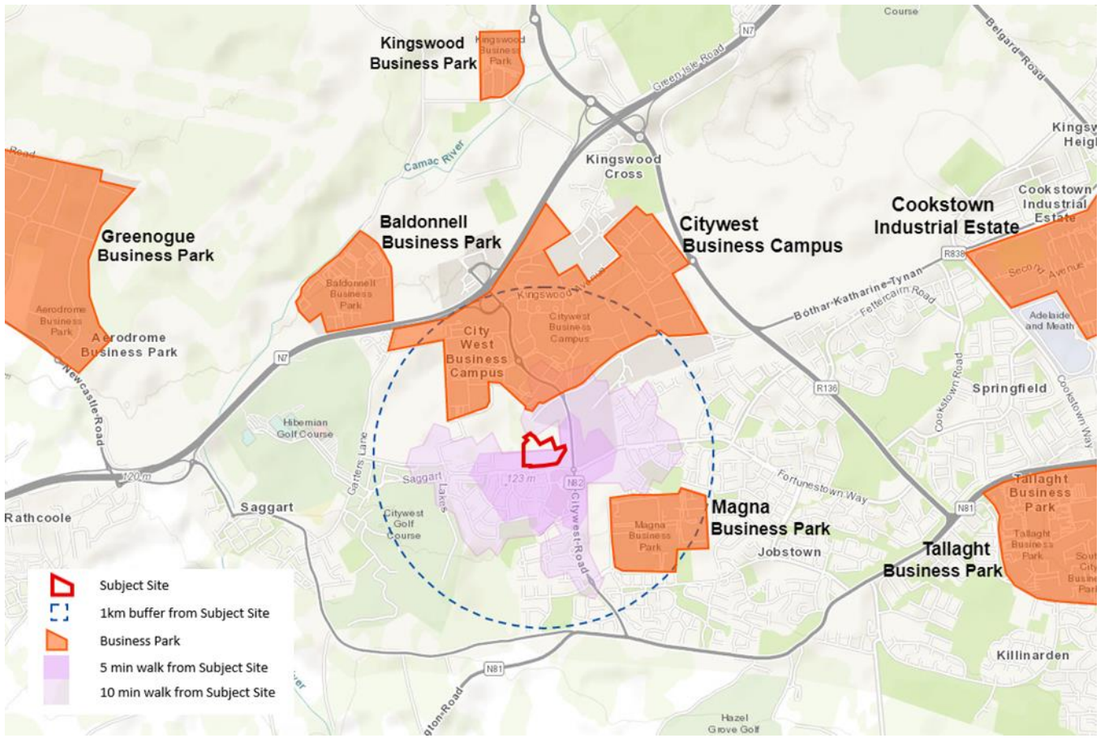

Figure 4.8 Business Parks in surrounding area

Existing Facilities with 1km of Subject Site	Location
Retail	
Lidl	Fortunestown Lane
Spar	Citywest Road
Dunnes Stores	Citywest Shopping Centre
Boyle Sports	Citywest Shopping Centre
Carphone Warehouse	Citywest Shopping Centre
O'Brien's	Citywest Shopping Centre
Regatta Great Outdoors	Citywest Shopping Centre
VM Home & DIY	Citywest Shopping Centre
Health Matters	Citywest Shopping Centre
iFix	Citywest Shopping Centre
More4Less	Citywest Shopping Centre
Seezers & Sears Butchers	Citywest Shopping Centre
VIP E-Cigarette	Citywest Shopping Centre
Cafés/Restaurants	
McDonald's	Citywest Shopping Centre
Eddie Rocket's	Citywest Shopping Centre
Baked Citywest	Citywest Shopping Centre
Romayo's	Citywest Shopping Centre
Chopped	Citywest Shopping Centre
Costa Coffee	Citywest Shopping Centre
Domino's Pizza	Citywest Shopping Centre
Open Space	
Citywest Playground	Carrigmore Green
Carrigmore Park	Carrigmore Green
Mac Uilliam Park and Playground	Mac Uilliam Mews
Community Hall/Centre	
Community Services	Citywest Shopping Centre
Medical	
Specsavers	Citywest Shopping Centre
McCabe's Pharmacy	Citywest Shopping Centre
Primacare	Citywest Shopping Centre
TLC Centre	Fortunestown Lane
Swiftbrook Medical Centre	Fortunestown Lane
Beauty	
DK Barbers Citywest	Citywest Shopping Centre
Kerry Hanaphy	Citywest Shopping Centre
House of Colour	Citywest Shopping Centre
Petrol Station/E-Car Charing Point	
Electric Charging Point	Citywest Shopping Centre
Electric Charging Point	Fortunestown Lane
Other Facilities	
National Driver Licence Service	Citywest Shopping Centre
Post Office	Citywest Shopping Centre
Tower Credit Union	Citywest Shopping Centre
Crystalwave Dry Cleaner	Citywest Shopping Centre
Celtic Careers	Citywest Shopping Centre
Funky Monkeys	Citywest Shopping Centre

Table 4.8 List of existing facilities within 1km of subject site

As noted above in the population section, several residential developments have been granted permission recently. In addition to housing, these developments also provide some retail units, community facilities, and public open space. These facilities will serve the population increase generated by the permitted developments.

In terms of retail, 12 no. retail units providing a total of 1,758 sqm have been permitted within 1km of the subject site. Four of these retail units will be provided as part of the Citywest Shopping Centre SHD scheme. Six will be located west of the site, adjacent to the Saggart Luas stop. The other two retail units are to the north-east of the subject site. The three locations of these retail units are shown in the map below.

These permitted developments also include a total of three café units. Two will be provided alongside the retail units in Citywest Shopping Centre and the third will be provided with the retail units at Saggart Luas Stop.

Permitted Facilities within 1km of subject site				
Reg. Ref.	Retail	Sqm	Location	Map ID
SD15A/0127	1 retail unit	237	Citywest Village	B
	1 kiosk	56.6	Citywest Village	B
ABP 305563	6 retail units	1,180	Fortunestown Lane	A
ABP 305556	4 retail units	284.6	Citywest Shopping Centre	C
Total	**12 retail units**	**1,758**		
Reg. Ref.	Café/Restaurant	Sqm		
ABP 305563	Café/Bar	188	Fortunestown Lane	A
ABP 305556	2 café units	205.8	Citywest Shopping Centre	C
Total	**3 café units**	**393.8**		

Table 4.9 Permitted Retail and Cafe Units within 1km of subject site.

Figure 4.9 Locations of Permitted Retail and Cafes

In terms of parks and public open space, the permitted developments include a variety of open spaces. The smaller parks will serve the residents of each development while the larger parks will serve as open space for the wider area.

The ABP305563 permission will provide a Local Square next to the Saggart Luas Stop, which will be framed by the 6 retail units. In addition to public open space, this Local Square will provide a clear connection between the Luas stop and the residential development to the north.

A large District Park located north-west of the subject site was permitted by ABP 300555 and will provide playing pitches. Once the surrounding developments are complete this park will be within a 10 minute walk of the subject site.

A linear park south of the subject site along Citywest Road was granted permission by ABP306602. This will provide further public open space within 5 minutes of the subject site.

The SD15A/0127 permission included the neighbourhood park, located to the north of the subject site, within its site boundary. The public open space permitted as part of SD16A/0210 was designed to integrate with this park. When complete these two parks will provide a large open space adjacent to the subject site, as shown in figure 4-12. The proposed development will provide a local park and connection to this neighbourhood park further enlarging this parkland.

The maps below show the walking distance from the subject site to these parks. The open spaces to the north-east currently appear out of reach from the subject site. However, when the developments are complete, they will be within a 5–10-minute walk of the subject site.

Permitted Parks and Public Open Space within 1km of Subject Site			
Reg. Ref.	Parks/Open Space	Sqm	Location
SD14A/0121	Neighbourhood Park	6,352	Cúil Dúin Avenue
	Triangular Park	2,853	Cúil Dúin Avenue
	Pocket Park	2,916	Cúil Dúin Avenue
SD15A/0127	Public Open Space	17,588	Citywest Road and Citywest Village Green
SD16A/0210	Public Open Space	6,462	Citywest Road
SD18A/0014	Public Open Space	3,070	Citywest Road
SD18A/0015	Public Open Space	3,040	Citywest Road
ABP 300555	District Park	43,000	Bianconi Avenue
	Neighbourhood Park	7,000	Bianconi Avenue
	Pocket Parks	9,000	Within Development
ABP 302398	Public Open Space	10,785	Citywest Avenue
ABP 305563	Link Routes	9,357	Within Development
	Local Square	3,845	Fortunestown Lane
ABP 306602	Linear Park	2,300	Citywest Road
	Total	**121,458**	

Table 4.10 Permitted Public Open Space within 1km of subject site.

Figure 4.9 Parks within 1km of Subject site

Figure 4.10 Permitted Parks in close proximity to subject site

Childcare

Desktop research was carried out analysing information provided by Pobal, South Dublin County Childcare Committee and South Dublin County Council. A catchment area comprising of a 1km buffer from the subject site was chosen as the basis for analysing the childcare provision in the area.

Pobal, the government agency, maintains an up-to-date map of registered childcare facilities within Ireland, enabling a more objective analysis of childcare provision and the targeting of areas where facilities may be needed in the future. This data was used to locate the existing facilities in the chosen childcare catchment area, which found that there are 6 no. childcare facilities operating within 1km of the subject. A further 6 no. childcare facilities are located within close proximity to the 1km catchment area. The locations of these 12 no. childcare facilities are shown in the figure below.

Figure 4.11 Existing Childcare Facilities within 1km of subject site

These 12 no. facilities were contacted by phone on the 30th January 2020 regarding their capacity and any vacancies. The results of this phone survey are shown in the table below.

South Dublin County Council carried out a *Study of Childcare Provision of the Fortunestown Local Area Plan* in August 2020. As part of this study, SDCC contacted 24 childcare facilities with the LAP area to determine their overall capacity and any vacancies. The LAP area is irregularly shaped and therefore not all of the childcare facilities within 1km of the subject site are included with SDCC's study. The results of the SDCC survey for the 12 no. facilities are shown in the table below, alongside the results of the phone survey carried out for this EIAR.

	Existing Childcare Facilities (the green cells are within 1km catchment area)		
		Available Spaces	
		Phone Survey (20th January 2020)	**SDCC Survey (August 2020)**
1.	Kildorama Academy	Full	No response
2.	Care & Cuddles Pre-school	1 no. spaces	No response
3.	Diane's Breakfast and Afterschool	Morning: 1 no. space. Afternoon: Full	Not listed
4.	Dara Noonan	No response	Not listed
5.	Cocoon Childcare	No response	3 no. spaces
6.	Ard Mor Montessori	No response	
7.	Loreto Playgroup	Morning: Full. Afternoon: 15 no. spaces	Morning: Full; Afternoon: 14 no. spaces
8.	Co-Operative Childcare Brookview	No response	No response
9.	Youth Horizons ltd	Full	Not listed
10.	Stepping Stones Creche and Montessori	Nearly Full	2 no. spaces
11.	Choice Childcare	Full	Not listed
	No of spaces		**19 spaces available**

Table 4.11 Childcare Facilities within 1km of Subject Site

The Citywest area has seen significant residential development in recent years. Within the subject site's vicinity, ten residential developments have been recently granted permission by South Dublin County Council or by An Bord Pleanála. Six of these ten residential development include a childcare facility. In addition, ABP included a condition in granting ABP 300555 which requires the provision of a childcare facility to serve the permitted development. A brief analysis of these developments is included to provide further context for the proposed development.

The seven permitted/conditioned childcare facility locations are shown in relation to the subject site in the figure below and listed in the following table. The permitted number of childcare spaces associated with each development is also shown in the table below and combined total 655 spaces. The childcare facility marked by number 3 (90 spaces) in the map below was permitted under ABP 302398 and is an earlier phase of development to the subject site and is in the same ownership.

Mapped Number	Planning Reference	Status	Childcare Spaces
1	SD14A/0121	Construction Commenced	130
2	SD15A/0127	Construction Commenced	107
3 (an earlier phase to the subject site, and in the same ownership)	ABP 302398	Construction Commenced	90
4	ABP 305563	Granted	110
5	ABP 305556	Granted	71
6	ABP 306602	Granted	117
7	ABP 300555; SD18A/0420	Granted	30

Table 4.12 Permitted Childcare Facilities as mapped above

Figure 4.12 Permitted Childcare Facilities within vicinity of subject site

An analysis of the local area's population indicates that c. 10.4% of the local population is aged 0-4. This is used below to estimate the population generated from the permitted developments and the expected childcare demand as a result. The following key points of analysis should be noted:

- The expected population from each permitted development was calculated by multiplying the number of units by the average household size of 2.7.
- The estimated population aged 0-4 was calculated by finding 10.4% of the total estimated population for each development.
- The childcare demand has then been estimated by calculating 25% of the population aged 0-4 projected for each permitted development. This percentage of 25% was chosen as, according to the Quarterly National Household Survey Module on Childcare, only 25% of all pre-school children in the Dublin area attend creche or Montessori.
- The 2018 Apartment Guidelines state that *one-bedroom or studio type units should not generally be considered to contribute to a requirement for any childcare provision.* Therefore, the first calculation excludes the permitted one bed units.
- The 2018 Apartment Guidelines also note that *subject to location, this may also apply in part or whole, to units with two or more bedrooms.* Therefore, the second calculation excludes the permitted one and two bed units.
- The units permitted by SD14A/0121 were replaced by SD15A/0095 and are therefore not included in the calculations below. The creche permitted under SD14A/0121 was not altered by SD15A/0095.
- The number of childcare spaces provided by the SD14A/0121 creche was estimated based on the 2001 Guidelines which require a minimum floor space of 2.32sqm per child, exclusive of kitchen, bathroom, halls and furniture.
- As part of the subject application 32 no. units permitted by ABP 302398 will be replaced. These 32 no. units have been excluded from the calculations.

Electoral Divisions	2016 Population	Pop Aged 0-4	% of Total Pop Aged 0-4
Saggart	4,640	504	10.9%
Tallaght – Jobstown	17,824	1958	11.0%
Tallaght - Fettercairn	8,380	739	8.8%
Total	**30,844**	**3201**	**10.4%**

Table 4.13 Electoral Divisions Population Aged 0-4. Source: CSO

Pre-school children

	Border	Midland	West	Dublin	Mid-East	Mid-West	South-East	South-West	State
Type of childcare									
Parent / Partner	65	56	59	62	65	51	67	65	62
Unpaid relative or family friend	16	13	18	16	16	16	20	22	17
Paid relative or family friend	2	5	2	3	5	1	4	2	3
Childminder / Au Pair / Nanny	13	18	21	8	13	13	13	12	13
Creche / Montessori / Playgroup / After-school facility	15	14	15	25	14	28	17	16	19
Other	1	<1	<1	1	<1	1	1	1	1
Total pre-school children using non-parental childcare	**45**	**47**	**49**	**46**	**45**	**53**	**45**	**45**	**46**
Unweighted sample	*198*	*136*	*234*	*525*	*244*	*189*	*230*	*316*	*2,072*

Figure 4.13 Extract from Quarterly National Household Survey, 2016 Q4 Module on Childcare

Planning Ref.	Number of Units excluding 1 beds units	Pop Aged 0-4 (10.4%)	Childcare Demand (25%)	Creche Spaces Provided
SD14A/0121, SD15A/0095	224	63	16	130
SD15A/0127	372	104	26	107
SD16A/0210	108	30	8	0
SD18A/0014	74	21	5	0
SD18A/0015	52	15	4	0
ABP 302398	309	87	22	90
ABP 305563	370	104	26	110
ABP 305556	184	52	13	71
ABP 300555; SD18A/0420	526	148	37	30
ABP 306602	376	106	26	117
Total	2595	729	182	655

Table 4.14 Estimated Childcare Demand from Permitted Developments when one bed units are excluded

Planning Ref.	Number of Units excluding 1 and 2 beds units	Pop Aged 0-4 (10.4%)	Childcare Demand (25%)	Creche Spaces Provided
SD14A/0121, SD15A/0095	224	63	16	130
SD15A/0127	336	94	24	107
SD16A/0210	90	25	6	0
SD18A/0014	58	16	4	0
SD18A/0015	52	15	4	0
ABP 302398	135	38	9	90
ABP 305563	43	12	3	110
ABP 305556	40	11	3	71
ABP 300555; SD18A/0420	459	129	32	30
ABP 306602	66	19	5	117
Total	1503	422	106	655

Table 4.15 Estimated Childcare Demand from Permitted Developments when one and two bed units are excluded

When only one bed units are excluded, it is estimated that c. 729 no. children from these ten developments will be within the 0-4 age cohort, of which c. 182 will require childcare (based on the Quarterly National Household Study which identified only 25% of children attend childcare, with the remainder minded by a parent, grandparent or childminder). When one and two bed units are excluded, an estimated c. 422 no. children will be within the 0-4 age cohort, of which an estimated c. 106 will require childcare.

Between these ten developments there will be c. 655 no. childcare spaces provided. Based on the estimated childcare demand from the permitted development, these permitted 655 no. spaces will result in an overprovision of childcare spaces between 473 no. spaces and 549 no. spaces.

This SDCC Childcare Provision study from August 2020 also analysed the permitted residential developments and permitted childcare facilities in the area. The study concluded that *the combined number of existing, permitted and proposed childcare facilities within the study area is sufficient to cater for current and future demand within the Fortunestown LAP.*

On this basis, it has been established that additional childcare facilities are not required in this area.

Schools

Desktop research of the schools in the area was carried out using the available information from The Department of Education and Skills and Google Maps.

The Department of Education and Skills divides the county into School Planning Areas to track school demand and ensure improvements to schools are provided in strategic locations. The subject site is located within the Tallaght School Planning Area, adjacent to the boundary with the Newcastle-Rathcoole School Planning Area.

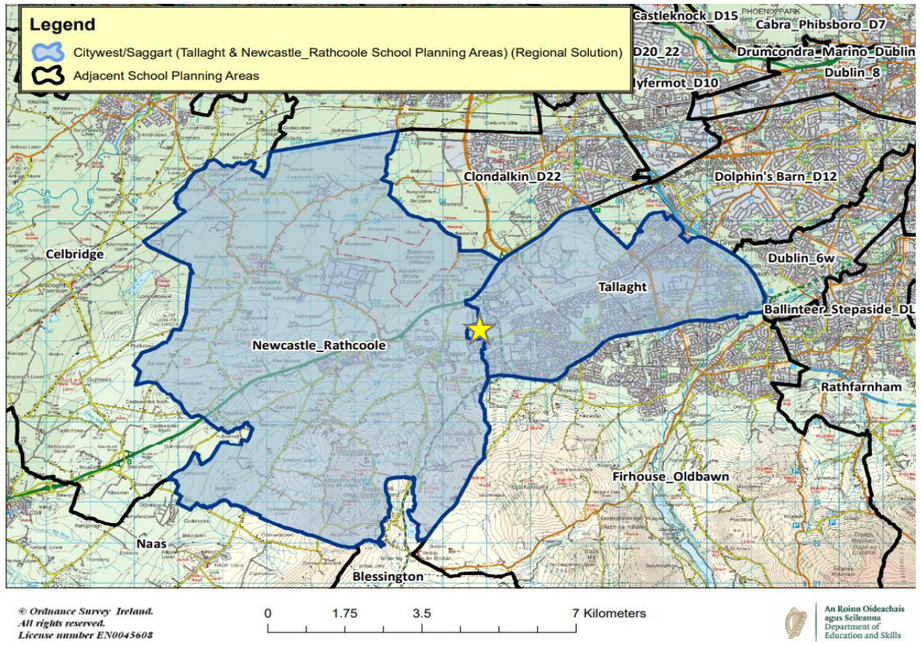

Figure 4.14 School Planning Areas. Subject Site Location marked by yellow star. Source: Education.ie

As these school planning areas covers a large area, a 1km Catchment Area was chosen as the basis for examining the schools in relation to the subject site. Within this catchment, there are three primary schools and one post-primary school. One of the primary schools is within a five minute walk of the site, the other three schools are within a ten minute walk. Permission was also recently granted (under SD19A/0393) for a three storey 1,000 pupil post primary school and a two storey 16 classroom primary school for 300 pupils.

This 1km catchment area, the four existing schools, and the two permitted schools are shown in the figure below.

The Department of Education provides enrolment information for all primary and post primary schools in the country. The 2019/2020 enrolment figures for the existing schools within 1km of the subject site are shown in the table below.

Roll No.	Primary Schools	Gender	2019/2020 Enrolment	School Planning Area
20422O	Scoil Aoife Community National School	Mixed	215	Tallaght
20402I	Citywest Educate Together National School	Mixed	384	Newcastle-Rathcoole
20398U	Citywest & Saggart Community National School	Mixed	414	Newcastle-Rathcoole
Roll No.	Post-Primary Schools	Gender	2019/2020 Enrolment	
91338D	St. Aidan's Community School	Mixed	438	Tallaght

Table 4.16 Schools within 1km Catchment of Subject Site

Figure 4.15 Schools within 1km of subject site

In addition to the four existing schools listed above, a further eleven primary schools and two post primary schools are located within the three Electoral Divisions used to calculate the local area population. Scoil Naomh Briotas is located c. 6km south of the site, which is the furthest away from the subject site. The rest of the schools below are all within 3km of the subject site.

Roll No.	Primary Schools	Gender	2019/2020 Enrolment	School Planning Area
17055T	Scoil Naomh Mhuire, Garter's Lane, Saggart	Mixed	703	Newcastle-Rathcoole
19702N	St Thomas Junior National School	Mixed	362	Tallaght

19765O	St Thomas Senior National School	Mixed	399	Tallaght
19782O	St Brigid's National School, Brookfield, Tallaght	Mixed	226	Tallaght
19834H	St Aidan's National School	Mixed	292	Tallaght
19582G	St Maelruain's National School, Jobstown	Mixed	78	Tallaght
19390U	Saint Marks Senior National School	Mixed	529	Tallaght
19472W	Saint Marks Junior National School	Mixed	506	Tallaght
20173T	St Anne's Primary School, Kilcarrig Av, Tallaght	Mixed	377	Tallaght
19503H	Scoil Chronain, An tSráid Mhór, Ráth Cúil	Mixed	409	Tallaght
18173H	Scoil Naomh Briotas, Brittas, Co. Dublin	Mixed	113	Blessington
	Post-Primary Schools	Gender	2019/2020 Enrolment	
70141N	Mount Seskin	Mixed	325	Tallaght
91332O	St Mark's Community School	Mixed	834	Tallaght

Table 4.17 Schools within 3 Electoral Divisions used to calculate the Local Area Population

A further eleven primary schools and four post primary schools are located within the Tallaght School Planning Area and the Newcastle-Rathcoole School Planning. However, as these schools are located further from the subject site, they are not listed here. The locations of all the schools listed above and the further ones with the school planning areas are shown in the figure below.

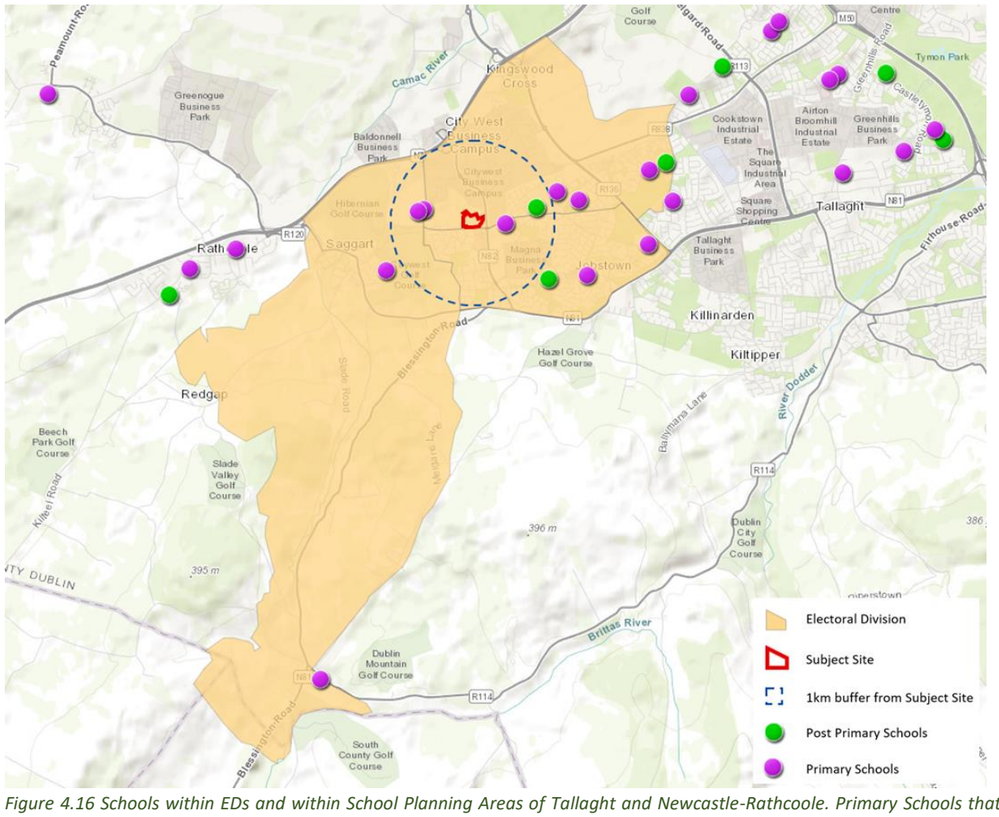

Figure 4.16 Schools within EDs and within School Planning Areas of Tallaght and Newcastle-Rathcoole. Primary Schools that consist of a junior school and senior school are represented by one icon.

The Department of Education and Skills maintains a status record on all school building projects around the country. These building projects include both new schools and extensions to existing schools. In the *31 May 2020 Current status of large-scale projects being delivered under the school building programme,* the following large school buildings projects are likely to serve the proposed development when complete:

Roll No.	School	Status
Primary Schools		
19503H	Scoil Chrónáin, Rathcoole	Site Acquisition Process, Stage 1 (Preliminary Design)
20398U	Citywest & Saggart CNS	Completed
20531T	Newcastle Rathcoole Saggart Primary	School to open in 2020. Site Secured. Stage 2b (Detailed Design)
19072N	St. Thomas Junior NS, Jobstown, Tallaght, D24	Stage 1
20402I	Citywest ETNS	Completed
20549P	Rathcoole Educate Together NS	School to open in 2020. Site Secured. Stage 1 (Preliminary Brief)
Post Primary Schools		
76594L	Citywest & Saggart (regional solution)	School to Open in 2020. Site Secured. Stage 2a (Developed Sketch Scheme)

Table 4.18 Current Status of Large Scale School Projects within vicinity of subject site. Schools in greyed out cells have been mentioned above.

Health

The surrounding context of the site consists of a mix of residential, community and amenity related land uses. It does not include any man-made industrial sites of processes (including SEVESO II Directive sites) that would be likely to result in a risk to human health and safety.

4.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development consists of a strategic housing development comprising 421 no. residential units, residential amenities, three retail units, offices, a new urban plaza, and open spaces. A detailed development description is included in Chapter 3 of this EIAR.

4.5 IMPACT ASSESSMENT

Impacts on Businesses and Residences

Construction Phase

The construction of the proposed development is likely to have a positive effect on the local employment and economic activity. The development in the short term (5 years maximum) will provide for construction related employment during the different phases of development. In the long term the project will provide additional spend in the local shops, restaurants etc and offers good quality residential units for existing and future residents of the city.

Businesses directly involved in the construction phase of the development would generate value and secure direct employment which in turn will contribute to the overall GDP of the economy and tax revenues.

Operational Phase

The proposed development will provide 421 no. residential units and considering the national average household size of 2.7 people this development will likely generate a population of c.1137 when fully occupied.

Considering the number of people in employment in the local area (57.6%), it can be expected that c.655 of the population generated will be working. This increase in the local employment population will contribute positively to local businesses and amenities, while also improving the vibrancy and vitality of the area and the community.

The proposed retail units and office space will bring new employment and economic activity to the area and will support the existing and future residential populations. The proposed retail units have been carefully considered to complement the existing retail and facilities in the area.

Impacts on Human Health

Construction Phase

The construction phase of the proposed development may give rise to short term (less than 5 years) impacts to the locality such as, construction traffic and surface contaminants, dust, exhaust emissions, noise and littering. Other impacts may include increased traffic due to hauling of building materials to and from the proposed development site, which are likely to affect adjacent population. The construction impacts are dealt with in the relevant chapters of this EIAR document. Where possible potential risks will be avoided by design.

Operational Phase

The operational stage of the development is unlikely to cause any adverse impacts on the existing and future residents of the locality in terms of human health. The design of the development has been formulated to provide for a safe environment for the future residents and visitors alike. The paths, roadways and public realm have been designed in accordance with the best practice and applicable guidelines. All open areas have been designed to be inviting, safe and conveniently located.

When complete the proposed development will increase the permeability and walkability of the area by providing safe and inviting pedestrian connections between the Citywest Shopping Centre and the existing residential areas to the north. This will make walking and cycling an attractive transport mode and will encourage people to walk and cycle, which will in turn increase daily physical activity and improve people's health.

Impacts on Air Quality and Climate

Construction Phase

The construction associated with the development will cause disturbances to the site and the locality to a certain extent. The likely impacts from the disturbance include dust emissions from moving heavy machinery and construction traffic. If not properly mitigated this has the potential to impact the surrounding population and human health.

Due to the extent of works on the site the increase in exhaust emissions will be a short-term effect and will not have any significant detrimental impacts to the air quality. The potential of an increase in exhaust emissions and dust release into the atmosphere will be managed through a Construction Management Plan. Waste generated during and after the construction phase will be dealt with in a Waste Management Plan. Any impacts to the existing population and health will be adequately addressed and mitigated.

Operational Phase

During the operational phase of the development, it is susceptible that there will be a slight reduction in air quality with the growth of population on site and associated increase in the vehicular traffic. Emissions from living conditions such as heating, and kitchen may also contribute to the small increase in localised emissions.

The completion and operation of the development will also see a growth in the landscaped areas within the site. Plants, trees and other landscaping elements will see to the absorption of Carbon Dioxide from the atmosphere and releasing oxygen back. These effects are discussed in detail in Chapter 9 - Air Quality and Climate. Any effects due to the development during the operational phase is not anticipated to be of significant impact to the existing or expected population of the locality.

Impacts on Retail and Community Services

Construction Phase

During the construction phase, the local retail and community services will be temporarily impacted by construction noise, traffic and dust. Although negative, this impact will be minor, mitigated and will only continue for the construction period.

Operational Phase

The local population increase that will be generated by the proposed development will support the existing and permitted retail and community facilities in the area.

The proposed retail units will serve both the proposed development and the surrounding area.

Although the Citywest Shopping Centre is located less than a five minute walk to the south-west of the subject site a pedestrian must cross the Luas track and Fortunestown Lane and navigate two roundabouts to access the shopping centre from the subject site. These elements hinder the pedestrian permeability to the shopping centre and will likely deter residents from walking the short distance for purchasing convenience goods. Therefore, small retail units are proposed within the development for the residents.

Figure 4.17 Fortunestown Lane and the Luas stop that separate the subject site from the Citywest Shopping Centre

Impacts on Childcare

Construction Phase

During the construction phase, the childcare facilities within close vicinity of the subject site will be temporarily impacted by construction noise, traffic and dust. Although negative, this impact will be minor, mitigated and will only continue for the construction period.

Operational Phase

The analysis of the 2016 population data for the local area shows that c. 10.4% of the population is aged 0-4. The proposed development will provide 421 no. residential units and is likely to result in a 0-4 aged population of c. 118 no. children. This projected increase in the local area's 0-4 aged population will result in an increased demand for childcare facilities. However, not all children will require childcare. The Quarterly National Household Survey Childcare Module notes that only c.25% of children in the Dublin area attend private childcare. Applying this 25% to the expected children, it can be assumed that just c. 30 children from the development will require childcare. In addition, the 2018 Apartment Guidelines note that one bed units and two bed units may be excluded for the purposes of estimating childcare demand. When one and two bed units are excluded, the proposed development will likely have a population of c. 8 children aged 0-4, of which only c. 2 will require childcare. These calculations are shown in the table below.

	2001 Childcare Guidelines	2018 Apartment Guidelines	
	Total Units	**Without 1 beds**	**Without 1 and 2 beds**
No. of Proposed Units	421	295	28
2001 Guidelines 20 spaces/75 units	112	79	7
Population Analysis			
Total Population (2.7 per household)	1137	797	76
Population 0-4 (10.4% of total pop)	118	83	8
Quarterly National Household Survey			
Total requiring childcare (25%)	30	21	2
Total requiring childcare (50%)	59	41	4

Table 4.19 Projected Childcare Demand from Proposed Development

The permitted development immediately west of the site (ABP 302398) includes a creche that will provide c. 90 childcare spaces. When the permitted development and the proposed development are assessed together, they have an expected population of 2,290, of which 238 will be within the 0-4 age cohort. Again, as only 25% children attend private childcare it can be expected that the two developments will have a childcare demand for c. 60 no, spaces. Therefore the permitted creche with c.90 no. childcare spaces will be sufficient to cater for both the permitted development and the proposed development. These calculations are shown in the table below.

	2001 Childcare Guidelines	2018 Apartment Guidelines	
	Total Units	**Without 1 Beds**	**Without 1 and 2 Beds**
Number of Units (of both permitted ABP 302398 plus the subject site)	848	614	173
2001 Guidelines 20no. spaces/75 units	226	164	46
Population Analysis			
Total Population (2.7 per household)	2290	1658	467
Population 0-4 (10.3% of Pop)	238	172	49
Quarterly National Household Survey			
Total Requiring Childcare (25%)	60	43	12
Total Requiring Childcare (50%)	119	86	24

Table 4.20 Projected Childcare Demand from Proposed Development & Adjoining Phase 2 Development

Furthermore, it is also noted above, that there are other creches permitted within the vicinity of the site, as such, any childcare demands arising from this site can be accommodated in the adjoining site, or others within the vicinity.

There are 11 existing creche facilities in the wider area plus an additional 7 planned creches which in total will provide 655 additional spaces. 3 of these creches are already under construction including the 90 place creche in the applicant's scheme noted above. SDCC (as per its Childcare Provision Study August 2020) also concludes that the combined number of existing, permitted and proposed childcare facilities within the study area is sufficient to cater for current and future demand within the Fortunestown LAP.

As a result, it is considered that there is sufficient existing/planned childcare provision in the vicinity and that a childcare facility will not be required as part of this proposed development.

Impacts on Schools

Construction Phase

During the construction phase of development there will be minimal impact on the surrounding schools. The school will be temporarily negatively impacted by construction noise and dust. However, any negative impact will be of short duration and will be mitigated appropriately.

Operational Phase

The 2016 census indicates the share of population in the Primary School (4-11) and Post Primary School (12-18) years. This percentage share was just to estimate the number of primary and post-primary school children the proposed development would generate.

An analysis of the 2016 Census information shows that the total population for identified Local Catchment Area (consisting of three Electoral Divisions) was 30,844 people, of which 4,569 were of primary school age and 3,600 were of post-primary school age. This equates to approximately 15% of the population as primary school age and approximately 12% as post-primary school age.

Local Area Catchment	**Number of People**	**% Total 2016 Population**
Primary School Age (5-11)	4,569	14.8%
Post Primary School Age (12-18)	3,600	11.7%
Total 2016 Population	30,844	100%

Table 4.21 Breakdown of 2016 Local Population

The national household size, according to the 2016 census, is 2.7 people. The proposed residential development contains 421 no. units and will have an expected population of c. 1,137 when mature. Using the percentages explained above, the estimated maximum primary school going population that would be generated by the development is c. 168 and c. 133 students for post-primary.

	Projected Population for Development when Mature
Total Population	1,158
Primary School Age (5-11)	171
Post Primary School Age (12-18)	135

Table 4.22 Projected School Aged Population of Development

However, the proposed development will not generate this level of demand instantly given that the development will initially be occupied by those predominately in the early family cycle (e.g. young, singles, newlyweds). Initially

the demand will be for childcare mainly. Over the course of approximately 10 years primary school demand will increase and then secondary school demand incrementally.

In addition, the enrolment levels in schools change over time and national enrolment projections estimate decreasing enrolment numbers first at primary school and 5 years later at post primary school. These national projections are carried out by the Department of Education and Skills.

The Department of Education published *Projections of Full-Time Enrolment Primary and Second Level 2018-2036* in July 2018 which outlined 4 possible scenarios for the future enrolment in schools. Enrolment projections show that primary school enrolment numbers reached their peak in 2018 and that a continuous decline in enrolment until 2036 is expected. The projected enrolment for post-primary schools is not expected to peak until 2024 or 2025, which is then expected to be followed by a continuous decline until 2036.

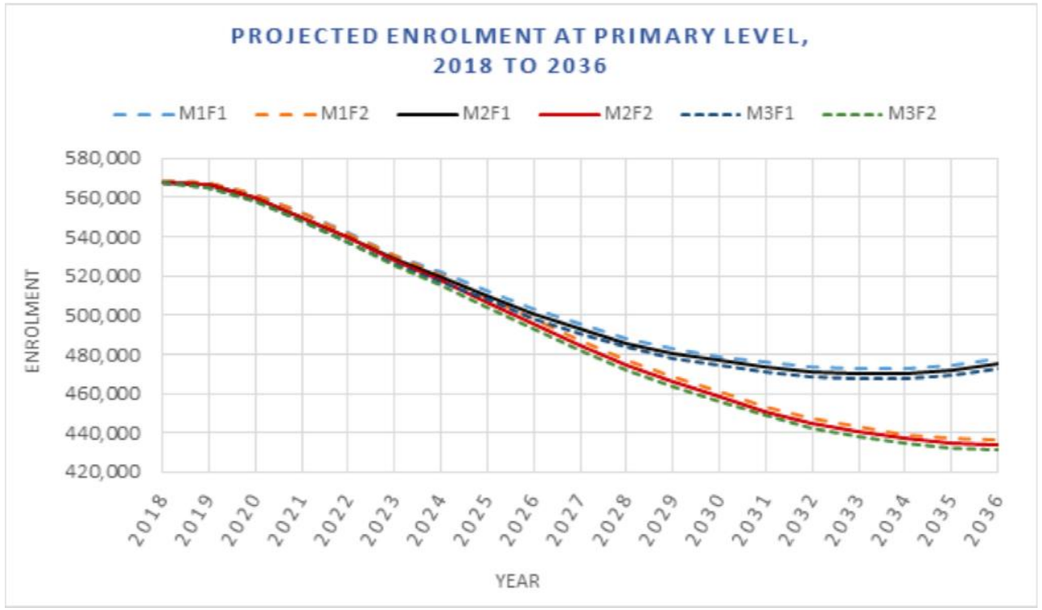

Figure 4.18 Projected Primary School Enrolment. Source: Dept. of Education and Skills

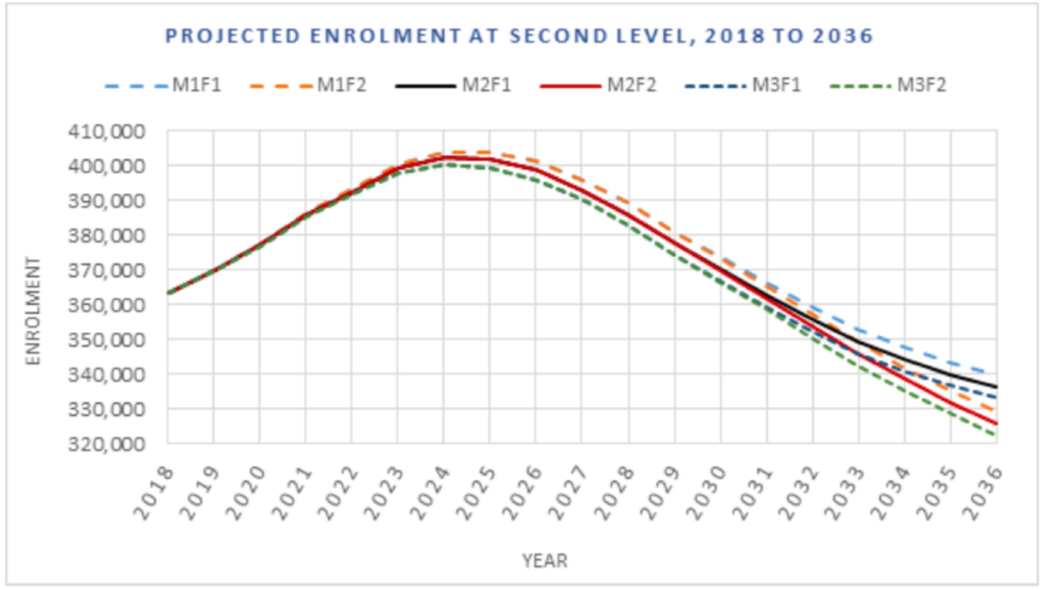

Figure 4.19 Projected Post-Primary Enrolment. Source: Dept. of Education and Skills

Following these projections, it can then be assumed that the increase in primary school aged children caused by the development is likely to be lower than expected and will level out in the near future and will not continue to increase into the future.

As it stands, permission has been granted for 2 no. primary schools (in accordance with the Fortunestown LAP) under Reg. Ref. SD16A/0255 located at Cooldown Commons, which is a short distance west of the subject site (c.500m). These schools are now complete and occupied by Citywest and Saggart Community National School and Citywest Educate Together National School. A further primary school reservation site has been identified in Boherboy (see planning application ABP Ref. 304828-19). Permission has also recently been granted for a new 1,000 pupil post primary school and new 16 classroom primary school under SD19A/0393 located at Fortunestown Lane, west of the subject site. These recently permitted schools will serve the projected demand for school places that is expected from the additional residential developments in the area.

The Department of Education and Skills is actively reviewing the potential need to establish a new primary school in Rathcoole and a new post-primary school in Tallaght. While there is no identified need for further schools within the LAP lands, there are LAP identified sites available should the demand arise in the future.

4.6 POTENTIAL CUMULATIVE IMPACTS

Overall, the cumulative impacts of the proposed development on the population and human health are envisaged to be positive. The significant new population will contribute to the economic viability of the area, increasing in spending and a range of new services and facilities and new open spaces will add to the viability and vibrancy of the area. The existing services and facilities will tap into the expanding population and invest more. Schools, Buses, shops etc. will benefit from the increase in population.

4.7 MITIGATION MEASURES

Construction Phase

A preliminary Construction Management Plan (CMP) has been prepared by DBFL and will be implemented during the construction phase to reduce the detrimental effects of the construction phase on the environment and local population. The CMP will be formally agreed in writing with the planning authority in writing prior to the commencement of the development (the preliminary CMP is included with this application for reference). Other items to be mitigated during the construction phase are discussed further under various environmental topics discussed in the chapters following. These measures are put forward to avoid any significant negative environmental impacts on the population and human health.

Operational Phase

The proposed development has been designed to avoid negative impacts on population and human health through the provision of various physical and social infrastructure as part of the development as are outlined in Chapter 3 of this EIAR. No addition mitigations measures are considered necessary.

4.8 PREDICTED IMPACTS

Construction Phase

Any adverse likely and significant environmental impacts will be avoided by the implementation of the remedial and mitigation measures proposed throughout this EIAR. Positive impacts are likely to arise due to an increase in employment and economic activity associated with the construction of the proposed development. The overall predicted likely and significant impact of the construction phase will be short-term, temporary and neutral.

Operational Phase

The proposed development will contribute to further growth and expansion of the neighbourhood contributing to the existing and future populations. The predicted impacts of the Operational Phase are considered to be long term and positive to population and human health.

4.9 CONCLUSIONS

Do Nothing Scenario

A 'do nothing' scenario will result in the subject site remaining undeveloped and the existing buildings falling into dereliction.

Worst Case Scenario

The worst-case scenario for the development will be a situation where the development is only partially completed.

4.10 MONITORING AND REINSTATEMENT

The monitoring measures required for the aspects of water, air quality and climate, noise, landscape and visual impact, etc provides an appropriate response in this instance. There are no reinstatement works proposed for the proposed site.

4.11 DIFFICULTIES IN COMPILING INFORMATION

As outlined above, there were two minor limitations in compiling the population data.

- The census data that informed this chapter's analysis dates from 2016, which could be considered out of date.
- This chapter was prepared during the Covid-19 pandemic which has impacted the employment levels and the childcare capacity levels. It is not yet clear what the long-term effects of this pandemic will be.

Despite these limitations to the data collection, every effort was made to ensure that the data collected and analysed was as accurate as possible.

4.12 REFERENCES

Central Statistics Office, 2020, *Labour Force Survey Quarter 1 2020*. Available at: https://www.cso.ie/en/releasesandpublications/er/lfs/labourforcesurveylfsquarter12020/

Central Statistics Office, 2020, *Annual Population Estimates.* Available at: https://statbank.cso.ie/px/pxeirestat/statire/SelectVarVal/Define.asp?Maintable=PEA01&PLanguage=0

Central Statistics Office, 2016, *Census 2016 Small Area Population Statistics*. Available at: http://census.cso.ie/sapmap/

Department of Education and Skills, 2020, School Enrolment Statistics for Primary Schools. Available at: https://www.education.ie/en/Publications/Statistics/Data-on-Individual-Schools/primary/

Department of Education and Skills, 2020, School Enrolment Statistics for Post-Primary Schools. Available at: https://www.education.ie/en/Publications/Statistics/Data-on-Individual-Schools/post-primary/

Department of Education and Skills, 2020, *31 May 2020 Current status of large-scale projects being delivered under the school building programme.* Available at: https://www.education.ie/en/Schools-Colleges/Services/Building-Works/Major-Projects/current-status-of-large-scale-projects.pdf

Department of Education and Skills, *2020 Citywest/Saggart (Tallaght & Newcastle_Rathcoole School Planning Areas) (Regional Solution).* Available at: https://www.education.ie/en/Schools-Colleges/Information/Establishing-a-New-School/New-Post-Primary-Schools/2020/Citywest-Saggart.pdf

Department of Education and Skills, 2017, *Projections of Full Time Enrolment Primary and Second Level 2017-2035*. Available online at: https://www.education.ie/en/Publications/Statistics/projections/Projections-full-time-enrolment-Primary-and-Second-Level-2017-2035.pdf

Pobal, 2020, *Childcare Services Map*. Available at: https://maps.pobal.ie/WebApps/ChildcareFacilities/index.html

SDCC, 2020, *Study of Childcare Provision of the Fortunestown Local Area Plan*

5 BIODIVERSITY

5.1 INTRODUCTION

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

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

Proposed Development Site Location and Brief Description
The subject site is located in the townland of Cooldown Commons which is located in the western portion of County Dublin and less than 1.5km east of the village of Saggart. The subject lands are currently composed of modified or disturbed ground and are bounded to the west and south by built development. Open land lies to the north. Historic mapping shows that this general area was in agricultural use until relatively recently however significant land use change has occurred since the 1990s (www.osi.ie).

Statement of Competence
This section of the EIAR has been prepared by Pádraic Fogarty of OPENFIELD Ecological Services. Pádraic Fogarty has worked for 25 years in the environmental field and in 2007 was awarded an MSc from Sligo Institute of Technology for research into Ecological Impact Assessment (EcIA) in Ireland. OPENFIELD is a full member of the Institute of Environmental Management and Assessment (IEMA).

5.2 METHODOLOGY

The assessment was carried out in accordance with the following best practice methodology: 'Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland' by the Chartered Institute of Ecology and Environmental Management (IEEM, 2016).

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

This biodiversity study and impact assessment was completed through a combination of detailed desktop reviews and baseline field assessments which are described in the following sections.

Site visits were carried out on the 4th of March and the 25th of May 2020 during suitable weather conditions. On each occasion the site was surveyed in accordance with the Heritage Council's Best Practice Guidance for Habitat Survey and Mapping (Smith et al., 2010). Habitats were identified in accordance with Fossitt's Guide to Habitats in Ireland (Fossitt, 2000).

Surveys took place within the optimal survey period for general habitat and breeding birds (Smith et al., 2010). March is within the optimal survey period for surveying breeding birds, Badgers and amphibians. A dedicated bat survey was carried out for this development by Dr Tina Aughney during the optimal period. It was possible to classify all habitats on the site to Fossitt level 3.

A desktop review of available data for the study site was completed by referring to relevant online databases such as: The National Parks and Wildlife Services (NPWS), The National Biodiversity Data Centre (NBDC) and The Environmental Protection Agency (EPA).

5.3 RECEIVING ENVIRONMENT

Best practice guidance suggests that an initial zone of influence be set at a radius of 2km for non-linear projects (IEA, 1995). However, some impacts are not limited to this distance and so sensitive receptors further from the project footprint may need to be considered as this assessment progresses. This is shown in figure 5.1.

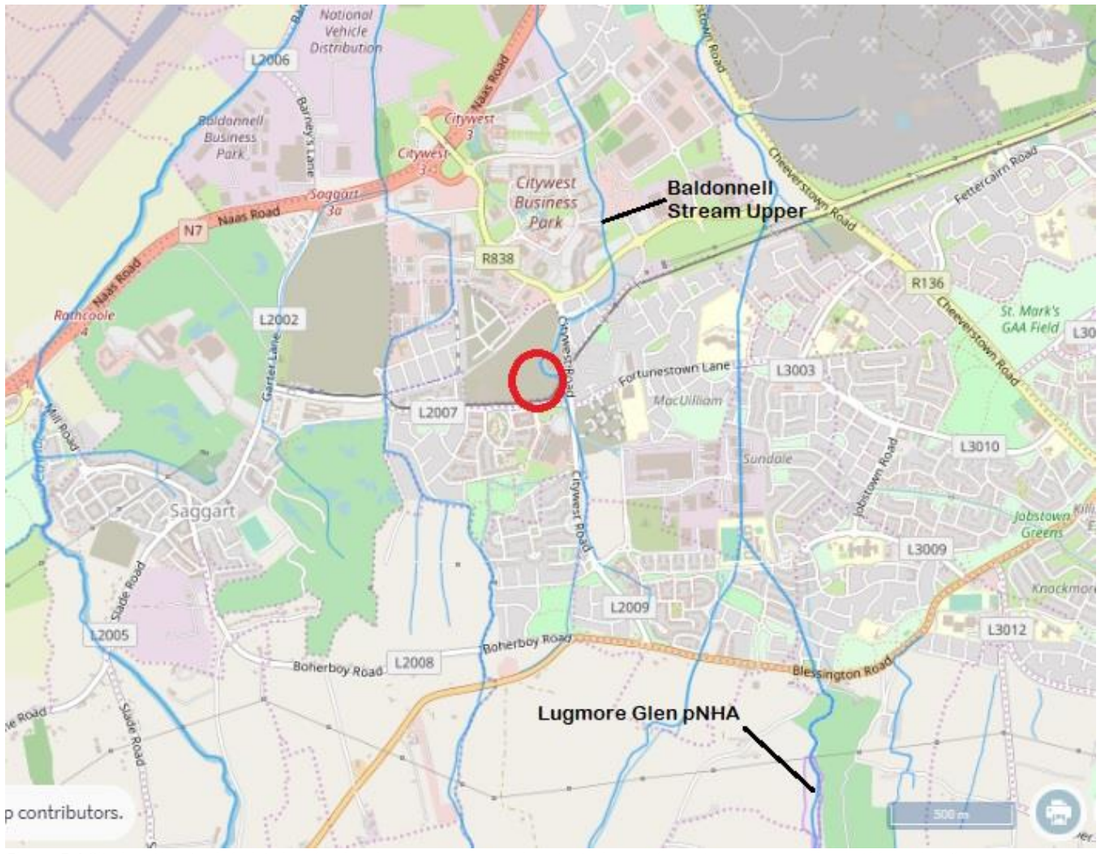

Figure 5.1 Site location (red circle) showing local water courses and protected areas for nature conservation in this region (from www.epa.ie).

There are a number of designations for nature conservation in Ireland including National Park, National Nature Reserve, RAMSAR site, UNESCO Biosphere reserves, Wildfowl Sanctuary, Special Protection Areas (SPA – Birds Directive), Special Areas of Conservation (SAC – Habitats Directive); and Natural Heritage Areas. The mechanism for these designations is through national or international legislation. Proposed NHAs (pNHA) are areas that have yet to gain full legislative protection. They are generally protected through the relevant County Development Plan.

There is no system in Ireland for the designation of sites at a local, or county level. Within 2km of the subject site there are a number of such areas.

The residential area/footprint of the study site is not located within the boundary of any designated nature conservation site. The nearest designated site is the Lugmore Glen pNHA (site code: 1212). This small wooded glen is located about 2 km south-east of Saggart in Co Dublin. It is quite a narrow valley cut in glacial drift. A small stream winds through the valley.

The wood is mainly of dense Hazel (Corylus avellana) but also contains Ash (Fraxinus excelsior), Elder (Sambucus nigra) and Blackthorn (Prunus spinosa). The herb layer is quite rich, especially towards the stream, with species such as Wood-sorrel (Oxalis acetosella), Bugle (Ajuga reptans), Primrose (Primula vulgaris), Honeysuckle (Lonicera periclymenum), Bluebells (Hyacinthoides non-scripta), Ivy (Hedera helix), Wood Sedge (Carex sylvatica), Woodruff (Galium odoratum) and Wood Speedwell (Veronica montana). The Soft Shield-fern (Polystichum setiferum) and Broad Buckler-fern (Dryopteris dilatata) also occur.

The rare Yellow Archangel (Lamiastrum galeobdolon) occurs at this site and was recorded as being frequent in 1991.

The site is not managed or used for any purpose and does not appear to have changed much in recent years. It is surrounded by golf-links.

The importance of this site is that it is a fine example of a wooded glen with a good representation of woodland plants. This type of semi-natural habitat is now scarce in Co Dublin. The presence of a rare plant species adds to the interest of the site. (NPWS, 1995)

The web site of the National Biodiversity Data Centre (www.biodiversity.ie) contains a mapping tool that indicates records of legally protected species within a selected Ordnance Survey (OS) 10km grid square. The Cooldown Commons site is located within the square O02N and no species of protected flowering plant are highlighted. It must be noted that this list cannot be seen as exhaustive as suitable habitat may be available for other important and protected species.

Water quality in rivers, canals and estuaries is monitored on an on-going basis by the Environmental Protection Agency (EPA). The Cooldown Commons site is located within the Camac river system, which places it within the wider catchment of the River Liffey. Maps from the OSI and EPA indicate that the Baldonnell Upper Stream flows along the eastern boundary. The direction of flow is towards the north, where the stream meets the River Camac south of Baldonnell. The nearest monitoring point to the subject lands is on the Camac at the bridge south-west of Baldonnell. Here water quality was most recently assessed as Q3-4 – 'moderate status'. Indeed, all stretches of the River Camac downstream of the subject lands are assessed as either 'moderate' or 'poor' under the Water Framework Directive (WFD) reporting period 2013-2018. This suggests pollution from point or diffuse sources as well as other impediments to 'good ecological status', e.g. from barriers to fish passage. These data are taken from www.epa.ie.

Flora

The subject site is almost entirely composed of a large area of **buildings and artificial surfaces – BL3** and **spoil and bare ground – ED2** with minimal vegetation.

The Baldonnell Upper Stream is highly modified and can be described as a **drainage ditch – FH4** in this location, with excessive growths of Water-cress *Nasturtium officinalis*. It is culverted under the Luas line. Elsewhere, where there is vegetation it is ruderal in nature, with Creeping Thistle *Cirsium arvense,* Clovers *Trifolium sp.* and Willowherbs *Epilobium sp.*

There are no plant species listed as alien invasive under SI No. 477 of 2011.

Fauna

There is no suitable habitat on the lands for Otter and the Baldonnell Upper Stream lacks ecological connectivity for this species to the wider Camac catchment due to extensive culverting at either end. There was no evidence of Badger activity and no sett is present.

According to the bat survey there are no features on the site suitable for bat roosting, with no buildings or old trees with cracks and crevices. During the 2020 survey three species of bat were recorded foraging: Common Pipistrelle, Soprano Pipistrelle and Leisler's Bat. Overall, bat activity was assessed as 'low'.

Habitat is not available for Red Deer, Pine Marten or Red Squirrel. Irish Hare are widespread in Ireland and avail to a large extent of agricultural lands. Nevertheless, no record of its presence was found. Small mammals such as the Irish Stoat, Hedgehog and Pygmy Shrew are considered more or less ubiquitous in the Irish countryside, and may be active throughout (Lysaght & Marnell, 2016). Rabbits *Oryctolagus cuniculus* were seen. No other direct evidence of any mammal was recorded although Fox *Vulpes* is common along with Brown Rat *Rattus norvegicus*, House Mouse *Mus domesticus* and Field Mouse *Apodemus sylvaticus*. These species are not protected.

No birds were recorded during either March or May surveys. There is no suitable nesting vegetation for birds on this site.

The Baldonnell Upper Stream may be suitable for breeding Common Frog *Rana temporaria*, while Common Lizard *Zootoca vivipara* is considered widespread. There is no pond suitable for Smooth Newt *Lissotriton vulgaris*.

Monitoring by Inland Fisheries Ireland, from 2011, indicated that the River Camac holds populations of Brown Trout *Salmo trutta* and Three-spined Stickleback *Gasterosteus aculaetus*. Drainage ditches running through the site are of low significance in terms of their fisheries habitat but are nevertheless hydrologically linked to the wider catchment. Land use and activities in the headwaters of rivers have knock-on impacts in the main channel of rivers further downstream.

Most habitats, even highly altered ones, are likely to harbour a wide diversity of invertebrates. In Ireland only one insect is protected by law, the Marsh Fritillary butterfly *Euphydryas aurinia,* and this is not to be found on the type of habitats present here. Other protected invertebrates are not recorded from this square (NPWS, 2013).

Habitat	**Significance**
Artificial surfaces – BL3 Spoil and bare ground – ED2	Negligible ecological value

Table 5.1 Evaluation of the importance of habitats and species on the Cooldown Commons site

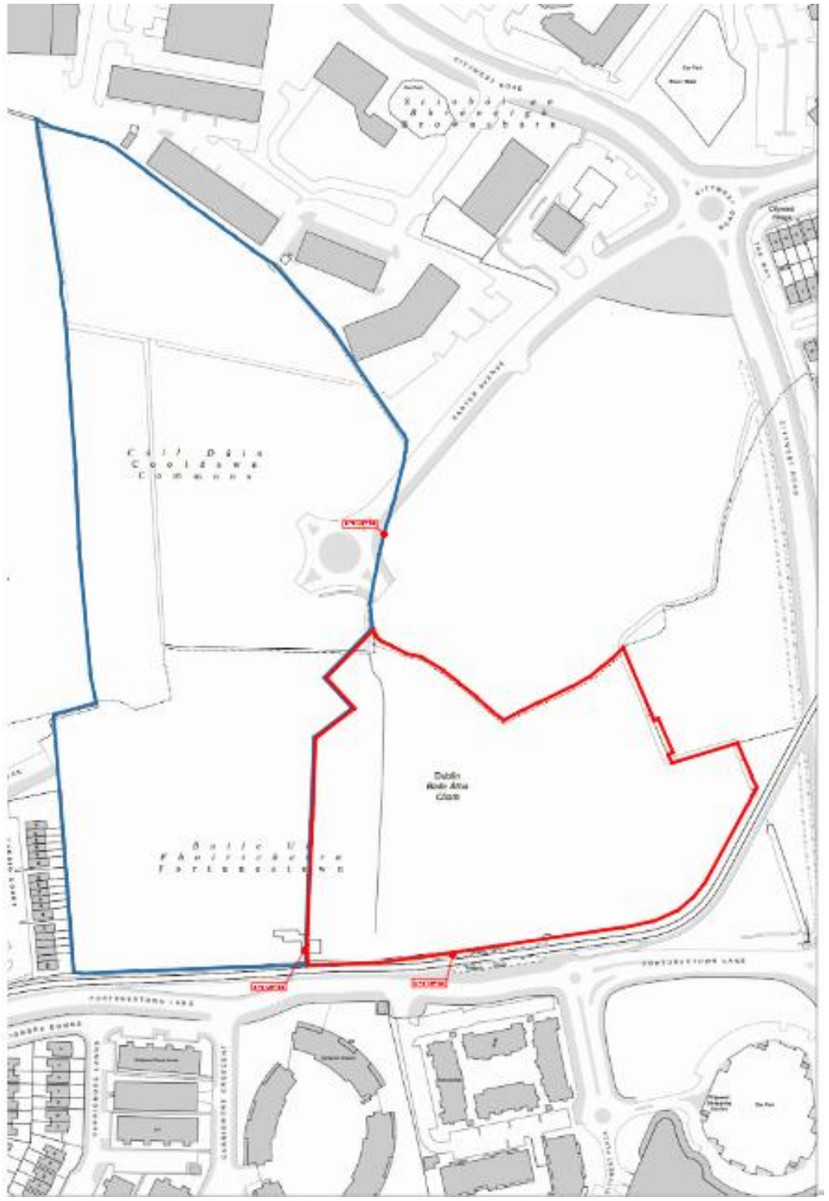

Figure 5.2 Site boundary. Source: Reddy Architecture + Urbanism Site Location Plan

5.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed residential development (with small scale retail, offices and residential amenities) is described in detail in Chapter 3 of this EIAR. The proposed development will involve the clearance of the site and preparation for construction. The Baldonnell Upper Stream is to remain in its open state with a minimum 10m setback from any buildings.

5.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT IN THE ABSENCE OF MITIGATION

This section provides a description of the potential impacts that the proposed development may have on biodiversity in the absence of mitigation. Methodology for determining the significance of an impact has been published by the NRA (NRA, 2009).

Construction Phase

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

1. The removal of artificial habitats. This will remove habitat for a small number of species which are common and widespread while the habitat itself is of negligible biodiversity value. A portion of the site is to be retained as open space while the Baldonnell Upper Stream is to remain open and in its natural state. Habitat for the majority of the species present is therefore likely to remain. This effect is considered to be neutral.
2. Pollution of water courses through the ingress of silt, oils and other toxic substances. The Baldonnell Upper Stream is not of significant fisheries value, however it does lead to the Camac and Liffey Rivers, which is are salmonid status. Silt in particular can clog spawning gravels downstream and, at high concentrations, directly affect the gills of fish. This project will include extensive land clearance works which is likely to result in sediment runoff. This effect is potentially moderate negative.
3. The direct disturbance of species during land clearance. There is no suitable habitat on the site for nesting birds. There are no bat roosts on the site. According to the bat report: "There is minimal linear habitats present within the proposed development site and therefore the proposed development site has a low value for local bat populations in relation to foraging and commuting."

Operation Phase

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

1. Impacts to species through the disruption of ecological corridors: bats may be impacted through the loss of foraging territory. There will be no disruption to aquatic corridor (noting that the Baldonnell Upper Stream is already culverted along substantial sections). A minimum 10m buffer zone is to be maintained along the stream to preserve its value as an ecological corridor.
2. Pollution of water from surface water run-off. The Greater Dublin Strategic Drainage Study (2005) identified issues of urban expansion leading to an increased risk of flooding in the city and a deterioration of water quality. This arises where soil and natural vegetation, which is permeable to rainwater and slows its flow, is replaced with impermeable hard surfaces. Surface water from the project footprint will drain to the River Camac. In this way, rain runoff will be separated from foul wastewater within the site. Currently there is no attenuation of rain run-off and this is likely to soak through open ground or enter the Baldonnell Upper Stream. In accordance with the Greater Dublin Strategic Drainage Study this project will incorporate sustainable drainage systems (SUDS) that ensure that run-off remains at a 'greenfield' rate. These are standard measures in all development projects and are not included here to avoid or reduce any effect to a Natura 2000 site. The development site is to be divided into two catchments, one of which will drain to the existing surface water drainage network for Phase 2 of this development, while the second will drain to the Baldonnell Upper Stream

via an attenuation storage unit, a flow control devise and a petrol interceptor. Additional SUDS methods include the use of permeable paving and green roofs which will reduce volumes entering the sewer system.

3. Pollution of water from foul wastewater arising from the development. Foul wastewater from the proposed development will be sent to the wastewater treatment plant at Ringsend in Dublin. Emissions from the plant are currently not in compliance with the Urban Wastewater Treatment Directive. In February 2019 Irish Water was granted planning permission to upgrade the Ringsend plant. This will see improved treatment standards and will increase network capacity by 50% and these works are currently underway. The additional loading to the Ringsend plant from this development will have no measurable impact on the discharge quality
4. Disturbance to species from increased human activity (lighting, pets etc.). The species/habitats present on this site are not considered sensitive to disturbance from noise or general human activity. Bats may be sensitive to the additional artificial lighting that may arise from this development. According to the bat report: "The potential impact of the proposed development is considered to be Minor due to the low level of bat activity recorded within the proposed development area."
5. Impacts to protected areas. There is a pathway to protected areas in the Dublin Bay, via the Camac and Liffey Rivers. A separate screening report for Appropriate Assessment has been presented and this concludes that negative effects to Natura 2000 sites are not likely to arise. There is no pathway to the Lugmore Glen or any other areas designated for nature conservation.

5.6 POTENTIAL IMPACTS

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

Impact		Significance
Construction phase		
1	Habitat loss of features of negligible value	Imperceptible
2	Disturbance to animals during construction	Imperceptible
3	Pollution of water during construction phase	Moderate negative
4	Disruption of ecological corridors	Imperceptible
5	Surface water pollution during operation	Imperceptible
6	Wastewater during operation	Imperceptible
7	Disturbance to species from human disturbance (lighting)	Not significant
8	Impacts to protected areas	Imperceptible

Table 5.2 Significance level of likely impacts in the absence of mitigation.

5.7 POTENTIAL CUMULATIVE IMPACTS

A number of the identified impacts can also act cumulatively with other impacts from similar developments in the Dublin area. These primarily arise through the urbanisation of the city's hinterland as provided for by land use zoning and include: pollution from surface water run-off and pollution from wastewater generation.

A cumulative loss of wildlife value however will be experienced as land use changes in this area from open to suburban. This is offset somewhat as open green spaces and private gardens mature over time. It is considered that the species which are already present in this area will not suffer long term consequences arising from this land use change.

5.8 MITIGATION MEASURES

Construction Phase
Pollution during construction – mitigation by reduction

A Construction Management Plan has been prepared by DBFL Construction Engineers and which should include pollution prevention measured in accordance with best practice guidelines from Inland Fisheries Ireland (2016). This identifies the potential pollution impacts and states that the following measures will be taken:

Contamination of Groundwater – There is a risk that ground water could become contaminated with lime from cement which could subsequently finds its way into the local adjacent watercourses. The measures proposed to be put in place to mitigate any potential damage from the effluent of contaminated ground water would be to create an exclusion zone, as far as reasonably practicable.

Sediment & Erosion – Similar to the above, groundwater needs to be protected from sedimentation and erosion due to direct surface water runoff generated onsite during the construction phase. To prevent this from occurring, surface water discharge from the site will be managed and controlled for the duration of the construction works until the permanently attenuated surface water drainage system of the proposed site is complete. A temporary positive drainage system shall be installed prior to the commencement of the construction works to collect surface water runoff by the site during construction. A series of geotextile lined cascading, high level outfall, settling basins will be installed upstream of the agreed discharge point. This temporary surface water management facility will throttle runoff and allow suspended solids to be settled out and removed before being discharged in a controlled manner to the agreed outfall. All inlets to the cascading settling basins will be riprapped to prevent scour and erosion near the inlet.

Discharge Licences – It will not be permitted to discharge into any newly constructed storm water systems or watercourse without adhering to the conditions of the discharge licence and agreeing the same with the Site Manager and Local Authority Area Engineer.

Over Ground Oil / Diesel Storage – Only approved storage system for oil / diesel within the site will be permitted, (i.e. all oil / diesel storage to be located within a designated area placed furthest away from adjacent watercourses and contained within constructed bunded areas e.g. placed on 150mm concrete slab with the perimeter constructed with 225mm solid blockwork rendered internally). The bunded area will accommodate the relevant oil / diesel storage capacity in case of accidental spillage. Any accidental spillages will be dealt with immediately on site by containment /removal from site.

Concrete Washout – The washing out of concrete trucks on site will not be permitted as they are a potential source of high alkaline discharges to watercourses. Consequently, it is a requirement that all concrete truck washout takes place back in the ready-mix depot.

Disposal of Wastewater off Site – The Site Management Team will maintain a record of all receipts for the removal of toilet or interceptor waste off site to insure its disposal in a traceable manner. These will be available for inspection at all times by the Environmental Section of South Dublin County Council.

Road Sweepers / Cleaning – The cleaning of public roads in and around the subject site will be undertaken to reduce environmental impacts and care will be taken to prevent any pollution of watercourses from this activity.

Operational Phase
The following measures are taken from the bat report but will also benefit invertebrates and common birds:

Lighting
It is important that any proposed lighting for the proposed residential development is wildlife friendly. Nocturnal mammals are impacted by lighting. Therefore, it is important that lighting installed within the proposed development site is completed with sensitivity for local wildlife while still providing the necessary lighting for human usage. It is also important that developments reduce their impact on the night sky and reduce sky glow. The "Dark Sky" principal should be followed – i.e. no upward lighting to reduce light pollution. The following principles should be followed:

- 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).
    - o All luminaires used will lack UV/IR elements to reduce impact.
    - o LED luminaires will be used due to the fact that they are highly directional, lower intensity, good colour rendition and dimming capability.
    - o A warm white spectrum (<2700 Kelvins will be used to reduce the blue light component of the LED spectrum).
    - o Luminaires will feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats.
    - o Column heights should be carefully considered to minimise light spill. The shortest column height allowed should be used where possible. Ballard lighting should be considered for pedestrian and greenway areas, if deemed necessary.
    - o Only luminaires with an upward light ratio of 0% and with good optical control will be used.
    - o Luminaires will be mounted on the horizontal, i.e. no upward tilt.
    - o Any external security lighting will be set on motion-sensors and short (1min) timers. The intensity of external lighting should be limited to ensure that skyglow does not occur in order to reduce light pollution.
    - o As a last resort, accessories such as baffles, hoods or louvres will be used to reduce light spill and direct it only to where it is needed.

Landscape Plan
The landscape plan includes the following proposals:
- Development of links to a Neighbourhood Park.
- Development of a Local Park.
- Planting of native tree and shrub plant species.
- New treelines and hedgerows along the eastern boundary of the proposed development site, particularly linking in with the Neighbourhood Park.

Biodiversity Enhancement Measures
It is recommended to erect two Habitat Rocket Bat Boxes within the buffer zone along the stream. This will provide roosting sites for local bat populations. These should be located in dark zones adjacent to tall vegetation proposed to be planted as part of the landscaping.

The bat report should be consulted for full details.

5.9 'DO NOTHING' SCENARIO

In the absence of the current development scrub will develop on areas of the development site which are currently bare or disturbed soil, eventually resulting in high woodland. This would enhance the biodiversity value of the site to a certain degree. Nevertheless, the urban context of this area and its limited connectivity to surrounding areas of woodland, as well as its limited size, means that the value of the habitat is not likely to exceed 'high local value' even over a very long time period.

5.10 'WORST CASE' SCENARIO

In a worst-case scenario, pollution to the Baldonnell Stream could negatively affect fish populations as well as other aquatic life.

5.11 MONITORING & REINSTATEMENT

Monitoring is recommended post-construction works. This monitoring should involve the following aspects:

- 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.

5.12 DIFFICULTIES IN COMPILING INFORMATION

No particular difficulties in relation to compiling information for this biodiversity chapter were encountered. As noted earlier in this chapter as the biodiversity assessments were undertaken outside of the optimal period for badgers, and large mammals, as far as possible these seasonal constraints were considered as part of the impact assessment. However, every effort was made to take account of seasonal constraint. Badgers are not believed to be using the site however site surveys were carried out during summer and early autumn months when vegetation is tall. This can mean that field signs are not detected. No other difficulties were encountered in preparing this study.

5.13 RESIDUAL IMPACTS

With the full implementation of mitigation measures, no residual impacts are expected to occur which are significant.

5.14 REFERENCES

- Balmer, D.E., Gillings, S., Caffrey, B.J., Swann, R.L., Downie, I.S., and Fuller, R.J. 2013. Bird Atlas 2007-11: the breeding and wintering birds of Britain and Ireland, BTO Books, Thetford.
- Bang, P. & Dahlstrom, P. 2004. Animal Tracks and Signs. Oxford University Press, Oxford.
- Bat Conservation Ireland 2010. Bats and Lighting: Guidance Notes for Planners, Engineers, Architects and Developers. Bat Conservation Ireland (www.batconservationireland.org).
- BCT (Bat Conservation Trust) and ILP (Institution of Lighting Professionals). 2018. Bats and Artificial Lighting in the UK. Bats and the Built Environment Series. Guidance Note 08/18. England, UK.
- CIEEM. 2018. Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester.
- Colhoun K. & Cummins S. 2013. Birds of Conservation Concern in Ireland 2014–2019. Irish Birds 9: 523-544.
- EPA. 2017. Guidelines on the Information to be Contained in Environmental Impact Assessment Reports. Draft, August 2017. Environmental Protection Agency.
- Fossitt J.A. 2000. A Guide to Habitats in Ireland. Heritage Council, Kilkenny.
- Foulkes, N., Fuller, J., Little, D., McCourt, S. and Murphy, P. 2013. Hedgerow Appraisal System - Best Practise Guidance on Hedgerow Survey, Data Collation and Appraisal. Woodlands of Ireland, Dublin. Unpublished Report [pdf]
- NRA (National Roads Authority; now TII). 2009. Guidelines for Assessment of Ecological Impacts of National Roads Schemes. Revision 2, 1st June 2009. NRA, Dublin.
- NRA (National Roads Authority; now TII). 2006. Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub Prior to, During and Post -Construction of National Road Schemes. National Roads Authority, Dublin.
- NRA (National Roads Authority; now TII). 2005. Guidelines for the Treatments of Bats During the Construction of National Road Schemes.
- Parnell, J. and Curtis, T. 2012. 8th Edition. Webb's An Irish Flora. Cork University Press, Youngline Industrial Estate, Pouladuff Road, Togher, Cork, Ireland.
- Poland, J. & Clement, E. 2009. The Vegetatve Key to the British Flora. John Poland in Association with the Botanical Society of the British Isles.
- Poland, J. The Field Key to Winter Twigs. A guide to native and planted deciduous trees, shrubs and woody climbers (xylophytes) found in the British Isles. Published by John Poland, Southampton in association with the Botanical Society of Britain and Ireland.
- Smith G.F., O'Donoghue P., O'Hora K. & Delaney E. 2011. Best Practice Guidance for Habitat Survey and Mapping. The Heritage Council.
- Stone, E.L. 2013. Bats and lighting: Overview of Current Evidence and Mitigation. University of Bristol.

6 LAND, SOILS AND GEOLOGY

6.1 INTRODUCTION

This chapter of the EIAR assesses and evaluates the impact of the proposed development on the sites soils and lands during the construction and operational phases of the proposed development. It also identifies the characteristics, predicted potential impacts, mitigation measures and predicted impacts arising from the proposed development.

This chapter was prepared by DBFL Consulting Engineers - Deirdre Walsh BA BAI MSc, CEng, MIEI.

6.2 METHODOLOGY

This chapter should be read in conjunction with the site layout plans and the project description sections of the report.

The methodology followed for this section is in accordance with the EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports (Draft) 2017 and Advice Notes for Preparing Environmental Impact Statements (Draft) 2015. Information on the surrounding lands and soils was assembled from the following sources:

- Geological Survey of Ireland (GSI) interactive mapping;
- Site Investigations Report dated October 2020 carried out by 'Ground Investigation Ireland" comprising
  - 9 No. Trial Pits to a maximum depth of 3.60m BGL
  - 2 No. Soakaways to determine a soil infiltration value to BRE digest 365
  - 18 No. Window Sample Boreholes to recover soil samples
  - 11 No. Dynamic Probes to determine soil strength/density characteristics
  - 17 No. Cable Percussion boreholes to a maximum depth of 10.00m BGL
  - 15 No. Rotary Core Boreholes to a maximum depth of 15m BGL
  - Installation of 5 No. Groundwater monitoring wells
  - Geotechnical & Environmental Laboratory testing
- Environmental Assessment Report dated November 2020 by "Ground Investigation Ireland"
- Environmental Protection Agency (EPA) interactive mapping;
- Teagasc soil and sub-soil data;
- Ordnance Survey Ireland (OSI) mapping;
- Topographical Survey;
- Site Inspection / walkover;

6.3 RECEIVING ENVIRONMENT

Site Description, Topography, Land Use

The subject site is situated approximately 1km northwest of Saggart in the Fortunestown area of Citywest. It is bounded to the west and north by Phases 1 & 2 residential development under construction under planning reference ABP-302398-18. It is bounded to the east by the LUAS red line and undeveloped residentially zoned lands and the N81 and to the south by the LUAS red line and Fortunestown LUAS Stop. The N7 Naas Road is approximately 700m north of the site, with junction 3 accessed from the N82.

The Balldonnell Upper Stream forms the north east boundary of the site. The site falls from south to north and west to east towards the stream.

Soils

Review of information available on the GSI's online mapping service (GSI Maps), the subsoil appears to be till derived chiefly from deep well drained mineral (Figure 6-1) which overlays the underlying visean limestone & calcareous bedrock (Figure 6-2), commonly found within this area.

This is confirmed by site investigations of the subject site which summarise the existing ground conditions as follows: made ground, topsoil or gravelly clay was present to circa 400mm below ground level, overlying glacial till sandy gravelly clay, frequently with low cobble content, usually firm or stiff in upper horizons, becoming very stiff with increasing depth overlying bedrock.

The results of the soakaway testing indicate poor permeability, with both soakaway tests failing, which corresponds to the impermeable clay found throughout the site.

Results of the environmental laboratory testing are included in the Environmental Assessment Report by Ground Investigations Ireland, dated November 2020. The results of the "Waste Acceptance Criteria" Test Suite are presented with the individual parameter limits for "Inert" "Non-Hazardous" and "Hazardous" as outlined in the European Council Directive 1999 131/EC Article 16 Annex II, "Criteria and procedures for the acceptance of waste at landfills". The results are all below the inert limits, all spoil disposed of off-site should be sent to a suitably licenced facility.

Geology

GSI bedrock mapping for the area identifies the bedrock geology underlying the site and immediate vicinity as "Visean limestone & calcareous shale" (Figure 6.2). The site investigations did not prove rock at any borehole location, with rotary cores completed at circa 17m.

A desktop study did not identify any formal designated protection or conservation areas, karst features, geological heritage areas, geo-hazards, or mines / mineral extract in the immediate area.

GSI have classified the site's groundwater vulnerability as low and have classified underlying aquifers as "Locally important aquifer – Bedrock which is moderately productive only in local zones". Refer to Chapter 7.0 Hydrology for further information regarding Hydrogeology.

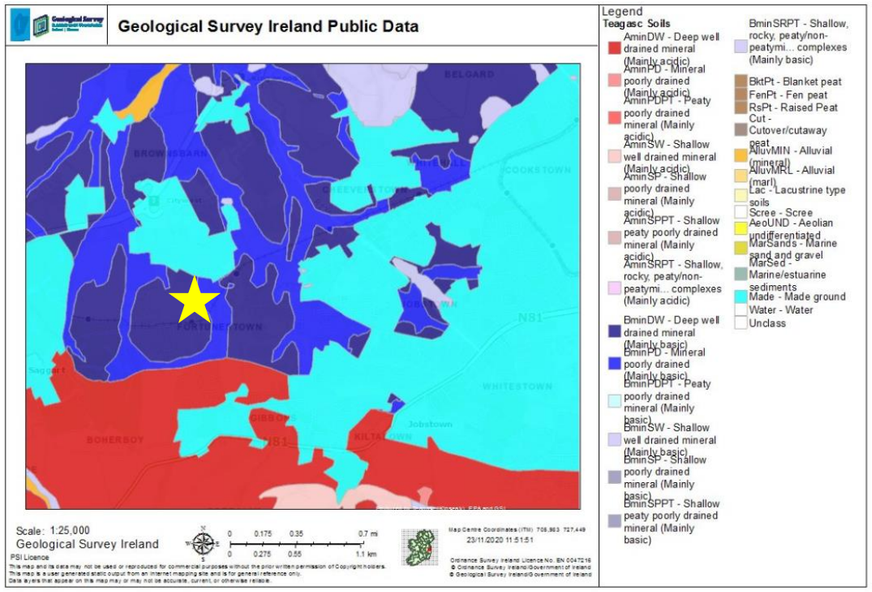

Figure 6.1 Subsoil mapping (Courtesy of GSI)

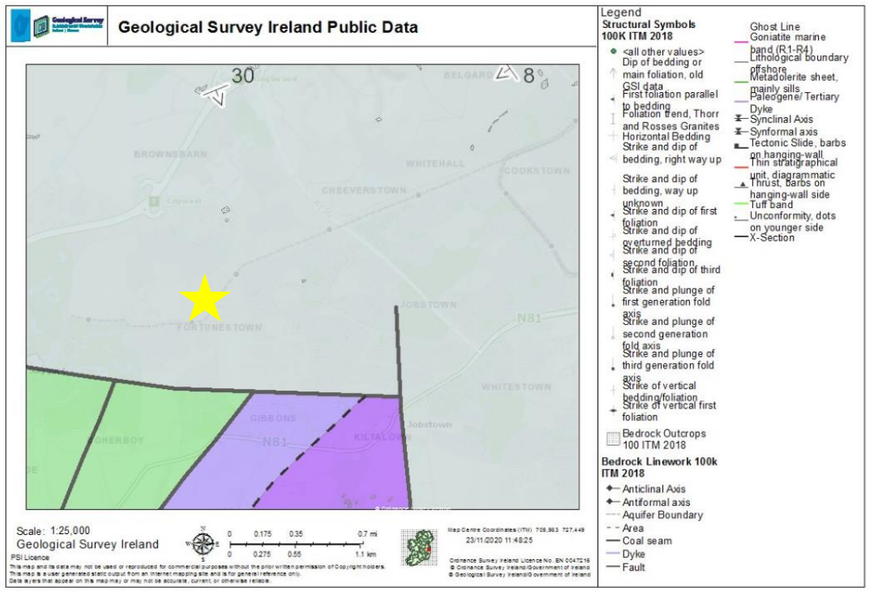

Figure 6.2 Bedrock Unit, Rock Type- Limestone (Courtesy of GSI)

6.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

Refer to Chapter 3.0 for a detailed site and development description.

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

- Removal of topsoil, topsoil mounding, and subsoil to allow road construction, foundation excavation, services installation and excavation of basement car park.
- It is estimated that circa 31,000 cumecs of cut and 18,000 cumecs of fill will be required across the development. The standard stone fill material used will be primarily sourced from the cut material on site.
- Construction of main access routes into the development.
- Installation of main underground services and utilities to serve the site.
- Construction of the underground surface water storage system and overground detention basin. Earth works would be required in the proposed open space areas to accommodate the detention basin.
- Construction of open space areas.

6.5 POTENTIAL IMPACTS

Construction Phase

Potential impacts of the proposed development during the construction phase include the following:

- Approximately 4,000 cumecs (approximately 200mm depth) of topsoil shall be excavated to form a building platform for new buildings and roads, cycle paths and footpaths. This will result in the exposure of the subsoil to various elements including weather and construction traffic. Therefore, the impact may be characterised as a likely, short term, slight, adverse impact on the natural strength of the subsoil, subsequently resulting in deeper foundations being required.
- Rutting and deterioration of the topsoil layer and any exposed subsoil layers or bedrock by earthworks plant and construction traffic. As such the impact may be characterised as likely, short term, moderate, adverse impact on subsoil, the consequence of which will be erosion and generation of sediment laden runoff.
- Approximately 27,000 cumecs of subsoil will be excavated to facilitate development. Therefore, the likely impact may be characterised as likely, permanent, slight impact on subsoil.
- The single storey basement under Blocks D1, D2, D3 and D4 will be constructed by open excavation with the basement slab comprising a suspended slab on piled foundations extending into black boulder clay. Blocks E1 and E2 will be piled from close to existing ground level into black boulder clay, and the duplex units will comprise traditional strip foundations. Therefore, the likely impact may be characterised as likely, permanent, slight impact on soil.
- Earthworks are required in the open space areas to accommodate underground and overground surface water storage systems and detention basins and other SuDS features. This landscaping activity will likely have a moderate, positive, permanent, impact on the soil and ground profile
- During the construction period, large machinery and associated fuel and fuel storage will be present on site on a daily basis. As a result, accidental spills and leaks (e.g. storage of oils and fuels on site) use of cement and concrete during construction works may occur during the construction phase. As such, the impact may be characterised as a likely, temporary, regionally short term, moderate adverse impact on subsoil and ground water.
- Approximately 18,000cumecs of fill (generally comprising normal stone used in the construction of roads, footpaths and buildings) will be required across the development, with some of this material originating from cut material on site.

Operational Phase

It is anticipated that the development will create additional impermeable surface areas. The only direct discharges to the ground during the operation of the development are via the SuDS features and the surface water storage features to accommodate surface water runoff from impermeable areas. This will result in a likely, slight, adverse, permanent impact on soils and geology.

The ground profile of the open spaces will be permanently altered due to the development of the surface water underground storage system and overground detention basins and the associated landscaping. This likely positive impact on soils and land will be permanent and moderate.

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

6.6 POTENTIAL CUMULATIVE IMPACTS

At construction stage it is not considered that there are cumulative impacts arising from the development.

At operational stage, the development of the subject site and the adjoining phases 1 and 2 developments will result in additional impermeable areas which is characterised as likely, permanent, slight, adverse. The only direct discharges to the ground during the operation of the development are via the SuDS features and the surface water storage features to accommodate surface water runoff from impermeable areas. This will result in a likely, slight, adverse, permanent impact on soils and geology.

The ground profile of the open spaces in the subject site and adjoining sites will be permanently altered due to the development of the surface water underground storage system and overground detention basins and the associated landscaping. This likely positive impact on soils and land will be permanent and moderate

6.7 MITIGATION MEASURES

Construction Phase

- 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 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 be located on site.
- Top and subsoils shall be re-used on-site for landscaping purposes to minimise the volume of soils to be exported off-site
- The design of road levels and finished floor levels has been carried out to minimize cut and fill type earthworks operations.
- Disturbed subsoil layers will be stabilized as soon as practicable. Therefore, backfilling of service trenches, construction of road capping layers, construction of building foundations and completion of landscaping), will all be carried out promptly to minimise the duration that subsoil layers are exposed to the effects of weather.
- Stockpiles of excavated subsoil material will be protected for the duration of the works. Stockpiles of subsoil material will be located separately from topsoil stockpiles.
- 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 open drainage ditches).
- Where feasible, excavated material will be reused as part of the site development works (e.g. for landscaping works and for backfill in trenches).
- Earthworks plant and vehicles 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 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.
- 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 hardstanding area, remote from surface water inlets (when it is not possible to carry out such activities off-site).
- Site Investigations indicate that bedrock is deeper than below circa 17m on site. Therefore, it is unlikely that bedrock will be exposed during construction works. Should bedrock be encountered, the extent of exposed bedrock will be limited to the immediate vicinity of active work areas. Where bedrock is encountered it will be crushed, screened and tested for use within the designed works to reduce the volume of material required to leave site. This will also reduce the volume of material to be imported to the site.

Operational Phase

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

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

6.8 PREDICTED IMPACTS

Construction Phase

Where the mitigation measures have been implemented, the residual impact is considered to be imperceptible.

The primary predicted impact is the removal of excess excavated material to an appropriate waste permitted/licenced facility.

Operational Phase

There are no predicted impacts arising from the operational phase.

6.9 'DO NOTHING' SCENARIO

There are no predicted impacts should the proposed development not proceed.

6.10 WORST CASE SCENARIO

If the proposed development was to proceed, and the proposed mitigation measures substantially fail then it is likely that there would be an impact on the soils and geology.

6.11 MONITORING & REINSTATEMENT

Construction Phase

Proposed monitoring during the construction phase in relation to the soil and geological environment are as follows:

- Adherence to the "Construction Management Plan (CMP)". The developer will be responsible for ensuring adherence with the CMP.
- 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.).
- The contractor will be responsible for the inspection of fuel / oil storage areas, and for ensuring that these are fit for purpose.
- The contractor will be responsible for monitoring the cleanliness of the adjacent road network and for ensuring that all vehicles exiting the site use the vehicle wheel wash facilities provided. The contractor will also be responsible for ensuring 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; protection of soils from contamination for removal from site).
- Monitoring sediment control measures (sediment retention ponds, surface water inlet protection etc.). The developer is responsible for ensure that these measures are fit for purpose. If they are found to be inadequate, then the development will ensure that they are made good and fully utilised.
- Soil removed during the construction phase will be monitored to maximise potential for re-use on site.
- The quantities of topsoil, subsoil and rock removed off site will be recorded.

Operational Phase

Monitoring of the public open space areas and surface water SuDS features by the Parks Department of South Dublin County Council will be on-going. The Parks Department of South Dublin County Council will ensure that these features are adequately maintained.

6.12 DIFFICULTIES IN COMPILING INFORMATION

No difficulties in compiling information occurred.

6.13 REFERENCES

- Department of Communications, Climate Action and Environment, Geological Survey Ireland, Available at https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228, Accessed on 30th April 2020.
- GII, Ground Investigation Report.
- Murphy Surveys, Topographical Survey of Lands.

7 HYDROLOGY AND WATER SERVICES

7.1 INTRODUCTION

This chapter of the EIA assesses and evaluates the likely impact of the proposed development on the surrounding surface water and hydrogeological environments, as well as identifying proposed mitigation measures to minimize any impacts.

This chapter was prepared by DBFL Consulting Engineers - Deirdre Walsh BA BAI MSc, CEng, MIEI.

7.2 METHODOLOGY

The methodology followed for this section is in accordance with the EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports (Draft) 2017 and Advice Notes for Preparing Environmental Impact Statements (Draft) 2015. Information on the surrounding surface water and hydrogeological environments was assembled from the following sources:

- Environmental Protection Agency (EPA) interactive mapping and water quality data;
- Ordnance survey Ireland (OSI) mapping;
- Geological Survey of Ireland (GSI) online mapping service;
- Topographical survey; Site inspection / walkover;
- Office of Public Works (OPW) National Flood Hazard Mapping & CFRAM Studies (Catchment Flood Risk and Management Studies);
- South Dublin County Council record drawings;
- Site Investigations data;
- Fortunestown Local Area Plan May 2012;
- "Site Specific Flood Risk Assessment' by DBFL Consulting Engineers

7.3 RECEIVING ENVIRONMENT

Hydrology

The main surface water bodies in the vicinity of the proposed development lands comprise the following:

- The Baldonnell Upper Stream which forms the north eastern boundary of the site. This flows to the north and joins the Camac River approximately 2km north of the subject site.;
- The Irish Sea Coast is circa 15km to the east of the subject site.

The LAP lands including the subject site are located within the Eastern River Basin District (ERBD) and the "Liffey and Dublin Bay", Water Framework Directive Catchment, and within the Water Framework Directive River Camac Water Framework Directive River Sub Basin. The Camac River (Figure 7-1), is the main hydrological feature in the area and is an EPA designated watercourse.

The site falls from south to north and west to east towards the stream.

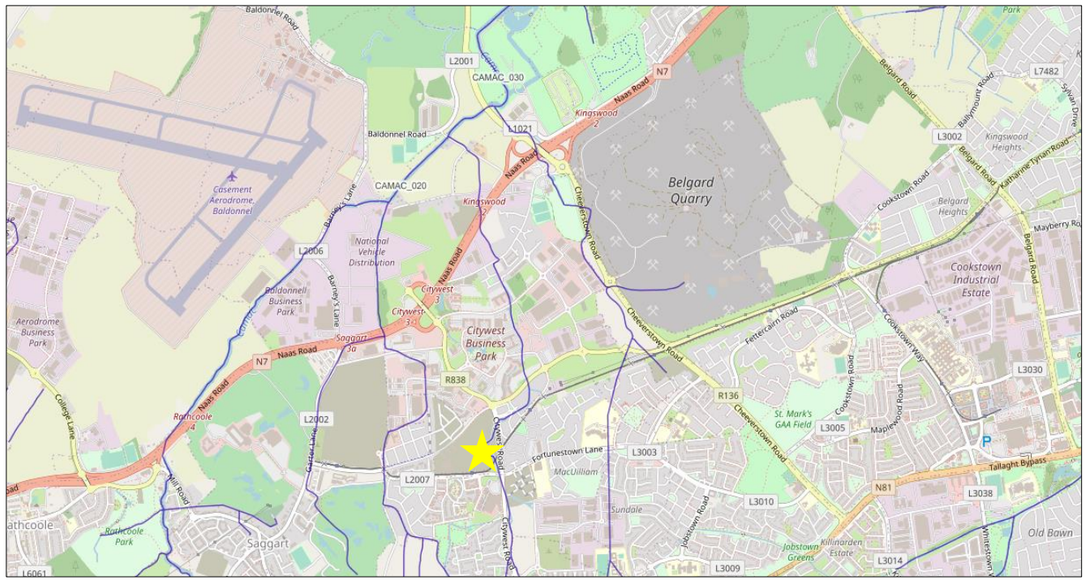

Figure 7.1 Extract from EPA Online Mapping Service (Courtesy of EPA)

Hydrogeology

For the purpose of implementing the WFD, Ireland has been divided into eight river basin districts or areas of land that are drained by a large river or number of rivers and the adjacent estuarine/coastal areas. The management of water resources is based on these river basin districts. The Cooldown Commons area falls within the Eastern River Basin District (ERBD). The Local Authorities located in the ERBD - including South Dublin County Council - have prepared a River Basin Management Plan and Programme of Measures. This Eastern River Basin Management Plan (ERBMP) (2009-2015) identifies the status of water bodies within the RBD and provides objectives in order to implement the requirements of the WFD.

The Fortunestown LAP lands, including the subject site, drain to the Camac River which is a tributary of the River Liffey that discharges to Dublin Bay. The overall status of the River Liffey is classified on the EPA maps 2010-2012 as being of "moderate" status while the Camac is classified as "poor". The main causes are attributed to wastewater and industrial discharges, due to misconnected foul sewers, combined sewer overflows and urban area pollution.

The "Fortunestown Local Area Plan – May 2012", states that the Geological Survey of Ireland (GSI) "has undertaken a Groundwater Protection Scheme for South Dublin County. The overall aim of the Groundwater Protection Scheme, which has been undertaken jointly between the GSI and the Local Authority, is to preserve the quality of groundwater, particularly for drinking water purposes, for the benefit of present and future generations. The aquifer to the north of the Newcastle - Blackrock Fault-line is rated as "Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones". To the South of the fault-line, the aquifer is described as "Poor Aquifer – Bedrock which is Generally Unproductive except for Local Zones". The groundwater vulnerability within the LAP lands varies from low to moderate vulnerability, with some areas of high vulnerability located in the north-eastern portion of the lands adjoining the Roadstone Quarry at Cheeverstown due to the open nature of these features, and proximity of rock strata to the surface."

Groundwater and water catchment areas have an inherent ecological and economic value and are a major resource that needs to be protected. Groundwater contributes to rivers and lakes and influences their amenity and recreational value. The Council is responsible for the protection of all waters including rivers, lakes and groundwater sources. The responsibilities include implementation of pollution control measures, licensing of effluent discharges, implementing and monitoring compliance with environmental regulations and the drawing up of pollution contingency measures.

The GSI (Geological Survey of Ireland) have also classified the groundwater vulnerability in the area of the site as low, as indicated in Figure 7-2.

The GSI have classified underlying aquifers in the area of the subject site as "locally important", as indicated in Figure 7-3. Locally important aquifers are defined as bedrock which is moderately productive only in local zones.

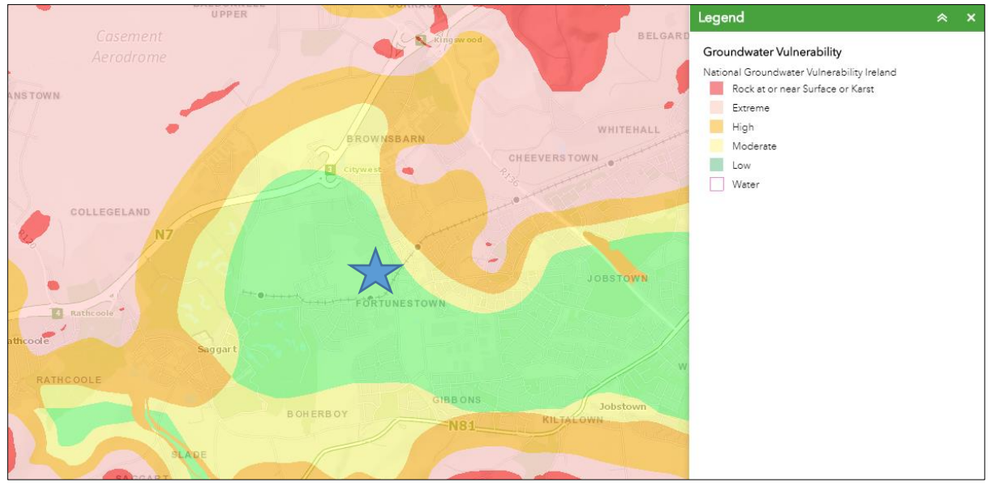

Figure 7.2 Groundwater Vulnerability Map (Courtesy of GSI)

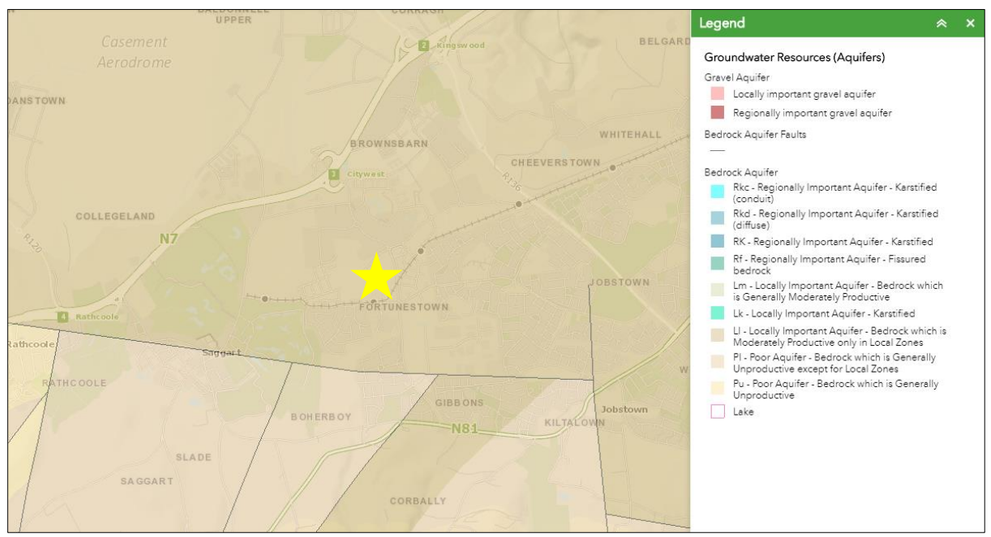

Figure 7.3 Groundwater resources (Aquifers) Courtesy of GSI

Section 1.5.6.3 of the LAP's Strategic Environmental Assessment states that "none of the water bodies within the Fortunestown LAP area have been listed on the WRD (Water Framework Directive) Register of Protected Areas (RPA's).

Standpipes were installed in 6 boreholes within the subject site (BH01, BH02, BH 08, BH10, BH16 and BH17 to allow the equilibrium groundwater to be determined. The results of the groundwater monitoring are included in Table 7-1.

Refer to *Ground Investigations Ireland* "Ground Investigation Report" dated October 2020, which is included as a standalone report.

	BH01	**BHO2**	**BHO8**	**BH10**	**BH16**	**BH17**
Depth	BGL m	BGL m	BGL m	BGL m	BGL m	BGL m
	Reduced Level mOD	Reduced Level mOD	Reduced Level mOD	Reduced Level mOD	Reduced Level mOD	Reduced Level mOD
Date Installed/ Date Checked	**16.09.2020**	**17.09.2020**	**02.09.2020**	**17.08.2020**	**20.08.2020**	**31.08.2020**
14.10.2020	2.56	1.27			1.77	2.68
	109.24	110.70			110.22	109.32
20.10.2020	2.60	1.20				2.60
	109.20	110.85				109.40
21.10.2020	2.60/	1.30	7.70	4.90		2.60
	109.20	110.70	108.90	109.30		109.00

Table 7.1 Groundwater Monitoring Results

Flood Risk

In accordance with the 'The Planning System and Flood Risk Management – Guidelines for Planning Authorities' (2009), a Site-Specific Flood Risk Assessment (SSFRA) has been carried out by DBFL Consulting Engineers for the subject site and is included as a standalone report. This report confirms that in accordance with the "Guidelines", the subject site is located within Flood Zone 'C'. Flood Zone C lands are suitable for all types of land use, including residential developments which are classified as "highly vulnerable" in the "Guidelines". Therefore, the development meets the requirements of The FRA Guidelines, the proposed development is suitable for this type of flood zoning and the Planning Guidelines Sequential Approach is passed and a justification test is not required.

Final Eastern CFRAM Study, Camac Fluvial Flood Extent maps indicate that the site is in Flood Zone "C".

Water Quality

The EPA (Environmental Protection Agency) records, specify a water quality status for the Baldonnell Upper Stream along the eastern site boundary as moderate. The EPA maps indicate the Camac River water quality status as "moderate" in the location where the stream discharges to the Camac River and as "poor" downstream of the connection point. The stream discharge point is circa 2km north of the subject site. Refer to figure 7-4 below.

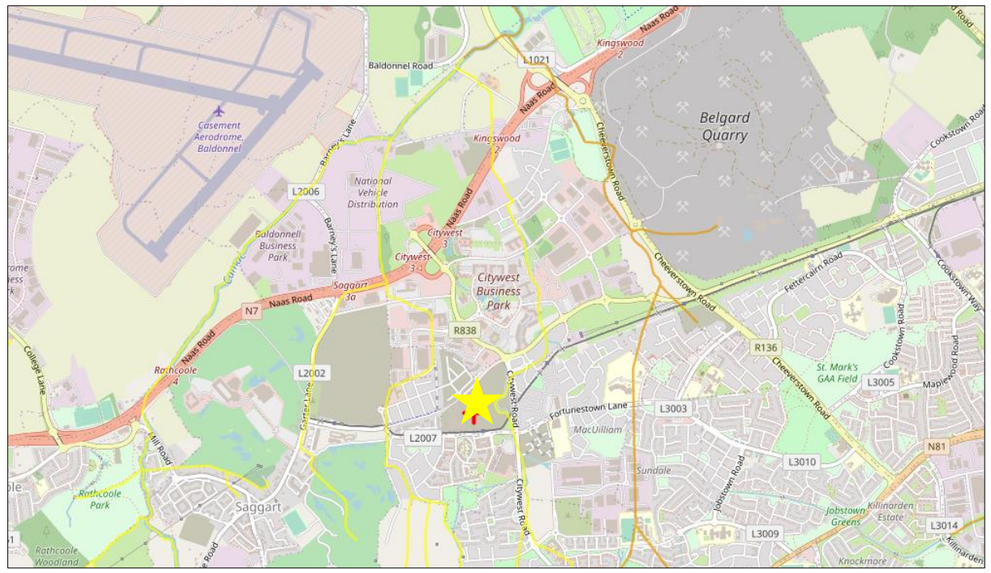

Figure 7.4 River Water Quality – 2010 to 2012 Courtesy of EPA Maps

7.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

Refer to Chapter 3.0 (Description of Development and alternatives) for a detailed site and development description. For further information regarding the infrastructure demands of the proposed development refer to DBFL "Infrastructure Design Report".

Hydrology

The proposed development is designed to limit surface water runoff from the site to greenfield runoff and to store flows exceeding this in the surface water storage system for up to a 1% AEP, (Annual Exceedance Probability)
To manage surface water runoff from the development, it is proposed to separate the development into two surface water catchments ("A" & "B") corresponding to each surface water outfall.

Catchment "A" comprises a portion of the subject site (0.24ha) which was previously granted planning permission under ABP-302398-18 for Phase 2 of the development, with surface water outfalling to the surface water drainage system within the phase 2 development and continuing through the drainage system in phase 1 before outfalling to an existing drain at the northern boundary of the phase 1 lands. Surface water is stored for up to a 1% AEP for Catchment "A" in the existing surface water storage system for Phase 2 (which has been designed to accommodate runoff from a portion of the subject site).

Surface water catchment "B" comprises the balance of the subject site, with attenuated runoff from this catchment discharging to the Baldonnell Upper Stream along the eastern boundary. Surface water storage for this catchment is provided in the public open space area in a combination of underground and overground storage.

The development layout is designed to accommodate overland flow paths, with water directed away from properties and into open space areas. SuDS features such as swales, tree pits, green roofs, permeable paving and detention basins are incorporated into the drainage design for the scheme. These measures protect or enhance water quality, are sympathetic to the environment, provide a habitat for wildlife and encourage natural ground water recharge.

The allowable surface water runoff for the subject site has been calculated for both catchments and the storage volume required to accommodate runoff from a 1%AEP (Annual Event Probability) is calculated using "Source Control" module of Microdrainage. Details of surface water attenuation and storage provided is included in Table 7-2. Refer to the DBFL "Infrastructure Design Report" submitted with the planning application for detailed calculations of the allowable outflow from the site and the storage requirements.

The surface water drainage network, attenuation storage and site levels are designed to accommodate a 1% AEP storm event (including an allowance for climate change of a 10% increase in rainfall figures, as required in the GDSDS (Greater Dublin Strategic Drainage Study)). Proposed finished floor levels of all dwellings are set a minimum of 500mm above the estimated 1% AEP storage level, as required in the GDSDS.

Surface Water Catchment	*Area of Catchment (ha)*	*Allowable Outflow Rate (Qbar) (l/s)*	*Underground Storage "StormTech" Volume (m3)*	*Above Ground Storage "Detention Basin" Storage Volume (m3)*	*Total Storage Volume (m3) (100-year Return Period/ 1% AEP)*
A	0.24	(Attenuated and stored in Phase 2 development site as part of Catchment 1- attenuated to 2l/s/ha)	189 (within Catchment 1 surface water storage system for the Phase 2 development)	N/A	189
B	2.78	9.8	1069	70	1,139
			TOTAL		**1,328**

Table 7.2 Details of Surface Water Attenuation & Storage

Hydrogeology

The integration of SuDs features with traditional drainage methods, is a strategy of both the Fortunestown LAP and the County Development Plan. SuDs features encourage groundwater recharge and replicate natural drainage systems. SuDs features proposed for the subject site include swales, tree pits, extensive and intensive green roofs, permeable paving and Stormtech Storage unit with above ground detention basin.

Flood Risk

The "Site Specific Flood Rik Assessment" by DBFL Consulting Engineers, assesses the proposed development in the context of the 'Planning System and Flood Risk Management Guidelines'. This report is included as a standalone report. It confirms that in accordance with the "Guidelines", the subject site is located within Flood Zone 'C'. Flood Zone C lands are suitable for all types of land use, including residential developments which are classified as "highly vulnerable" in the "Guidelines". Therefore, the development meets the requirements of The FRA Guidelines, the proposed development is suitable for this type of flood zoning and the Planning Guidelines Sequential Approach is passed and a justification test is not required.

A riparian corridor is maintained along the Baldonnell Upper Stream along the eastern boundary with maintenance access provided. The riparian corridor varies in width from circa 12m to circa 29m.

Potable Water

The subject site is within the catchment area of the Saggart Reservoir. The daily domestic demand generated by the proposed development is estimated at circa 171.71m^3.

Wastewater

Wastewater generated by the proposed development will discharge to Ringsend Wastewater Treatment Plant, and to the Irish Sea for final disposal. The estimated daily foul loading generated by the development is circa 188.97m^3.

7.5 POTENTIAL IMPACTS

Construction Phase

Potential impacts that may arise during the construction phase are noted below:

- Excavation of soil and sub-soil layers for the proposed development site. The removal of the overburden and the replacement with hard standing areas (roads, footpaths and houses) for the development will reduce the ability of the lands to recharge groundwater. The majority of surface water runoff will therefore be collected and positively discharged from the development to the existing stream along the site boundary. It is likely that this activity will have a slight, adverse, permanent, residual, impact on groundwater.

- The development will require new surface water drainage to accommodate surface water runoff from the development. It is likely that this activity will have a slight, adverse, permanent, residual, impact on the existing open channel / stream.

- Surface water runoff during the construction phase may contain increased silt levels (e.g. runoff across areas stripped of topsoil) or become polluted by construction activities. This will result in increased silt and pollutant levels into existing nearby watercourses. It is likely that this activity would have a slight, adverse, temporary, residual impact on the existing streams.

- Heavy rainfall or a high level of ground water could produce ponding in open trenches. Discharge of this rain water pumped from excavations to existing streams could compromise the capacity or the stream and as such cause flooding. This impact may be characterised as a likely, moderate, temporary, adverse impact. The consequence of this will increase the flow within the existing stream and hence potentially cause flooding.

- Discharge of wash water from concrete trucks and discharge of vehicle wheel wash water may contaminate the groundwater. This impact may be characterised as a temporary, regionally short-term moderate impact. It is likely that this activity would have a temporary, adverse, slight, adverse, impact on groundwater and local watercourses within the area.

- Dangerous substances such as oils and fuels may enter the surface water drainage system.

Operational Phase

Potential operational phase impacts are noted below:

- Increased impermeable surface area will reduce local groundwater recharge and potentially increase surface water runoff and flooding downstream. It is likely that this activity would have a slight, permanent, adverse, impact on groundwater and the existing stream.

- Accidental hydrocarbon leaks and subsequent discharge into piped surface water drainage network (e.g. along roads and parking areas). The likely impact may be characterised as imperceptible, temporary and adverse.

- Contamination risks arising from development use / leaking pipes / contaminated surface water runoff. The likely adverse impact arising from this activity may be characterised as imperceptible and temporary.

- A maintenance access will be provided to the open channel / stream along the eastern boundary. The likely impact may be characterised as a slight, permanent, favourable impact.

- The hydraulic demand on the public potable water supply and treatment facility would increase. It is likely that this activity would have a slight, permanent, adverse, impact on the public water extraction and treatment facility.

7.6 POTENTIAL CUMULATIVE IMPACTS

The removal of the overburden and the replacement with hard standing areas (roads, footpaths and houses) will reduce the ability of the lands to recharge groundwater. The majority of surface water runoff will be collected and positively discharged from the development sites to existing surface water networks or open channels / streams. It is likely that this activity will have a slight, adverse, permanent, residual, impact on groundwater in the general area.

Taking into consideration the management of surface water runoff form extant neighbouring permissions, their discharge rates are all limited to greenfield runoff and would not increase flood risk elsewhere.

The cumulative impact on the water supply system is assessed as part of the Irish Water Confirmation of Feasibility.

7.7 MITIGATION MEASURES

Construction Phase

To minimise the impact of the construction phase on the water environment, mitigation measures should be implemented.

- Implement best practice construction methods and practices complying with relevant legislation to avoid or reduce the risk of contamination of watercourses or groundwater.
- A Site-Specific Construction Management Plan will be developed and implemented during the construction phase. Site inductions will include reference to the procedures and best practice as outlined in the Construction Management Plan.
- Works will be carried out in accordance with Inland Fisheries Ireland “Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters”.
- It will not be permitted to discharge into any newly constructed storm water systems or watercourse without adhering to the conditions of the discharge licence and agreeing the same with the Site Manager and Local Authority Area Engineer.
- 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.
- Sediment & Erosion: groundwater should be protected from sedimentation and erosion due to direct surface water runoff generated onsite during the construction phase. To prevent this from occurring, surface water discharge from the site will be managed and controlled for the duration of the construction works until the permanently attenuated surface water drainage system of the proposed site is complete. A temporary positive drainage system shall be installed prior to the commencement of the construction works to collect surface water runoff by the site during construction. A series of geotextile lined cascading, high level outfall, settling basins will be installed upstream of the agreed discharge point. This temporary surface water management facility will throttle runoff and allow suspended solids to be settled out and

removed before being discharged in a controlled manner to the agreed outfall. All inlets to the cascading settling basins will be riprapped to prevent scour and erosion near the inlet.

- Weather conditions and seasonal weather variations will also be taken account of when planning stripping of topsoil and excavations, with an objective of minimizing soil erosion.
- The extent of sub-soil and topsoil stripping to be minimised to reduce the rate and volume of the run-off during construction until the topsoil and vegetation are replaced.
- Concrete batching will take place off site or in a designated area with an impermeable surface.
- Concrete wash down and wash out of concrete trucks will take place off site or in an appropriate facility.
- Discharge from any vehicle wheel wash areas is to be directed to on-site settlement ponds.
- Over Ground Oil / Diesel Storage – Only approved storage system for oil / diesel within the site will be permitted, (i.e. all oil / diesel storage to be located within a designated area placed furthest away from adjacent watercourses and contained within constructed bunded areas e.g. placed on 150mm concrete slab with the perimeter constructed with 225mm solid blockwork rendered internally). The bunded area will accommodate the relevant oil / diesel storage capacity in case of accidental spillage. Any accidental spillages will be dealt with immediately on site by containment /removal from site.
-
- Refuelling of construction machinery shall be undertaken in designated areas away from surface water drainage in order to minimise potential contamination of the water environment. Spill kits shall be kept in these areas in the event of spillages.
- Hazardous construction materials shall be stored appropriately to prevent contamination of watercourses or groundwater.
- Dewatering measures should only be employed where necessary.
- Basement excavations to be kept to a minimum to reduce impacts on groundwater.
- Hydrobrake flow controls and petrol interceptors should be constructed on each surface water outfall before the outfalls are made operational.
- At construction stage, the location of all dropped kerbs to be fully reviewed to ensure all overland flow paths are not impeded.
- Ensure the basement is fully tanked and not at risk of groundwater ingress.

Operational Phase

- The design of proposed site levels (roads, FFL etc.) has been carried out to replicate existing surface contours, break lines etc. and 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 recommended in the Greater Dublin Strategic Drainage Study (GDSDS). Surface water discharge rates will be controlled by a Hydrobrake flow control device, with attenuation tank and detention basin provided to store runoff from a 1% AEP storm event. SUDs features are implemented in the surface water drainage network to reduce the rate of runoff form hard standing area sand to improve the quality of surface water runoff. For detailed information refer the “Infrastructure Design Report” prepared by DBFL and submitted with the planning application.
- Surface water runoff from the development to be collected by an appropriately designed system with contaminants removed prior to discharge i.e. petrol interceptor.
- A regular maintenance and inspection programme of the flow control devices, attenuation storage facilities, gullies and petrol interceptor will be required during the Operational Phase to ensure the proper working of the development’s networks and discharges.
- Overland flow routes for pluvial events should not be built on or become blocked off. Overland flow routes should be designed to direct to grassed areas and away from dwellings.
- Waste generated by the everyday operation of the development should be securely stored within designated collection areas with positive drainage collection systems to collect potential runoff. Operational waste should be removed from site using licenced waste management contractors.
- Water conservation methods to be implemented such as the use of low flush toilets.
- Maintain the riparian strip adjoining the stream.

7.8 PREDICTED IMPACTS

Construction Phase

Implementation of the measures outlined in 7.7 will ensure that the potential impacts of the proposed development on water and the hydrogeological environment the residual impact is considered to be imperceptible.

Operational Phase

As surface water drainage design has been carried out in accordance with the GDSDS, and SuDS methodologies are being implemented as part of a treatment train approach, there are no predicted impacts on the water and hydrogeological environment arising from the operational phase.

Implementation of the measures outlined in Section 7.7 will ensure that the potential impacts of the proposed development on water and the hydrogeological environment do not occur during the operational phase and that any residual impacts will be short term and imperceptible.

7.9 ‘DO NOTHING’ SCENARIO

If the development did not proceed there would be no additional impact on the existing water environment. The land use would remain unchanged, i.e. greenfield. The flood risk to the site and adjoining areas would be the same as the existing scenario.

7.10 WORST CASE SCENARIO

In the event that the proposed development was to proceed, and the proposed mitigation measures substantially fail then it is likely that there would be a moderate impact on the hydrology and water services with the potential for an increase in flood risk and contamination of local watercourses.

7.11 MONITORING & REINSTATEMENT

Monitoring Construction Phase

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

- Works will be carried out in accordance with the ‘Construction Management Plan’, which includes procedures for monitoring and tracking construction activities.

Monitoring Operational Phase

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

- The taking in charge of the water infrastructure will ensure the system is regularly inspected and maintained. If specific maintenance is required on the water network, then the Local Authority will be responsible for ensuring that these maintenance measures are implemented.
- Where infrastructure is located in privately managed areas, the management company will be responsible for all maintenance of these systems.

- The performance of all SuDS features will be monitored by the relevant authorities during the life of the development. If specific maintenance is required on the SuDS features, then the Local Authority or management company will be responsible for ensuring that these maintenance measures are implemented.
- Monitoring of the installed Hydrobrake and gullies will be required to prevent contamination and increased runoff from the site. If specific maintenance is required on the surface water Hydrobrake and on gullies, then the Local Authority will be responsible for ensuring that these maintenance measures are implemented.
- Although no specific monitoring will be required as part of the proposed development, it is envisaged that EPA Monitoring will continue in the area through the life of the development.

Reinstatement

Where required, normal post construction reinstatement of surface water and foul sewer trenches will be completed as part of the proposed development. Where such works arise, all existing roads will be reinstated in accordance with South Dublin County Council's requirements and the Department of Transport, Tourism and Sport "Guidelines for Managing Openings in Public Roads".

A new connection will be made to the existing 200mm diameter watermain within the Phase 2 development. Where required, normal post construction reinstatement of watermain trenches will be completed as part of the proposed development. Where such works arise, all existing roads will be reinstated in accordance with South Dublin County Council's requirements, the Department of Transport, Tourism and Sport "Guidelines for Managing Openings in Public Roads" and Irish Water's Code of Practice and Standard Details.

7.12 INTERACTIONS

There are interactions between water and land and soils with changes in depth and type of overburden over rock impacting the protection provided to aquifers. The likely impact will be permanent not significant and adverse.

There are interactions between water and land and soils, with some surface water conveyed and stored in SuDS features such as swales and detention basins and discharging to the ground where possible. The likely impact will be permanent slight and favourable.

There are interactions between water and material assets build services, with attenuated surface water runoff from the western portion of the site outfalling to the existing surface water drainage network and foul flows from the site discharging to the existing foul sewerage network. The likely impact will be permanent slight and adverse.

There are interactions between water and material assets with potable water for the development supplied from surface water and ground water abstractions. The likely impact will be permanent slight and adverse.

7.13 DIFFICULTIES IN COMPILING INFORMATION

No difficulties in compiling information occurred.

7.14 REFERENCES

- Environmental Protection Agency (EPA), 2000, EPA Geo Portal, Available at http://gis.epa.ie/, Accessed 30th April 2020.
- Geological Survey Ireland (GSI), Department of Communications, Climate Action & Environment, Available at https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228, Accessed 1st May 2020;
- Office of Public Works (OPW), Flood Mapping, Available at http://www.floodinfo.ie/map/floodmaps/, Accessed 1st May 2020;
- Greater Dublin Regional Code of Practice for Drainage Works;
- Fortunestown Local Area Plan May 2012.

8 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 a proposed residential development at Cooldown Commons, Fortunestown Lane, Citywest, Dublin 24 during both the Construction and Operational Phases of the development.

The proposed development will consist of the construction of 421 no. residential units within 9 no. blocks ranging in height from 1 – 13 storeys, retail/commercial/office units, and open spaces along with all associated site development works and services provisions to facilitate the development including parking, bin storage, substations, landscaping and all services. A full description is provided in the statutory notices and in Chapter 3 of the EIAR.

This chapter of the EIAR 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 existing ambient noise levels at local noise sensitive receptors and structures.

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 at any existing or future receptors in the vicinity of the development site.

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 24 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, professional affiliations and professional experience, Ian Byrne is defined as a *"Competent Person"* as defined in the *EPA's 2016 Guidance Note for Noise: License Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4).*

8.2 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:

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (DoHPLG, August 2018).
- 2017 EPA Draft 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).
- Environmental Protection Agency, 2015. Revised Guidelines on the Information to be Contained in Environmental Impact Statements
- Environmental Protection Agency, 2015. Draft Advice Notes for Preparation of Environmental Impact Statements
- Development Management Guidelines (DoEHLG, 2007).
- Planning and Development Regulations 2001, as amended by European Union (Planning & Development)(Environmental Impact Assessment) Regulations 2018.

Impact Assessment Methodology

The inward and outward noise impacts 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 TII's *Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (March 2014*). *UK Department of Transport (Welsh Office) - Calculation of Road Traffic Noise [CRTN]* and the *Highways Agency Design Manual for Roads and Brides 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.

Construction Impact Assessment Criteria

The construction noise limits, which are presented in Table 8.1 represent a reasonable compromise between the practical limitations in a construction project, and the need to ensure an acceptable noise level for the nearby residents and other sensitive receptors including amenity space. Table 8.1 specifies the recommended Project Noise Limit Criteria in accordance with *BS 5228 – 1:2009+A1 2014 Code of practice for noise and vibration control on open sites: Part 1 Noise*. Noise limit criteria are based on the noise measured at the external façade of a receptor.

Construction Phase Noise Limit Criteria		
Location / Day	**Assessment Period**	**External Noise Limit Criteria**
All Receptors Monday to Friday Morning	07:00hrs – 08:00hrs	70 dB(A), $L_{Aeq, 1hr}$
All Receptors Monday to Friday Daytime	08:00hrs – 18:00hrs	75dB(A), $L_{Aeq, 10hr}$
All Receptors Monday to Friday Early Evening	18:00 – 19:00hrs	70 dB(A), $L_{Aeq, 1hr}$
All Receptors		

Monday to Friday Late Evening	19:00hrs – 22:00hrs	65 dB(A), $L_{Aeq, 3hr}$
All Receptors Monday to Friday Nightime	22:00hrs – 07:00hrs	55 dB(A), $L_{Aeq, 1hr}$
All Receptors Saturday Morning	07:00hrs – 08:00hrs	70 dB(A), $L_{Aeq, 1hr}$
All Receptors Saturday Daytime	08:00hrs – 13:00hrs	75dB(A), $L_{Aeq, 5hr}$
All Receptors Saturday Midday	13:00 – 14:00hrs	70 dB(A), $L_{Aeq, 1hr}$
All Receptors Saturday Afternoon-Evening	14:00 – 22:00hrs	65 dB(A), $L_{Aeq, 3hr}$
All Receptors Monday to Friday Nightime	22:00 – 07:00hrs	55 dB(A), $L_{Aeq, 1hr}$
All Receptors Sundays and Public Holidays Daytime	07:00hrs – 21:00hrs	65 dB(A), $L_{Aeq, 1hr}$
All Receptors Sundays and Public Holidays Nightime	21:00 – 07:00hrs	55 dB(A), $L_{Aeq, 1hr}$

Table 8.1 BS5228-2014 Construction Phase Noise Limit Criteria

The construction phase vibration limits are detailed in Table 8.2 and are referenced 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.*

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 8.2 Transient vibration guide values for cosmetic damage

Table 8.3, 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.

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.

Table 8.3 Guidance on the effect of construction vibration levels on humans

Operational Impact Assessment Criteria

Additional traffic volumes are the principal outward operational impact that the proposed development will have on the receiving noise climate. Relative impact assessment criteria associated with road traffic noise is set out in Table 8.4 below.

Change in sound level (L_{10})	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

Table 8.4 Likely impact associated with change in traffic noise level

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.

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.

The operational phase of the development shall be assessed with regard to the 2018 WHO guidelines and appropriate acoustic design of residential units to ensure that they comply with the *Department of the Environment, Building Regulations 2014, Technical Guidance Document E – Sound.*

Inward Noise Assessment Methodology

Luas Sound Exposure Level (SEL) Measurement
The Sound Exposure Level (SEL) describes the noise exposure from a single event and is determined by measuring the sound level at a given monitoring location which is generated by a single passing Luas tram event recorded between the initial and final measurement period, that is from the point of audibility to the point of inaudibility of the tram pass by.

Noise Measurement Position
Noise monitoring equipment was installed at each of the specified locations at the facade of the subject property facing towards the Luas line. The microphone was positioned according to the nature of the property as follows:

Single story building - the microphone was positioned 1.25m above ground level and where possible, 1m from the facade of the building.

Multi story building - the microphone was positioned between 3.5 – 4.0m above ground level at first floor window height and where possible, 1m from the facade of the building.

Noise Measurement Data
The mean SEL at each monitoring location was obtained by recording noise levels associated with 6 (No.) passing Luas tram movements comprised of 3 inbound movements and 3 outbound movements. Noise measurements were only recorded for single tram pass events. Dual tram pass by events were not recorded.

The following information was recorded for each recorded tram pass event:

- Description of the monitoring location
- Weather and track conditions
- Start & End time of tram pass by (the duration that the tram was audible)
- Tram direction
- Tram number
- LAeq, LAFmax, SEL, 1/3 octave band frequency analysis
- Characteristics of tram noise
- Characteristics of ambient noise

Ambient Noise Measurement
Ambient noise may be defined as the overall noise climate at a given location at a particular time which is comprised of all noise sources both near and far.

Ambient noise surveys were conducted at each of the specified locations for either 24 hour unattended periods or 3 hour attended periods as detailed above in Table 4.

24 hour unattended monitoring was conducted where the noise monitoring equipment could be installed at a secure and safe location at the proposed Noise Sensitive Receptor.

In all cases, the noise monitoring instrumentation was programmed to consecutively log 10 minute intervals over the unattended 24 hour or the attended 3 hour period.

Ambient noise measurements were conducted at the same position as the SEL measurements either at ground floor or first floor building height.

Calculation of Tram Noise Levels
The noise impact of the operational lines at each specific location is determined by establishing the following noise indices:

Ambient LAeq, 18hr noise level
Specific Tram LAeq, 18hr noise level
Residual LAeq, 18hr noise level (ambient noise level – tram noise level)

Ambient Lden noise level
Specific Tram Lden noise level
Residual Lden noise level (ambient noise level – tram noise level)

The impact of tram noise at a given location is influenced by the number of tram movements that pass a location over the course of a day period as obtained from the operating Luas schedule as detailed below in Table 8.5.

Line	Time Period	No. of Tram Movements
Luas Citywest	Day (07:00 – 19:00)	150
	Evening (19:00 – 23:00)	48
	Night (23:00 – 07:00)	34
	16 hour (07:00 – 23:00)	198
	Total (05:30 – 00:30)	232

Table 8.5 LUAS Citywest Line Daily Tram Movements

Source Transdev March 2020

Inward Vibration 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.*

In inward vibrational impact from passing LUAS trams has been established in accordance with the methodology specified in the TII 2015 document entitled “Noise Monitoring Procedure for Operational Systems”.

Vibration measurements included the simultaneous measurement of Peak Particle Velocity (PPV) values and Vibration Dose (VDV) values at ground level of the external building facades of each monitoring location during tram pass by events. Measurements were conducted during both inbound (into City Centre) and outbound (out of Dublin City) tram pass by events. The integrity of measured vibrations associated with single tram by pass events only, was ensured by discounting non tram vibration causing events such as passing pedestrians or road traffic which may impact the measured values during each monitoring interval. Dual tram pass by events were not recorded.

Vibration measurements were conducted in accordance with *British Standard BS 6472 Part 1, 2008 – Guide to evaluation of human exposure to vibration in buildings.*

Vibration measurements were conducted using a calibrated twin channel Vibrock V901 seismograph fitted with a Peak Particle Velocity (PPV) tri-axial geophone and a Vibration Dose Value (VDV) tri-axial accelerometer to allow for the simultaneous monitoring of PPV and VDV levels during each tram pass by event.

The results of the vibration monitoring surveys are presented in terms of a Peak Particle Velocity (PPV) value which is a measure of the velocity of vibration displacement in millimetres per second (mm/s) and the Vibration Dose (VDV) value which is an assessment of the vibrational impact on humans within the building. The VDV value is the

measured frequency weighted acceleration in m/s2 and the time period during which the VDV value is measured in seconds. These parameters result in a VDV value in m/s1.75.

The VDVday/night values are calculated from the number of operational trams on each line in accordance with the following equation:

$$VDV_{b/d/g,\ day/night} = \left[\sum_{n=1}^{n=N} VDV^4_{b,d,g,tn}\right]^{0.25} \quad \text{(Eq.5)}$$

Where
VDV b/d/g,day/night is the weighted vibration dose value for the day/night period
VDV b/d/g, tn is the event vibration dose value from the x, y and z axis
N is the number of tram pass by events per day/night

Place & Period	Vibration Dose Values (m/s $^{-1.75}$)		
	Low probability of adverse comment Note 1	Adverse comment possible	Adverse comment Probable Note 2
Residential Buildings 16 hour Day period	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential Buildings 8 hour Night period	0.13	0.26	0.51

Table 8.6 Vibration Dose Values (VDV) above which various degrees of adverse comment may be expected in residential buildings

Note 1 Below these ranges adverse comment is not expected
Note 2 Above these ranges adverse comment is very likely
Note 3 Where the building under consideration is non-residential that is an office or workshop *BS 6472 states that multiplying factors of 2 and 4 respectively should be applied to the above VDV ranges for a 16 hour day*

8.3 RECEIVING ENVIRONMENT

Description of the baseline environment – Environmental Noise Context

The subject site is located in the Citywest area of South Dublin which includes residential developments, retail areas and the Citywest Business Campus. The subject site is located north of Fortunestown Lane opposite the Citywest Shopping Centre. The local road network carries large volumes of traffic throughout the day and the N7 road is located c.850m from the site. The Citywest LUAS line runs along and adjacent to the southern and south-eastern site boundary.

The largest local industrial development is the CRH Roadstone quarry located c. 1.5km northeast of the subject site, however activities from the quarry are inaudible at the subject site.

The most dominant noise sources in the local area that will have an inward noise impact on the development have been identified during the baseline noise monitoring periods to be road traffic on Fortunestown Lane and noise from LUAS movements on the Citywest Line located adjacent the southern and southwestern site boundary. Overhead aircraft movements associated with Casement Aerodrome located c. 2.5km northwest of the site were also intermittently observed during the baseline surveys.

Baseline noise data in the vicinity of the closest residential receptors to the proposed development site boundaries has been obtained from noise monitoring surveys conducted by Byrne Environmental Consulting Ltd between 2nd – 5th March 2020 (prior to the CV 19 Lockdown) 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 noise and vibrational impact of local road traffic and LUAS noise within the site.

Measurements were conducted during suitable weather conditions using calibrated *B&K 2250* Integrating sound level meters fitted with outdoor microphone kits and enclosures.

Vibration measurements were conducted using calibrated *Vibrock V9000* seismographs.

Baseline Measurement Locations

Baseline noise and vibration measurements were conducted at three locations as shown in Figure 8.1 below and as described in Table 8.7 below. Noise monitoring surveys were conducted under free-field conditions at a height of approximately 1.5m and 9m above ground and approximately 3.5m away from reflecting surfaces for a period of 24 hours in order to obtain detailed noise data and assess the existing noise climate at the locations accurately.

Location N1	South eastern site boundary adjacent LUAS Citywest Line and Fortunestown Lane
Location N2	Southern site boundary adjacent LUAS Citywest Line and Fortunestown Lane
Location N3	Residential apartments opposite southern site boundary

Table 8.7 Baseline Noise Survey Locations

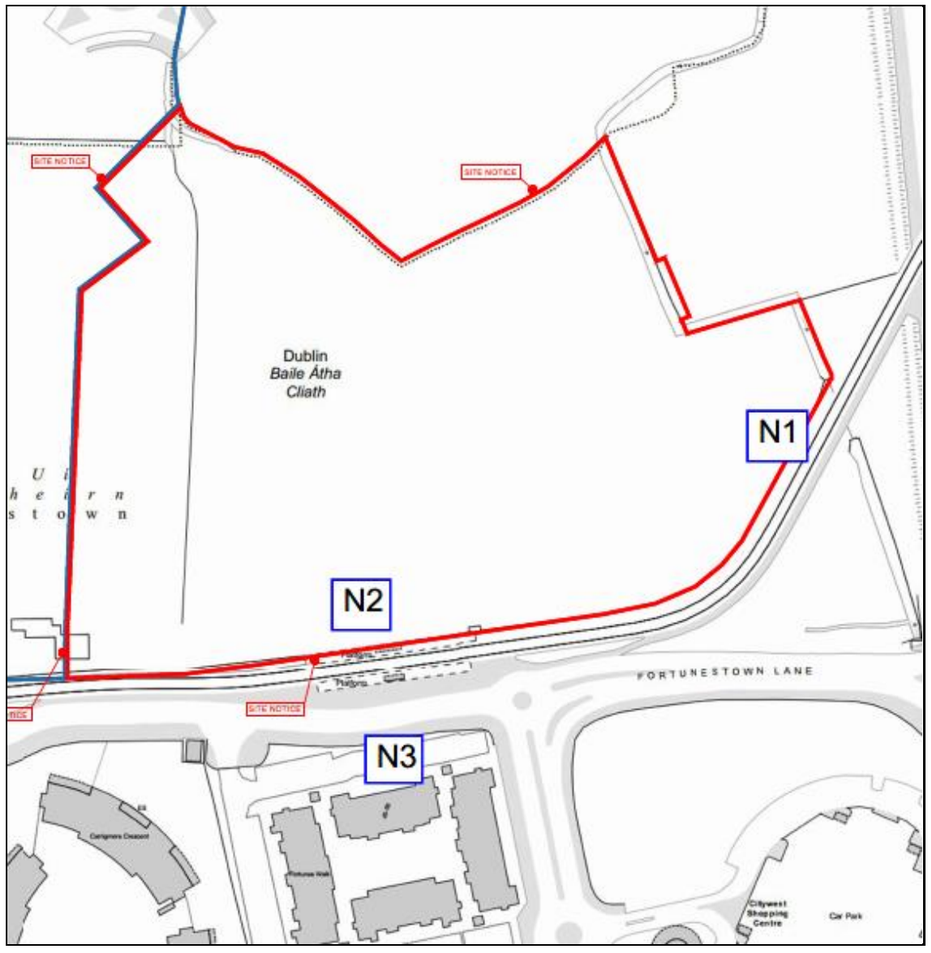

Figure 8.1 Baseline Noise Monitoring Locations N1 – N3

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.
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.
L_{Amax}:	The instantaneous maximum sound level measured during the sample period.
L_{den}	Day-evening-night indicator 24hrs
L_{day}	Day indicator 07:00hrs – 19:00hrs
L_{night}	Night indicator 23:00hrs – 07:00hrs
$L_{evening}$	Evening indicator 19:00hrs – 23:00hrs

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.

Baseline Environmental Noise Measurement Results

02.03.20	**Measured sound pressure levels dBA (re 20µPa) 9m agl**			
	$L_{Aeq,1hr}$	**$L_{A10,\ 1hr}$**	**$L_{A90,\ 1hr}$**	**L_{AMax}**
Daytime period 07:00 – 19:00hrs	66 - 72	74-77	48 - 60	89
Nightime period 23:00 – 07:00hrs	38 - 66	40 - 71	32 - 48	85
Lden 73 dBA Lnight 64 dBA	The Lden and Lnight values were determined at N1 over a 24-hour period			

Table 8.8 Location N1 South-eastern site boundary

During the daytime and nighttime periods the noise climate at N1 is primarily influenced by road traffic noise.

Vibration was not perceptible during the survey period at Location N1.
The EPAs strategic road related noise maps been reviewed as part of this assessment as published by the EPA in the Round 3 Noise Mapping Programme.

Figures 8.2 - 8.5 present the EPA' s Round 3 Noise Maps as Lden and Lnight values for local road traffic and the associated modelled noise levels at the northern boundary of the site.

The EPA Round 3 noise map in Figure 8.2 indicates that road traffic during the 24-hour period Lden period is 55- 59dB(A) and LUAS noise during the 24-hour period Lden period is 65- 69dB(A) and during the night the Lnight for road noise is <50 dB(A) and the Lnight for LUAS noise is 50 - 54 dB(A).

Combining the Road and LUAS Noise contours provides an Lden of 65 - 69 dB(A)
Combining the Road and LUAS Noise contours provides an Lnight of 53 - 54dB(A)

Measured Lden and Lnight values are slightly higher than the EPA's 2017 Round 3 Noise Mapping values. This may be attributable to higher volumes of traffic in the area as a result of new residential developments over the last 3 years.

03.03.20	Measured sound pressure levels dBA (re 20µPa)			
	$L_{Aeq,1hr}$	$L_{A10,\ 1hr}$	$L_{A90,\ 1hr}$	L_{AMax}
Daytime period 07:00 – 19:00hrs	67 - 74	75 - 78	50 - 63	90
Nightime period 23:00 – 07:00hrs	39 - 69	42 - 70	35 - 50	86
Lden 74 dBA Lnight 65 dBA	The Lden and Lnight values were determined at N2 over a 24-hour period			

Table 8.9 Location N2 Southern site boundary

During the daytime and nightime periods the noise climate at N2 is primarily influenced by road traffic noise.

Vibration was not perceptible during the survey period at Location N2.

The EPAs strategic road related noise maps been reviewed as part of this assessment as published by the EPA in the Round 3 Noise Mapping Programme.

Figures 8.2 - 8.5 present the EPA' s Round 3 Noise Maps as Lden and Lnight values for local road traffic and the associated modelled noise levels at the northern boundary of the site.

The EPA Round 3 noise map in Figure 8.2 indicates that road traffic during the 24-hour period Lden period is 60- 64dB(A) and LUAS noise during the 24-hour period Lden period is 60- 64dB(A) and during the night the Lnight for road noise is 50 - 54 dB(A).and the Lnight for LUAS noise is 50 - 54 dB(A).

Combining the Road and LUAS Noise contours provides an Lden of 63 - 67 dB(A)
Combining the Road and LUAS Noise contours provides an Lnight of 53 - 57 dB(A)

Measured Lden and Lnight values are higher than the EPA's 2017 Round 3 Noise Mapping values. This may be attributable to higher volumes of traffic in the area as a result of new residential developments over the last 3 years.

05.03.20	Measured sound pressure levels dBA (re 20µPa)			
	$L_{Aeq,1hr}$	$L_{A10,\ 1hr}$	$L_{A90,\ 1hr}$	L_{AMax}
Daytime period 07:00 – 19:00hrs	62 - 70	65 - 74	45 - 62	83
Nightime period 23:00 – 07:00hrs	36 - 61	38 - 66	30 - 50	79
Lden 67 dBA Lnight 57 dBA	The Lden and Lnight values were determined at N3 over a 24-hour period			

Table 8.10 Location N3 Fortunes Walk Residential apartments opposite southern site boundary

During the daytime and nightime periods the noise climate at N3 is primarily influenced by road traffic noise and LUAS movements up until c. 00:00hrs.

Vibration was not perceptible during the survey period at Location N3

The EPAs strategic road related noise maps been reviewed as part of this assessment as published by the EPA in the Round 3 Noise Mapping Programme.

Figures 8.2 -8.5 present the EPA' s Round 3 Noise Maps as Lden and Lnight values for local road traffic and the associated modelled noise levels at the northern boundary of the site.

The EPA Round 3 noise map in Figure 8.2 indicates that road traffic and LUAS noise during the 24-hour period Lden period is 55- 59dB(A) and during the night the Lnight for road noise is 50 - 54 dB(A) and the Lnight for LUAS noise is 45 - 49 dB(A).

Combining the Road and LUAS Noise contours provides an Lden of 58 - 62 dB(A)
Combining the Road and LUAS Noise contours provides an Lnight of 51 - 55 dB(A)

Measured Lden and Lnight values are slightly higher than the EPA's 2017 Round 3 Noise Mapping values. This may be attributable to higher volumes of traffic in the area as a result of new residential developments over the last 3 years.

LUAS Tram Noise & Vibration Survey Results

LUAS Tram Noise & Vibration Assessment Results

The results of the tram noise survey at the subject location are detailed below which include the measured noise levels for three inbound and three outbound tram movements.

Location	LAeq,	LAFmax	SEL
Inbound Track			
Tram 1	66.24	70.0	77.38
Tram 2	70.03	75.4	80.82
Tram 3	69.38	74.5	80.51
Mean	68.8	73.9	79.80
Outbound Track			
Tram 4	68.94	74.7	81.50
Tram 5	68.60	74.6	80.64
Tram 6	64.47	71.0	77.47
Mean	67.80	73.7	80.20
Combined Mean Levels	**68.3**	**73.8**	**80.0**

Table 8.11 Measured LUAS Noise Levels

$^1/_3$ Octave Band Analysis

There were no tonal components noted from the analysis of the 1/3 Octave Band Spectra recorded for each tram pass-by event

Table 8.12 present the assessment of LUAS noise levels at site boundary locations N1 and N2 based on the measured SEL values and the number of daily LUAS movements.

Location	LAeq, 18hr Day	LAeq,8hr Night
N1 Southern Site Boundary	54.9	50.7
N2 South-eastern site boundary	53.5	49.8

Table 8.12 Predicted Daily LUAS Noise Levels

Table 8.13 present the assessment of LUAS vibration levels at site boundary locations N1 and N2 based on the measured PPV and VDV values and the number of daily LUAS movements.

Time Period	Vibration Assessment Parameter			
	VDV_x m/s$^{-1.75}$	VDV_y m/s$^{-1.75}$	VDV_z m/s$^{-1.75}$	PPV mm/s
16hr day	0.0150	0.0213	0.0875	0.125

Table 8.13 LUAS Vibration Monitoring Results

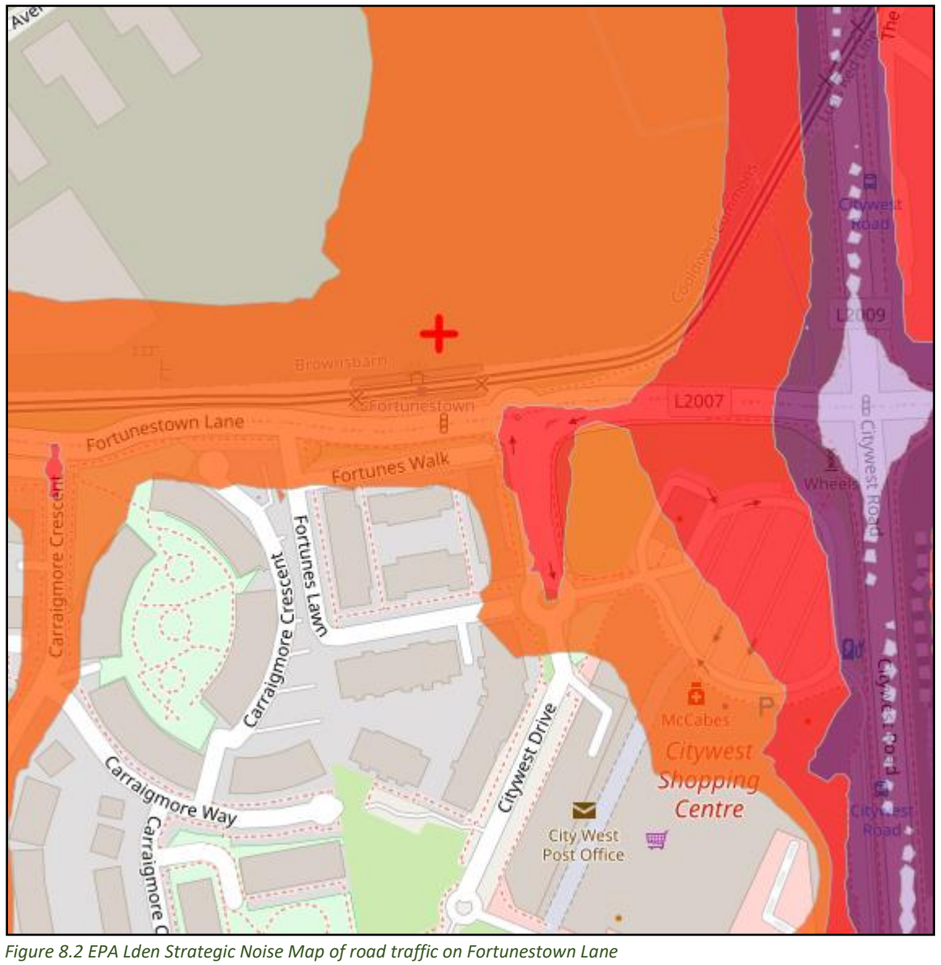

Figure 8.2 EPA Lden Strategic Noise Map of road traffic on Fortunestown Lane

Site within Lden 55 – 59dB contour

South-eastern section of site within Lden 60 – 64dB contour

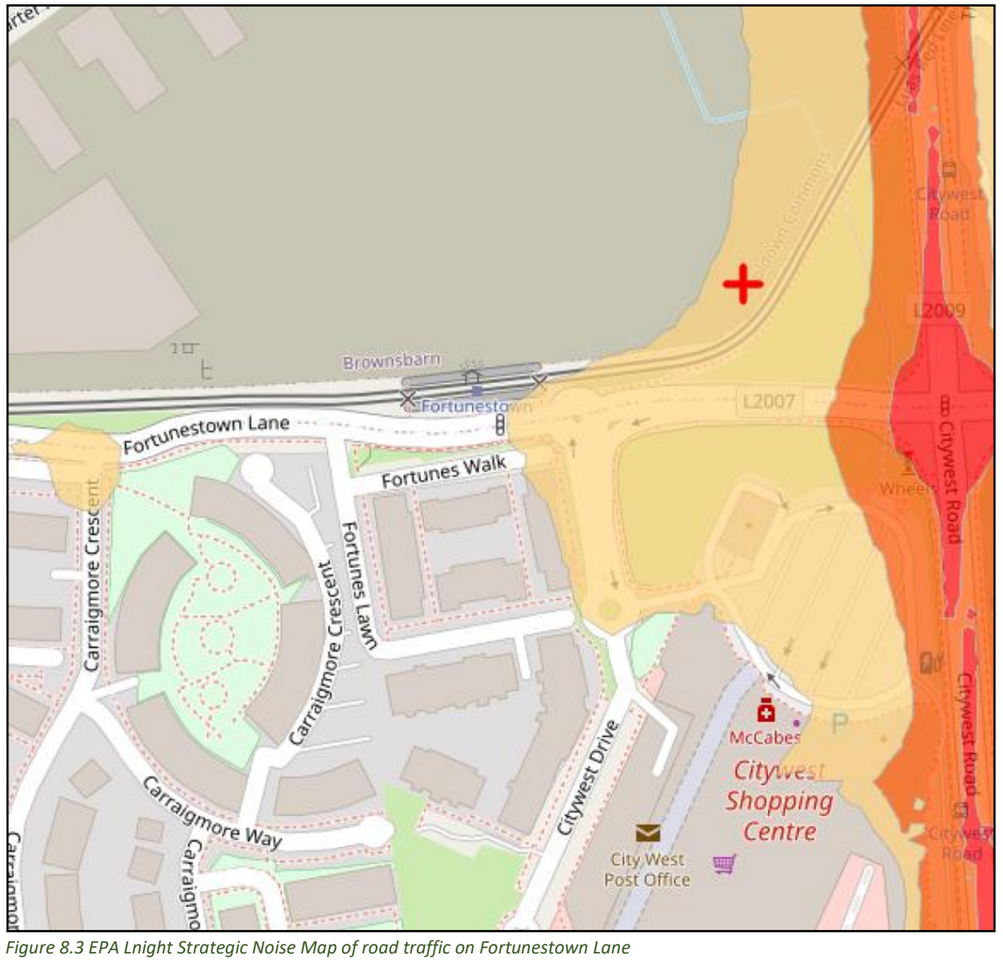

Figure 8.3 EPA Lnight Strategic Noise Map of road traffic on Fortunestown Lane

Site within Lnight <50dB contour

South-eastern section of site within Lnight 50 – 54dB contour

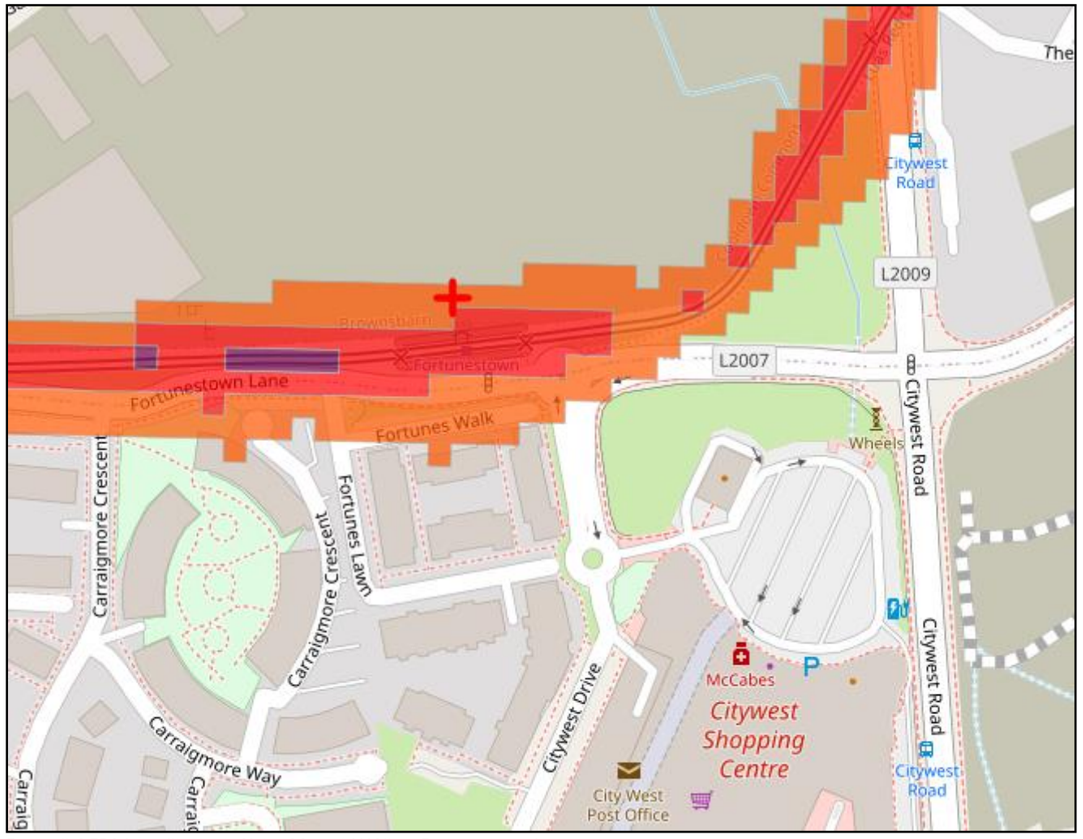

Figure 8.4 EPA Lden Strategic Noise Map of LUAS on Fortunestown Lane

Southern Site within Lden 60 – 64dB contour

South-eastern section of site within Lden 60 – 64dB contour

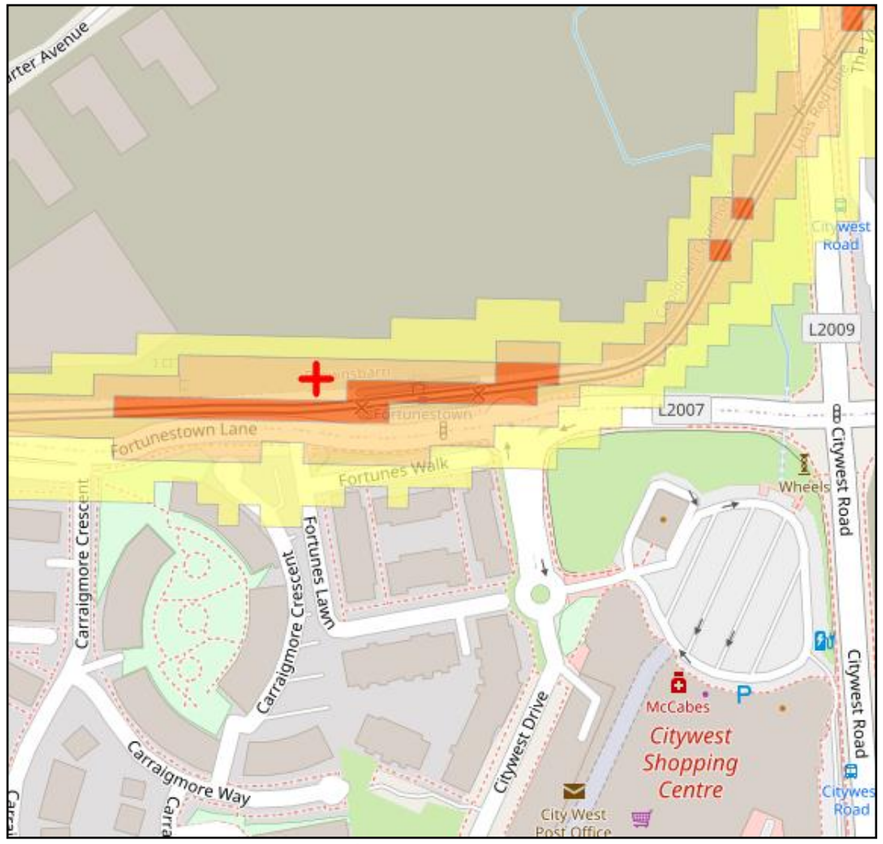

Figure 8.5 EPA Lnight Strategic Noise Map of LUAS on Fortunestown Lane

Site within Lnight 50-54dB contour

Significance of Results

Based on the recorded baseline noise surveys conducted in the vicinity of the proposed development site it may be concluded that the existing ambient noise levels at the proposed residential receptors along the southern site boundary are dominated by passing road traffic noise and LUAS pass-by noise during the daytime and nightime periods.

The ambient noise climate at the apartments on Fortunes Walk is similarly dominated by passing road traffic noise and LUAS pass-by noise during the daytime and nightime periods.

The **Professional Guidance on Planning & Noise (ProPG)** document was published in May 2017. The document was prepared by a working group comprising members of the Association of Noise Consultants (ANC), the Institute of Acoustics (IOA) and the Chartered Institute of Environmental Health (CIEH). Although not a government document, since it's adoption it has been generally considered as a best practice guidance and has been widely adopted in the absence of equivalent Irish guidance.

The ProPG outlines a systematic risk based 2 stage approach for evaluating noise exposure on prospective sites for residential development. The two primary stages of the approach can be summarised as follows:

Stage 1 - Comprises a high level initial noise risk assessment of the proposed site considering either measured and or predicted noise levels; and,

Stage 2 – Involves a full detailed appraisal of the proposed development covering four "key elements" that include:

Element 1 - Good Acoustic Design Process;
Element 2 - Noise Level Guidelines;
Element 3 - External Amenity Area Noise Assessment
Element 4 - Other Relevant Issues

A key component of the evaluation process is the preparation and delivery of an Acoustic Design Statement (ADS) which is intended for submission to the planning authority.

ProPG outlines the following possible recommendations in relation to the findings of the ADS:

A. Planning consent may be granted without any need for noise conditions;
B. Planning consent may be granted subject to the inclusion of suitable noise conditions;
C. Planning consent should be refused on noise grounds in order to avoid significant adverse effects ("avoid"); or,
D. Planning consent should be refused on noise grounds in order to prevent unacceptable adverse effects ("prevent").

ProPG Noise Risk Assessment

A site may be risk categorised in accordance with ProPG as negligible, low, medium or high risk with regards to the existing noise climate as graphically illustrated in Figure 8.6.

The subject site may be classified as Medium Risk based on the impact that LUAS and road traffic noise levels have on the southern and south-eastern site areas.

ProPG states that for a medium risk site: *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 how it is demonstrated that 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*.

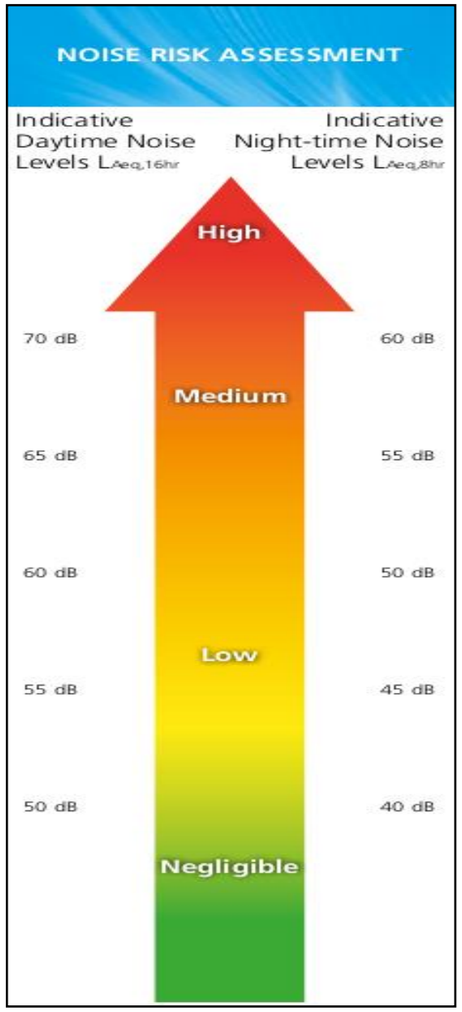

Figure 8.6 ProPG Noise Risk Assessment

8.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development will consist of the construction of 421 no. residential units within 9 no. blocks ranging in height from 1 – 13 storeys, retail/commercial/office units, and open spaces along with all associated site development works and services provisions to facilitate the development including parking, bin storage, substations, landscaping and all services. A full description is provided in the statutory notices and in Chapter 3 of this EIAR.

When considering a development of this nature, the potential impacts of noise and vibration must be considered for each distinct stage: the medium term (2-3 years) impact of the construction phase and the ongoing long term impact of the operational phase. It is important that there is no unacceptable increase in ambient noise levels during the construction phases and during the operational phase.

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 such as internal residential vehicle movements, children playing, pedestrians, bin collections and occasional delivery van movements. These normal residential activities are not considered “noise” as they are part of everyday living.

8.5 POTENTIAL IMPACTS

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 likely potential impacts for both construction and operation of the proposed scheme prior to mitigation are described below. The mitigation measures are described in Section 8..7 and the predicted impacts with the development in place and the mitigation measures incorporated in Section 8.8.

Construction Phase

The development of the site will be conducted in the following phased stages:

Enabling works - Site set up and Site clearance

Construction works including infrastructure and building construction and landscaping

Enabling works - Site Set Up and Clearance

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. 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, Construction and Demolition (C&D) waste shall be segregated as per the requirements of the Construction and Demolition Waste and By Product Management Plan for the site and shall be exported off-site by an appropriately permitted waste contractor. The movement of these trucks to and from the site shall result in an increase in the volume HGV’s within the immediate area and along the proposed haul routes which will generate additional noise levels.

A quantity of excavated top and subsoils will be stockpiled on site and used for landscaping purposes. These stockpiles will act to attenuate the propagation of noise through the site as they will in effect be an absorbent noise barrier.

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.

It is predicted that the construction phases shall result in a short-term 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.

Due to the phased nature of the development there will be slight to moderate impacts on the existing residential estates and houses located opposite the site boundaries.

The noise and vibrational impacts of construction works will only be prevalent when construction works are occurring in proximity to these residential receptor areas and as such the impacts will not extend over the entire duration of the total construction phase.

The proposed construction phase noise mitigation measures as detailed in Section 10 shall ensure that all construction activities are controlled and managed and audited by an independent acoustic consultant to confirm that the mitigation measures are implemented throughout the construction phase.

Operational Phase

Internal Noise Control – Apartments and houses

At the earliest stage during the construction phase, test apartment units and semi-detached houses shall be constructed to their finished level and shall be tested by a suitably qualified independent Acoustic Consultant to ensure that they comply with *Department of the Environment, Building Regulations 2014, Technical Guidance Document E – Sound.* Table 8.14 provides detail on the recommended sound insulation values that shall be achieved to ensure acoustic privacy between adjoin apartment units.

Dwellings	Airborne Sound Insulation D_{nTw} (dB)	Impact Sound Insulation L_{nTw} (dB)
Floors and Stairs	53	58
Walls	53	N/A

Table 8.14 Recommended sound insulation values for internal party walls / floors

The main potential noise impact on existing receptors associated with the proposed development relates to additional traffic flows on the surrounding road network. Given that traffic from the development will make use of existing road infrastructure, it is appropriate to consider the increase in traffic noise level that arises as a result

of vehicular movements associated with the development using the L_{A10} parameter which is typically used to describe traffic noise.

For other non-traffic related sources appropriate guidance on internal noise levels for dwellings is contained within *BS 8233: 2014: Guidance on Sound Insulation and Noise Reduction for Buildings.* This British Standard sets out recommended noise limits for indoor ambient noise levels in dwellings as detailed in Table 8.15.

Typical situations	Design Range, $L_{Aeq,T}$ dB	
	Daytime $L_{Aeq,16hr}$ (07:00 to 23:00hrs)	Night-time $L_{Aeq,8hr}$ (23:00 to 07:00hrs)
Living / Dining Rooms	35 / 40	n/a
Bedrooms	35	30

Table 8.15 Recommended Indoor Ambient Noise Levels from BS 8233:2014

8.6 POTENTIAL CUMULATIVE 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 European Commission's report of May 1999 'Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions' defines cumulative impact as follows:
"Impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project".

The local area has a number of residential developments under construction and a number of applications for residential developments have been lodged with the relevant authority.

Lands to the west of the subject site are currently being developed however, this development is likely to be completed by the time that construction works commence on the subject site should permission be granted. Other lands in the vicinity of the site may be developed in the future and as such short-term construction noise impacts may impact the subject site and other existing developments. The longer term impact of all operational sites if fully developed will not have an adverse noise or vibrational impact on the receiving environment by means of the nature of the developments which are predominantly residential and community based.

8.7 MITIGATION MEASURES

Construction Phase

General Construction Site Management
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 Mitigation Measures
An independent acoustic consultant shall be engaged by the contractor prior to the commencement of site activities to ensure that all noise mitigation measures as specified in this Section of the EIAR are implemented and to prepare a site specific *Construction Management Plan.* The Plan shall include all relevant noise and vibration control measures as specified in this report. The Plan shall be submitted to South Dublin County Council for approval as required.

The nominated contractor shall appoint a designated person to manage all environmental complaints including noise and vibration.

A noise complaint procedure shall be implemented in which the details of any noise related complaint are logged, investigated and where required, measures are taken to ameliorate the source of the noise complaint.

Appropriate signage shall be erected on all access roads in the vicinity of the site to inform HGV drivers that engines shall not be left idling for prolonged periods and that the use of horns shall be banned at all times.

HGV's queuing on any local or public road shall not be permitted and it shall be the responsibility of site management to ensure this policy is enforced.

Typical construction hours are:

07:00hrs – 19:00hrs Monday to Friday
08:00hrs – 14:00hrs Saturday
Closed on Sundays and Bank/Public Holidays

All onsite generator units (if required) used to supply electricity to the site shall be silenced models or enclosed and located away from any receptor.

The site compound shall be located at a point on site furthest away from any residential development.

Mains power shall be used to supply electricity to all site offices and site lighting at the earliest instance.

The use of generators during the night-time shall be avoided.

Construction Phase Noise Control & Mitigation
The following shall be implemented to mitigate construction noise impacts in order to ensure that the construction phase of the development does not have an unacceptable impact on sensitive receptors:

Construction Works Noise Mitigation Measures
A strictly enforced noise management programme shall be implemented at the site from the outset of construction activities.

The Construction Project Manager shall appoint an acoustic consultant to conduct continuous noise surveys which shall be conducted at the baseline noise monitoring locations throughout the construction phase of the development to assess compliance with the construction noise limit criteria detailed in Table 8.1 above and to assess the effectiveness and implementation of the specific Construction Phase noise mitigation measures detailed in this document.

The principal of controlling noise at source shall be implemented at the site. Best practice mitigation techniques as specified in *BS 5228:2009+A1 2014 – Noise and Vibration Control on Construction and Open Sites* shall be implemented during the construction phase and are detailed in this Section.

Noisy stationary equipment shall be sited away from sensitive site boundaries as far as practicable.

Where reasonable practicable, noisy plant or activities shall be replaced by less noisy alternatives if noise breaches and/or complaints occur.

Proper use of plant with respect to minimising noise emissions and regular maintenance will be required.

All vehicles and mechanical plant will be fitted with effective exhaust silencers and will be maintained in good efficient order

Where noisy plant is required to operate in works areas next to residential houses low noise plant options will be used wherever practicable.

Dumpers and any plant used for moving materials around the site will have high performance exhaust silencers.

Selected use of rubber-tyred equipment over steel track equipment where practicable.

The use of inherently quiet plant is required where appropriate – all compressors and generators will be "sound reduced" or "super silent" models fitted with properly lined and sealed acoustic covers, which will be kept closed whenever the machines are in use, and all ancillary pneumatic percussive tools will be fitted with mufflers or silencers of the type recommended by the manufacturers.

All compressors, generators and pumps shall be silenced models fitted with properly lined and sealed acoustic covers or enclosures, which will be kept closed whenever the machines are in use.

All pneumatic percussive tools such as pneumatic hammers shall be fitted with dampers, mufflers or silencers of the type recommended by the manufacturer.

Fixed items of plant shall be electrically powered in preference to being diesel or petrol driven.
Vehicles and mechanical plant utilised on site for any activity associated with the works shall be fitted with effective exhaust silencers and shall be maintained in good working order and operated in a manner such that noise emissions are controlled and limited as far as reasonably practicable.

Any plant, equipment or items fitted with noise control equipment found to be defective in shall not be operated until repaired / replaced.

Machines in intermittent use shall be shut down in the intervening periods between works or throttled down to a minimum during periods when not in use.

Static noise emitting equipment operating continuously shall be housed within suitable acoustic enclosure, where appropriate.

All excavator mounted pneumatic breakers used for demolition and ground breaking activities shall be fitted with effective dampeners and /or enclosed within a noise adsorbing blanket structure to minimise noise emissions.

Site activities shall be staggered when working in proximity to any receptor, that is concrete cutting and rock breaking should where possible. This proposed method of working will provide effective noise management of site activities to ensure that any receptor is not exposed to unacceptably high levels of noise over extended periods.

Excessive reviving of all vehicles shall be avoided.

Unnecessary dropping of heavy items onto ground surfaces shall be banned.

The use of an excavator bucket to break up slabs of concrete or tarmacadam shall not be permitted.

The dragging of materials such as steel covers, plant or excavated materials along ground surfaces shall not be permitted.

The use of acoustic screens to attenuate noise at source shall be implemented as deemed necessary.

Plant Reversing Alarms: Where reasonably practicable and deemed safe by risk assessment, taking into account onsite hazards and working environment, the tonal reversing alarms of mobile plant shall be replaced with broadband alarms.

A nominated person from the Project Management team will be appointed to liaise with local residents and businesses regarding noise nuisance events.

In the event of the requirement for out of hours work to occur which will involve the generation of noise levels that are predicted to exceed out of hours noise limit criteria, South Dublin County Council shall be immediately notified prior to the works commencing.

A nominated person from the Project Management team will be appointed to liaise with and inform local residents and South Dublin County Council regarding out of hours works.

An independent acoustic consultant shall review the implementation of the recommended mitigation measures on a monthly basis.

The images below describe the use of noise screens for construction activities.

It is recommended that high performing acoustic barriers are utilised such as *Echo Barrier* products or *Ventac* products.

Figure 8.7 Double height acoustic blanket enclosure

Figure 8.8 Acoustic blankets screening piling and excavations

Figure 8.9 3-sided Acoustic enclosure for surrounding breaking, cutting works.

Construction Phase Vibration Control & Mitigation
The following specific vibration mitigation and control measures shall be considered during the construction phase:

Vibration Mitigation Measures
Breaking out concrete elements using low vibration tools

Choosing alternative, lower-impact equipment or methods wherever possible

Scheduling the use of vibration-causing equipment, such as jackhammers, at the least sensitive time of day

Routing, operating or locating high vibration sources as far away from sensitive areas as 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.

Confining vibration-generating operations to the least vibration-sensitive part of the day which could be when the background disturbance is highest

A nominated person from the Project Management team will be appointed to liaise with local residents and businesses regarding vibrational nuisance events.

An independent acoustic consultant shall review the implementation of the recommended mitigation measures on a monthly basis.

In order to ensure that site construction activities are conducted to minimise the vibration impacts on the receiving environment, structural vibration monitoring shall be conducted during the course of the project works if required.

It is proposed that vibration monitoring will be conducted at properties adjacent to or within 20m of the site as required using calibrated vibration monitors and geophones capable of transmitting live text and email alerts to ensure that if vibration levels approach or exceed specified warning and limit values, site personnel will be alerted to cease at the earliest instance and appropriate mitigation measures may then be implemented to minimise the vibrational impacts of protected structures.

Live vibration monitoring systems shall be installed for the duration of the construction phase in cooperation with TII in proximity to the inbound Citywest LUAS track which runs adjacent to the southern and south-eastern site boundaries.

The transient vibration guide values for cosmetic damage as specified in *British Standard BS 7385:, Evaluation and measurement for vibration in buildings, Part 2 1993 Guide to damage levels arising from ground borne vibration* is 15 mm/sec Peak Component Particle Velocity at 4 Hz increasing to 20 mm/sec at 15 Hz. This limit value rises to 50 mm/sec at frequencies of 40 Hz and greater. The applied conservative limit of 12.5 mm/sec PPV (peak particle velocity) applied for this assessment is significantly lower than these levels.

In order to protect the amenities enjoyed by nearby residents and commercial premises, a full Construction Management Plan (including traffic management) shall be put in place prior to the commencement of development. This will have regard to the mitigation measures set out in Section 8.7 of this document.

Operational Phase

The operational phase of the development is predicted not to have an adverse 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.

Operational Phase noise mitigation measures relate to the inward impact of existing external noise sources on the operational development. Operational mitigation measures are classified as mitigation by design.

External noise can enter rooms within dwellings through windows, ventilators, walls, roof and doors. In most cases, however, windows provide the main path.

Acoustic Design requirements for residential buildings
Windows
In order to ensure a sufficient level of sound insulation is provided for all dwellings within the development, the sound insulation performance of windows and window frame sets in terms of the in-situ weighted sound reduction index (R_W) for all unit windows with a line of sight onto the LUAS Citywest Line, Fortunestown Lane and Citywest Road shall be up to 37dB R_W to ensure that the internal noise level criteria are achieved. All window sets shall be double/triple glazed and acoustically rated in accordance with EN ISO Part3 1995, EN ISO 717 1997.

Figure 8.10 Facades requiring acoustically rated windows.

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. This design feature of the residential units will ensure that the building structure is acoustically insulated from the external environment.

Wall Constructions

The wall construction typically provides the highest level of sound insulation performance to a residential building. The residential dwellings will be built using either masonry or a timber framed construction. The minimum sound insulation performance of the chosen wall construction will be 55dB Rw.

Acoustic Performance Verification

At the earliest stage during the construction phase, residential test units 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 8.12 above provides detail on the recommended sound insulation values that shall be achieved to ensure acoustic privacy between adjoining residential units and to assess compliance with external noise intrusion criteria as defined in *BS 8233: 2014: Guidance on Sound Insulation and Noise Reduction for Buildings.*

8.8 PREDICTED IMPACTS

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 L_{Aeq} 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.*

Tables 8.16 and 8.17 detail assumed plant items during the key phases of construction with the associated source reference from *BS 5228: 2009+A1 2014.* The closest residential properties to the proposed development site are located at distances ranging from 10m (Apartments under construction west of site) to 50m (Fortune Walk Apartments). Construction noise calculations have therefore been conducted both with and without noise mitigation at distances of 10 to 50m from the works for the Site Clearance and Main Construction phases, representing the nearest properties to the works.

Plant Item	**BS 5228 Reference**	**Calculated sound pressure levels L_{Aeq} dB at distances from receptors**	
		10	**50**
Generator (enclosed)	C.4 Ref 84	68	54
Compressor (enclosed)	D.6 Ref 19	71	57
Tracked Excavator	C.2 Ref 3	76	62
Wheeled Excavator	C.2 Ref 26	77	63
HGV	C.4 Ref 19	75	61
Dozer	C.2 Ref 11	79	65
Combined $L_{Aeq,period}$ without mitigation	-10	**83**	**70**
Combined $L_{Aeq,period}$ with mitigation		**68**	**55**

Table 8.16 Predicted construction noise predictions associated with Site Enabling works

Plant Item	**BS 5228 Reference**	**Calculated sound pressure levels L_{Aeq} dB at distances from receptors**	
		10	**50**
Generator (enclosed)	C.4 Ref 84	68	54
Compressor(enclosed)	D.6 Ref 19	71	57
Tracked Excavator	C.2 Ref 3	76	62
Wheeled Excavator	C.2 Ref 26	77	63
HGV	C.4 Ref 19	75	61
Concrete / Steel Cutting Equipment	Various	82	68
Dump truck	C.2 Ref 30	77	63
Combined $L_{Aeq,period}$ without mitigation	-10	**86**	**72**
Combined $L_{Aeq,period}$ with mitigation		**71**	**57**

Table 8.17 Predicted construction noise predictions associated with building construction works

The results of the assessment has indicated that, in general, at distances of greater than 10m from the works site provided all mitigation measures including site hoarding are implemented, the construction day time noise limit of 75dB $L_{Aeq,\ 11hr}$ can typically be complied with during both enabling and 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 Tables 8.14 and8.15 represent worst case scenarios when all items of plant are operating simultaneously without noise mitigation measures in place.

The proposed construction phase noise mitigation measures as detailed in Section 8.7 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.

Where works are occurring at distances of less than or at 10m from existing residential receptors, enhanced noise mitigation measures including the use of acoustic screens between the activities and the receptors will be required to reduce the impact of works. These measures are detailed in Section 8.7.

Construction Traffic Noise
Based on the assumption of up to 80 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 10m of the haul route road has been calculated using a standard international acoustical formula as described below.

$$L_{Aeq,\ T} = SEL + 10\log_{10}(N) - 10\log_{10}(T) + 20\log_{10}(^{r1}/_{r2})\ dB$$

where $L_{Aeq,\ T}$ 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 (80);
r1 is the distance at which SEL is assessed (5m)
r2 is the closest distance to the receptor from the road (10m)

The calculations assumed a maximum scenario of 10 truck movements per hour based on a 10 hour working day a maximum 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 $L_{Aeq,\ period}$ 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 45 dBA, $L_{Aeq,\ period}$.

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.

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.

Outward Noise Impact
During the construction phase there is the potential for minor impacts on nearby noise sensitive properties due to noise generated by construction site activities. The implementation of the construction phase noise and vibration mitigation measures and a continuous noise and vibration monitoring programme as detailed in Section 8.11 below, will minimise the potential noise and vibration impact on the receiving environment including existing residential receptors.

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:

- Ground preparation excavation activities that require the use of pneumatic rock breakers
- 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.

The nearest off-site residential receptors will be c. 10m from construction works. 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 highly unlikely that any construction generated vibrations at buildings 10m from the proposed development would result in cosmetic damage. Experience of similar construction projects has shown that beyond this distance there is no risk of cosmetic damage occurring within buildings.

A programme of structural vibration monitoring shall be conducted at residential receptors located within <20m of site activities as detailed in Section 8.11 below.

Operational Phase

Inward Noise Impact
The noise impact generated by additional traffic movements associated with the development is predicted to be of an imperceptible impact on existing ambient noise levels at receptors along the local road network.

It may be concluded that during daytime and night-time periods, acceptable internal noise levels can be achieved in all residential units as defined in *BS 8233* with windows closed.

With regard to the recommended mitigation by design measures as specified above, it may be concluded that residential properties located within the proposed development can be appropriately designed and constructed to achieve acceptable internal noise levels and to ensure the required acoustic performance of adjoining residential units.

Traffic Noise Impact
The main potential for altering the noise environment once the development is operational, and thus impacting neighbouring residential receptors, is from road traffic noise and retail facilities associated with the development.

The Traffic and Transportation Assessment Report prepared by DBFL Consulting Engineers submitted with this application 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 up to the design year of 2037 as shown in Figure 8.7 and Table 8.18.

The percentage traffic increase associated with the development has considered 6 existing junctions on the local road network.

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 development for all year scenarios will result in a negligible increase of less than 1dBA on existing ambient noise levels at existing residential receptors along the local road network resulting in an imperceptible impact.

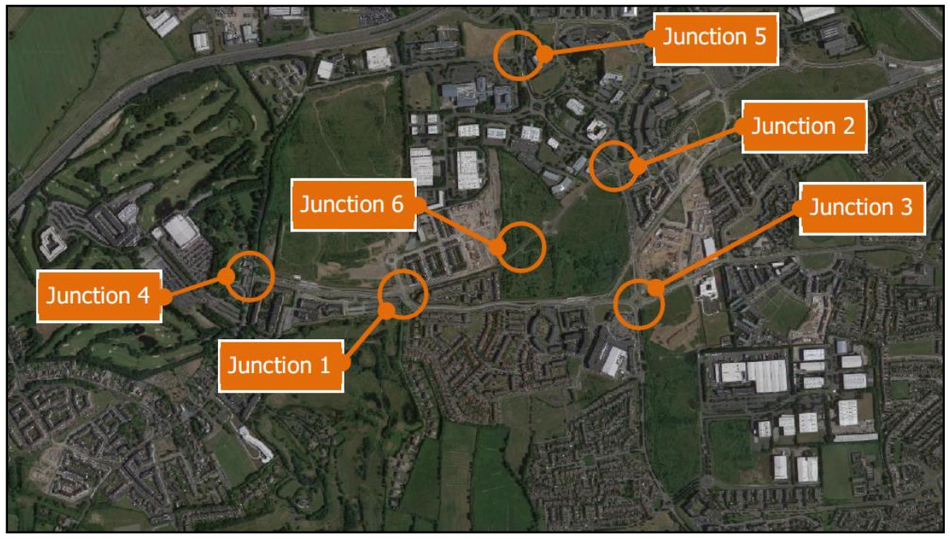

Figure 8.11 Traffic Junctions Analysed

Junction 1 Citywest Avenue / Fortunestown Lane signalised junction;
Junction 2 N82 Citywest Road/ Citywest Avenue 4-arm roundabout junction;
Junction 3 Fortunestown Lane / N82 Citywest Road/ Citywest Drive 4-arm signal controlled junction;
Junction 4 Fortunestown Lane / Garter Lane signal controlled junction;
Junction 5 N82 Citywest Road/ Bianconi Avenue 3-arm priority controlled junction
Junction 6 Citywest Avenue / Pl. Ref. SD19A/0117 permitted emerging development signal controlled junction

AM	Junction 1	DN	DS	Impact
2022	Cúil Dúin View / Citywest Avenue / Fortunestown Lane / Citywest Avenue	1365	1385	1.51%
2027		1560	1620	3.84%
2037		1647	1707	3.63%

AM	Junction 2	DN	DS	Impact
2022	Citywest Avenue / Citywest Road / Citywest Avenue / Citywest (NW)	2106	2143	1.74%
2027		2335	2441	4.56%
2037		2482	2588	4.29%

AM	Junction 3	DN	DS	Impact
2022	Citywest Road (N) / Fortunestown Lane (E) / Citywest Road (S) / Fortunestown Lane (W)	2217	2230	0.62%
2027		2457	2498	1.64%
2037		2621	2662	1.54%

AM	Junction 4	DN	DS	Impact
2022	Garters Lane / Fortunestown Lane	1322	1332	0.75%
2027		1445	1474	2.01%
2037		1544	1573	1.88%

AM	Junction 5	DN	DS	Impact
2022	Citywest Road (N) / Citywest Road (S) / Bianconi Avenue	2164	2171	0.32%
2027		2388	2408	0.81%
2037		2549	2568	0.76%

AM	Junction 6	DN	DS	Impact
2022	Garter Avenue / Citywest Avenue / Edenbrook Green / Cooldown Commons Phase 3 Main Site Access	509	559	9.78%
2027		621	765	23.31%
2037		644	789	22.47%

Table 8.18 % Increase in traffic at Junctions

On-Site Noise Sources

Internal Residential Traffic Noise

The subject development includes the provision of surface and under-croft 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 for impact beyond the boundaries of the site.

Retail Units

Noise associated with the retail units will be confined to deliveries and customers of the units. Any vents or fans shall be acoustically enclosed ensuring that the operation of these units will not cause an adverse impact within the development itself.

Office Space

The operation of the office space will not generate any outward noise impact.

Potential Inward Noise impacts on the proposed development

Regarding noise aspects within the proposed development itself, the aspects to be considered are:

- Suitability for residential development, in terms of the existing noise climate
- Avoidance of potential conflict in terms of activity noise within the development itself

The main potential noise impact on the proposed development relates to passing LUAS tram movements and road traffic on the surrounding road network. In order to comprehensively establish the impact the most dominant noise source, that is passing LUAS tram movements along the Southern and South-Eastern site boundaries will have on the residential aspect of the development, a series of LUAS noise measurements were conducted at the southern site boundary. The methodology implemented for the assessment was Transport Infrastructure Ireland's (TII) document entitled, *Environmental Noise Monitoring Procedure for the Operational Systems (January 2015).*

In order to assist with the interpretation of the noise associated with vehicular traffic on public roads, Table 2 above offers guidance as to the likely impact associated with any particular change in traffic noise level.

Vibration

The only source of vibration predicted, once the development has been constructed and is operational, is vibration associated with internal road traffic movements.

As a vehicle travels along a road, vibration can be generated in the road and subsequently propagate towards nearby buildings. Such vibration is generated by the interaction of a vehicle's wheels and the road surface and by direct transmission through the air of energy waves. Some of these waves arise as a function of the size, shape and speed of the vehicle, and others from pressure fluctuations due to engine, exhaust and other noises generated by the vehicle.

Ground vibrations produced by residential road traffic are unlikely to cause perceptible, cosmetic or structural vibration in properties located near to well-maintained and smooth road surfaces. Vibration impacts associated with road traffic in particular commercial van and trucks can therefore be largely avoided by good maintenance of the road surface.

It has been assessed that vibration levels related to road traffic movements, including those additional movements due to the proposed development would be significantly lower than those levels required to lead to disturbance of occupiers or to cause cosmetic or structural damage to buildings.

8.9 '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 up to the design year of 2037 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 imperceptible change in the existing noise climate at any local receptor.

8.10 WORST CASE SCENARIO

The main potential for adverse impacts on existing ambient noise levels will occur during the construction phase. The worst-case scenario, therefore, corresponds to the situation where the mitigation measures for construction activities fail or are not implemented. Should noise mitigation measures not be implemented during the construction phase, significant noise nuisance is likely in areas close to the construction site. There would be significant adverse effect on human health in the absence of such mitigation measures.

8.11 MONITORING & REINSTATEMENT

Construction Phase 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 or cause cosmetic or structural damage to properties or structures in the vicinity of the site.

On commencement of the site construction activities, continuous live noise monitoring systems shall be installed at site boundary locations / closest residential receptors to measures and assess the impact that site activities may have on ambient noise levels at local receptors and to assess levels against *BS5228* Noise Limit Criteria.

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*). L_{Aeq}, L_{A90}, L_{A10} and L_{Amax} and 1/3 Octave Frequency analysis.

Noise Monitoring Locations

The monitoring locations selected for the noise monitoring survey will be at residential noise sensitive receptors adjacent to the site boundaries and as identified in the baseline noise assessment, namely Fortunes Walk and the residential development adjacent the western site boundary once occupied.

Proposed Vibration Monitoring Programme During Site Construction

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 may be implemented during the course of the

construction phase if and as required. It is proposed that vibration monitoring will be conducted at adjacent properties opposite the site boundaries as required using calibrated vibration monitors and geophones with live text and email alert functionality to ensure that if vibration levels approach or exceed specified warning and limit values, site personnel will be alerted to cease at the earliest instance and appropriate mitigation measures may then be implemented to minimise the vibrational impacts of protected structures.

Vibration Monitoring Locations
The monitoring points chosen for locating the geophone of the vibration measuring instrument will be chosen 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.*

Operational Phase Monitoring
The noise associated with the operation of the retail units once they and the development is operational shall be assessed in accordance with *British Standard BS4142:2014 – "Method for Rating and Assessing Industrial and Commercial Sound* to ensure the operation of the retail units do not have an adverse noise impact at on-site or off-site residential noise sensitive receptors.

Reinstatement
Reinstatement issues are not relevant with reference to the noise and vibration impacts associated with construction and operational phases of the development.

8.12 DIFFICULTIES IN COMPILING INFORMATION

There were no difficulties encountered in compiling this noise and vibration impact assessment.

8.13 REFERENCES

Transport Infrastructure Ireland's (TII) document entitled, Environmental Noise Monitoring Procedure for the Operational Systems (January 2015).
Dublin Agglomeration Noise Action Plan 2018 – 2023 (NAP).
Design Manual for Roads & Bridges – Volume 11 Section 3.
Professional Guidance on Planning & Noise (ProPG), (IoA, 2017).
British Standard BS 5228 (2009 +A1 2014): Code of Practice for Control of Noise and Vibration on Construction and Open Sites Part 1: Noise & Part 2: Vibration.
British Standard BS 7385 (1993): Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration.
British Standard BS 8233: 2014: Guidance on sound insulation and noise reduction for buildings.
British Standard BS 4142: 2014: Methods for Rating and Assessing Industrial and Commercial Sound
Calculation of Road Traffic Noise, Department of Transport Welsh Office, HMSO, 1988.
ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise.
ISO 9613 (1996): Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation.
EPA Guidelines on the Information to be contained in Environmental Impact Statements, (EPA, 2002).
EPA Advice Notes on Current Practice (in the preparation of Environmental Impact Statements), (EPA, 2003).
EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports, (Draft August 2017).
EPA Advice Notes for Preparing Environmental Impact Statements, (Draft, September 2015).

9 CLIMATE AND AIR QUALITY

9.1 INTRODUCTION

Byrne Environmental Consulting Ltd have assessed the potential air quality and climatic impacts that the proposed residential development at Cooldown Commons, Fortunestown Lane, Citywest, Dublin 24 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 proposed development will consist of the construction of 421 no. residential units within 9 no. blocks ranging in height from 1 – 13 storeys, retail/commercial/office units, and open spaces along with all associated site development works and services provisions to facilitate the development including parking, bin storage, substations, landscaping and all services. A full description is provided in the statutory notices and in Chapter 3 of the EIAR.

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 24 years-experience in the monitoring and assessment of air quality and climatic impacts that residential, commercial and industrial developments may have on the receiving environment.

9.2 METHODOLOGY

The general assessment methodology of the potential impact of the proposed development on air quality and climate 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).
- Environmental Protection Agency, 2015. Revised Guidelines on the Information to be Contained in Environmental Impact Statements.
- 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

Impact Assessment Methodology

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 as detailed in Table 9.1.

Air quality significance criteria are assessed on the basis of compliance with the appropriate standards or limit values. The applicable standards in Ireland include the National Air Quality Standards Regulations 2011 (S.I No. 180 of 2011), which incorporate European Commission Directive 2008/50/EC which has set limit values for the pollutants SO_2, NO_2, PM_{10}, benzene and CO Council Directive 2008/50/EC combines the previous Air Quality Framework Directive (96/62/EC) and its subsequent daughter directives (including 1999/30/EC and 2000/69/EC). Provisions 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.

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 Annual report entitled Air Quality in Ireland 2019. 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 Citywest, South 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 9.2.

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

Table 9.1 Air Quality Standards Regulations 2011 (based on EU Council Directive 2008/50/EC)

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

Pollutant	EPA 2018 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
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

Table 9.2 EPA 2019 Assessment Zone A Classification

Construction Impact Assessment Criteria

Transport Infrastructure Ireland's 'Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes' (Revision 1, 2011) states that "*it is very difficult to accurately quantify dust emissions arising from construction activities*" and that "*it is thus not possible to easily predict changes to dust soiling rates or PM_{10} concentrations.*" The guidance advises the use of a semi-quantitative approach to determine the likelihood of a significant impact which should be combined with an assessment of the proposed mitigation measures.

The construction assessment criteria, reproduced from the TII guidance, are set out in Table 9.3 below.

Source		Potential distance for significant effects (distance from source)		
Scale	**Description**	**Soiling**	**PM_{10}**	**Vegetation effects**
Major	Large construction sites, with high use of haul routes	100m	25m	25m
Moderate	Moderate sized construction sites, with moderate use of haul routes	50m	15m	15m
Minor	Minor construction sites, with limited use of haul routes	25m	10m	10m

Table 9.3 Assessment criteria for the impact of duct emissions from construction activities with standard mitigation in place (TII 2011)

The impact of construction related dust emissions is assessed by estimating the area over which there is a risk of significant impacts as per the TII guidance. The significance of impact is assessed in terms of the significance criteria outline in the *EPA's 2017 Guidelines on the information to be contained in Environmental Impact Assessment Reports*.

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.

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.

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 number 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 most recent Conference of the Parties to the Convention (COP23) occurred in November 2017 and focussed on advancing the implementation of the Paris Agreement. The Paris Agreement was established at COP21 in Paris in 2015 and is an important milestone in terms of international climate change agreements. The "Paris Agreement", agreed by 200 nations, has a stated aim of limiting global temperature increases to no more than 2°C above pre-industrial levels with efforts to limit this rise to 1.5°C. The aim is to limit global GHG emissions to 40 gigatonnes as soon as possible whilst acknowledging that peaking of GHG emissions will take longer for developing countries. Contributions to greenhouse gas emissions will be based on Intended Nationally Determined Contributions (INDCs) which will form the foundation for climate action post 2020. Significant progress has also been made on elevating adaption onto the same level as action to cut and curb emissions. The EU, on the 23/24th of October 2014, agreed the "2030 Climate and Energy Policy Framework" (EU, 2014). The European Council endorsed a binding EU target of at least a 40% domestic reduction in greenhouse gas emissions by 2030 compared to 1990. The target will be delivered collectively by the EU in the most cost-effective manner possible, with the reductions in the ETS and non-ETS sectors amounting to 43% and 30% by 2030 compared to 2005, respectively. Secondly, it was agreed that all Member States will participate in this effort, balancing considerations of fairness and solidarity. The policy also outlines, under "Renewables and Energy Efficiency", an EU binding target of at least 27% for the share of renewable energy consumed in the EU in 2030.

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 SO_2, VOCs and NH_3 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, $PM_{2.5}$ and CH4. In relation to Ireland, 2020-29 emission targets are for SO_2 (65% below 2005 levels), for NO_X (49% reduction), for VOCs (25% reduction), for NH3 (1% reduction) and for $PM_{2.5}$ (18% reduction). In relation to 2030, Ireland's emission targets are for SO_2 (85% below 2005 levels), for NOX (69% reduction), for VOCs (32% reduction), for NH3 (5% reduction) and for $PM_{2.5}$ (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 an 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.

9.3 RECEIVING ENVIRONMENT

Description of the baseline environment

The subject site is located in the Citywest area of South Dublin which includes residential developments, retail areas and the Citywest Business Campus. The subject site is located north of Fortunestown Lane opposite the Citywest Shopping Centre. The local road network carries large volumes of traffic throughout the day and the N7 road is located c.850m from the site. The Citywest LUAS line runs along and adjacent to the southern and south-eastern site boundary.

The development area is located within a zone which includes sources of existing transportation related air emissions principally from local road infrastructure and sources of domestic, retail and commercial building heating. It is noted that there are no other major sources of industrial air emissions within 1km of the site. The largest local industrial development is the CRH Roadstone quarry located c. 1.5km northeast of the subject site.

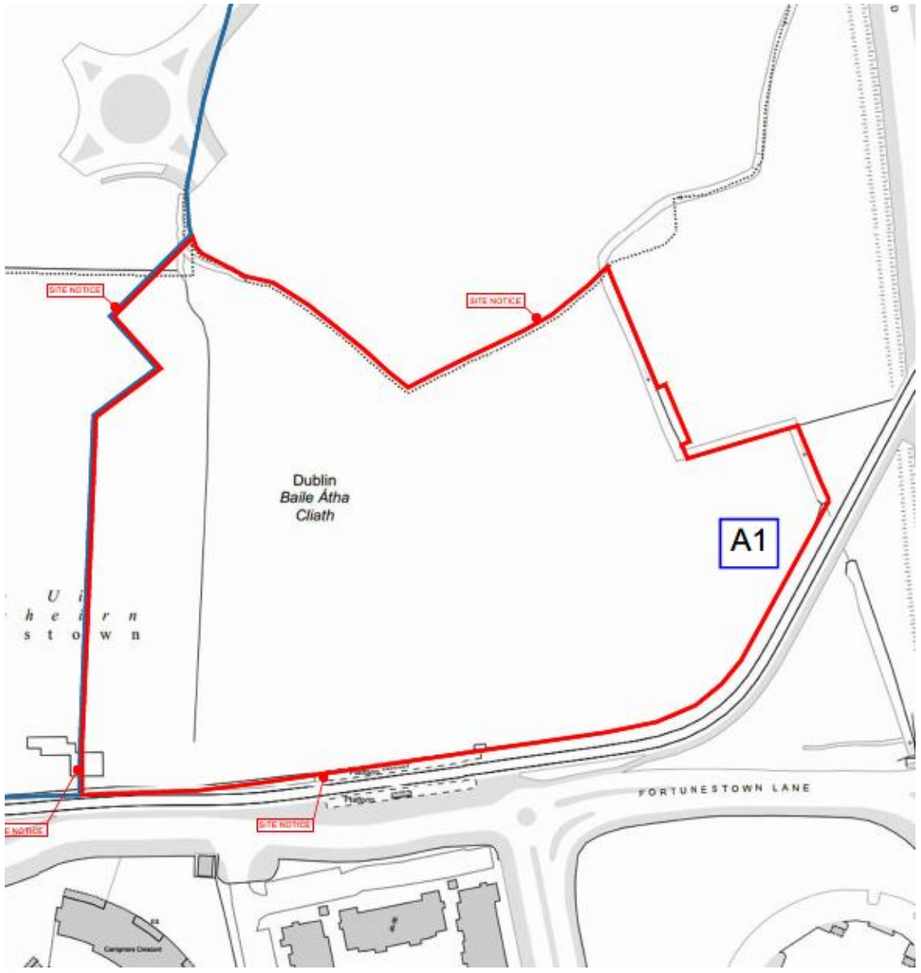

Figure 9.1 Location of development site and baseline air quality monitoring location A1

Description of Existing Climate

The nearest representative synoptic meteorological station to the subject site is at Dublin Airport which is located approximately 18km northeast of the site and as such, long-term measurements of wind speed/direction and air temperature for this location are representative of prevailing conditions experienced at the subject site. Recent meteorological data sets for Dublin Airport were obtained from Met Éireann for the purposes of this assessment study.

Rainfall

Precipitation data from the Dublin Airport meteorological station for the period 2011-2019 indicates a mean annual total of about 762 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 Dublin Airport (2011-2019) is 9.5ºC with a mean maximum of 15.9ºC and a mean minimum of 4.0ºC. Given the relatively close proximity of this meteorological station to the proposed development site, similar conditions would be observed. Table 4 sets out meteorological data for Dublin Airport from 2011-2019.

Year	Period	Rainfall (mm)	Maximum mean Temperature (ºC)	Minimum mean Temperature (ºC)	Mean Temperature (ºC)
2011	Annual Mean	672	16.7	3.1	9.4
2012	Annual Mean	850	15.3	5.4	9.3
2013	Annual Mean	764	14.0	3.6	9.9
2014	Annual Mean	870	15.8	5.4	10.6
2015	Annual Mean	766	14.0	4.0	9.0
2016	Annual Mean	725	15.7	4.4	10.1
2017	Annual Mean	661	15.0	5.3	9.9
2018	Annual Mean	709	14.8	4.8	9.7
2019	Annual Mean	886	15.9	5.1	9.6
Mean		762	15.3	4.0	9.5

Table 9.4 Meteorological Data for Dublin Airport 2011-2019

Data supplied by Met Eireann

Wind

Wind is of key importance for both the generation and dispersal of air pollutants. Meteorological data for Dublin Airport indicates that the prevailing wind direction, in the Dublin area, is from the West and Southwest and blows Northeast across the proposed development. The mean annual wind speed in the Dublin area between 2009 - 2019 is 5.7 m/s.

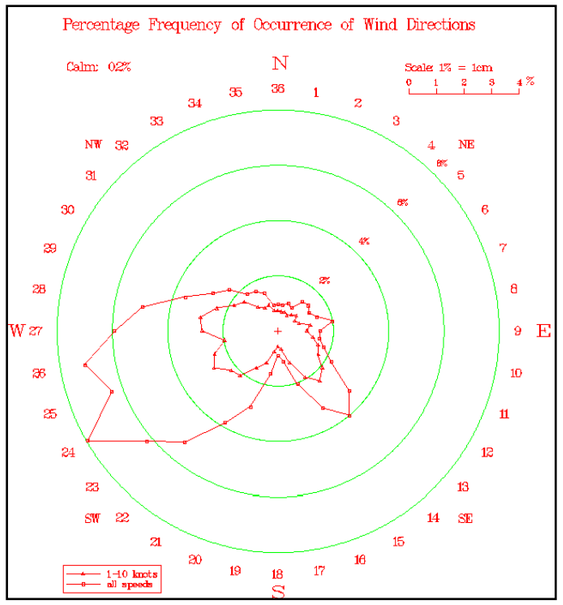

Figure 9.2 ***Windrose for Dublin Airport***

Description of existing air quality

The existing ambient air quality at and in the vicinity of the site is typical of an urbanised rural 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.

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– Key Indicators of Ambient Air Quality" details the range and scope of monitoring undertaken throughout Ireland. The Citywest area is categorised by the EPA as Zone A.

The most recent 2019 EPA publication (September 2020) 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 being 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 9.5 below presents a summary of the 2018 Air Quality data obtained from the Zone A locations which may be considered to be broadly representative to that of the subject site.

Pollutant	Regulation	Limit type	Limit value	EPA monitoring data 2019
Nitrogen dioxide	2008/50/EC	Annual limit for protection of human health	40 µg/m³	15 – 43* µg/m³
Sulphur dioxide	2008/50/EC	Daily limit for protection of human health (not to be exceeded more than 3 times per year)	125 µg/m³	0.8 – 2.5 µg/m³
Carbon monoxide	2008/50/EC	8-hour limit (on a rolling basis) for protection of human health (Zone C)	10,000 µg/m³	300 µg/m³
Particulate matter (as PM_{10})	2008/50/EC	Annual limit for protection of human health	40 µg/m³	11 – 19 µg/m³
Particulate matter (as $PM_{2.5}$)	2008/50/EC	Annual limit for protection of human health	25 µg/m³	8 - 11 µg/m³
Benzene	2008/50/EC	Annual limit for protection of human health	5 µg/m³	< 0.21µg/m³

Table 9.5 Summary of the 2019 Air Quality data obtained from Zone A areas

Baseline air quality monitoring

A site-specific short-term monitoring study was conducted for Nitrogen Dioxide using passive diffusion tubes over a two week period. Figure 1 identifies the monitoring location. The baseline survey was conducted during March

2020 when the potential for higher ambient levels of fossil fuel generated pollutants would be present as a result of the colder winter period.

These location was chosen in order to obtain short-term sample concentrations for the identified parameters from the principal sources of pollution i.e. vehicle exhaust emissions and home heating fossil fuel emissions.

The survey was indicative only and results obtained cannot be used to demonstrate compliance with short-term or annual limit values detailed in Table 1 above. The survey does, however, aid in identifying the influence of sources in the vicinity of the proposed development site. The results from the monitoring surveys are presented in Table 6.

The concentrations of NO_2 and dust deposition levels measured during the short-term measurement survey were significantly below their respective annual limit values and comparable with levels reported by the EPA.

Pollutant	Sampling period	Concentration A1 Eastern Site Boundary	Assessment criteria
Nitrogen dioxide	March 2020 2019	9.59 µg/m^3	40 µg/m^3 (as annual average)
Dust	March 2020	<52 mg/m^2-day	350 mg/m^2-day

Table 9.6 Results of passive diffusion tube monitoring at the development site

Significance

Based on published EPA air quality data for the Zone A area in 2019 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. 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.

Sensitivity

The subject site shall be developed by ground clearance and site preparation works and the subsequent construction of residential buildings, landscaped areas and road and path infrastructure. The principal local receptors that may be impacted by the development are existing and residential developments and the Citywest Shopping Centre located in proximity to the site boundaries.

9.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development will consist of the construction of 421 no. residential units within 9 no. blocks ranging in height from 1 – 13 storeys, retail/commercial/office units, and open spaces along with all associated site development works and services provisions to facilitate the development including parking, bin storage, substations, landscaping and all services. A full description is provided in the statutory notices and in Chapter 3 of the EIAR.

When considering a development of this nature, the potential impact on air quality and climate must be considered for each distinct stage: the short (1-5 years) and medium term (6-9 years) impact of the construction phase and the longer-term impact of the operational phase. The construction phase will be undertaken over a 2–3-year period. It is important that there are no unacceptable decreases in ambient air quality levels predicted during the construction phases and during the operational phase.

9.5 POTENTIAL IMPACTS

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”.

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 below. The mitigation measures are described in Section 9.7 and the predicted impacts in Section 9.8.

Construction Phase (Heading 3, Size 12)

Air quality

The development of the site will be conducted in the following phased stages:

Enabling works - Site set up and Site clearance
Construction works including site infrastructure, houses, apartment buildings and landscaping

Construction impacts with both of these phased stages are considered below.

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 works will be undertaken in separate phases and these activities have the potential to generate fugitive windblown dust emissions rising 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 phased development approach, only one phase at a time shall be developed with the remaining phased areas remaining generally undisturbed until such a time as they are developed. Infrastructural works will be required to facilitate site services, but it is not predicted that there would be bulk excavations of stripped soils until such a time as the development of subsequent phases are commenced.

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. Stripped top soils shall be stockpiled and covered on site for re-use during final landscaping works. 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 shall also generate windblown dust emissions. Where dusty waste material is loaded onto exposed open trucks, fine dusts may be released as the truck travels along public roads.

It is estimated that there will be up to 10 (No.) x 20 tonne tipper truck movements per hour or an average of 80 movements per day associated with initial site clearance works. This relatively small volume of truck movements will have a negligible impact on local ambient air quality. In general, site clearance works would occur for an approximate 2 - 3-month period.

The impact on local air quality during Site Set-Up and Clearance will be temporary in nature and will result in a potentially minor impact on local air quality and sensitive receptors.

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 some exhaust emissions. However, due to the size and nature of construction activities, exhaust emissions during construction will have a negligible impact on local air quality and therefore on human health.

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.

The construction phase activities will result in a minor impact on local air quality.

Climate

During the construction phase, existing vegetated areas throughout the development site will be removed due to site clearance works and associated movement of construction traffic thus impacting the micro-climate. Whilst this will impact the evapotranspiration rates of vegetation, there will be no impact upon the moisture evaporation from the exposed soil. Therefore, there will be no significant impacts on microclimate.

CO_2 will be released into the atmosphere as a result of the movement of construction vehicles and use of plant. However, emissions associated with such activities will occur over a short-term period (c. 2-3 years) which will not result in an adverse impact on the local micro or the broader macro climate.

Operational Phase

Air Quality

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

Traffic movements associated with the development have been evaluated and assessed as part of the Traffic & Transport Assessment by DBFL Consulting Engineers. The split in am and pm peak traffic movements will not result in an adverse impact on local air quality at any of the junctions and it is predicted that the impact of car engine exhaust emissions will have a negligible impact on local ambient air quality. It is expected that a proportion of the commuting residents will avail of the local public transport including Dublin Bus and LUAS. The availability of public transport for residents of the development will reduce the number of private vehicles exiting and entering the development during am and pm peak times.

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 slight 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 shall consider a number of sustainable heating and energy saving features.

Climate

The development site 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 during the warmer summer period. It is predicted that the proposed development will not have an adverse impact on the local micro-climate or on the local receiving environment and therefore human health in the vicinity of the development site.

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 shear effects. There will however be no unacceptable 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. 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 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. Mechanical Ventilation and Heat Recovery (MVHR) systems shall be incorporated into the design of the apartments. The MVHR systems together with thermally and acoustically 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 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.

9.6 POTENTIAL CUMULATIVE 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 future and current development in the vicinity of the subject site.

The European Commission's report of May 1999 'Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions' defines cumulative impact as follows:

"Impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project".

The cumulative air quality impact of the proposed residential development, other local currently under construction residential developments and existing local transport infrastructure is assessed with regard to having established the baseline air quality and then predicting the impact that the proposed development will have on the baseline air quality. Together the combined impact can be assessed to determine if there is sufficient "atmospheric budget" to facilitate the proposed development.

It is predicted that the cumulative impact of the construction and operational phases of the subject development and the currently under construction residential developments to the west of the site will not have an adverse long-term impact on the receiving environment.

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 on ambient air quality and climate primarily as a result of the use of diesel to fuel construction plant and equipment.

9.7 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, local flora and fauna, local businesses and on climate.

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:

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 topsoils, 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 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.

Operational Phase

The Operational Phase of the Cooldown Commons Phase 3 residential 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 operational phase includes mitigation measures relating to the design of the development to minimise the impact of the operational phase of the development on air quality and climate are as follows:

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

Air Quality Mitigation Measures
Natural Gas heating

Inclusion of electric car charging points to encourage electric vehicle ownership.

Proximity of Dublin Bus and LUAS to the development site to provide public transport to residents.

Provision of open landscaped areas and playgrounds within the development to encourage residents to avail of active lifestyle options.

9.8 PREDICTED IMPACTS

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.

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.

9.9 'DO NOTHING' SCENARIO

The subject site is currently comprised of undeveloped lands and if they remain undeveloped the site will continue to have no adverse 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 2037 the increase in traffic related emissions, based on projected Traffic Impact Assessment figures without the subject development would be slight. This increase above the existing situation would be minor and would not result in a perceptible change in the existing local air quality environment.

9.10 WORST CASE SCENARIO

There are no worst-case scenarios predicted for Air Quality and Climate for the proposed development.

9.11 MONITORING & REINSTATEMENT

Construction Phase

This section describes the dust monitoring methodologies that shall be implemented at the site during the construction phases to ensure that dust and construction vehicle exhaust emissions as NO_2 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.

Dust Deposition Monitoring Methodology

Dust deposition levels will be monitored 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 periods when the highest levels of dust are expected to be generated i.e., during site preparation works and soil stripping activities and on a quarterly basis thereafter. The proposed monitoring locations (A1 – A3) are presented above in Figure 7.1.

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.

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 dust fall. 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.

The results of all dust deposition surveys shall be maintained by the Project Manager and shall be made available to South Dublin County Council.

NO_2 Monitoring Methodology

In order to assess the impact on existing air quality that vehicle and plant exhaust emissions associated with the construction phase of the development may have, it is proposed that a programme of Nitrogen Dioxide monitoring shall be undertaken for a 1-year period at the baseline air quality location, A1 as shown above in Figure 1. The purpose of this monitoring programme will be to verify the effectiveness of the various construction phase mitigation measures and to quantify by measurement, the concentration of NO_2 in the ambient air to allow for the assessment of measured NO_2 levels against levels measured in EPA Zone A areas over a similar period. NO2 levels shall also be assessed against the annual limit value NO_2 as defined in National Air Quality Standards Regulations 2011 (S.I No. 180 of 2011) which specify an annual limit value of 40 µg/m^3, for the protection of human health, over a calendar year.

Operational Phase

In order to assess the impact on existing air quality that vehicle and heating emissions associated with the operational phase of the development may have, it is proposed that a programme of Nitrogen Dioxide monitoring shall be undertaken for a 1-year period at the baseline air quality location, A1 as shown above in Figure 1 when the development is fully occupied. The purpose of this monitoring programme will be to assess the concentration of NO_2 in the ambient air to allow for the assessment of measured NO_2 levels against levels measured in EPA Zone A areas over a similar period. NO2 levels shall also be assessed against the annual limit value NO_2 as defined in National Air Quality Standards Regulations 2011 (S.I No. 180 of 2011) which specify an annual limit value of 40 µg/m^3, for the protection of human health, over a calendar year.

Reinstatement

Reinstatement issues are not relevant to this assessment with regard to the construction and operational phases.

9.12 DIFFICULTIES IN COMPILING INFORMATION

There were no difficulties encountered in compiling this Air Quality and Climate Assessment.

9.13 REFERENCES

Air Quality Regulations 2011, SI 180 of 2011
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.
Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (DoHPLG, August 2018).
Environmental Protection Agency, 2017 Draft Guidelines on information to be contained in Environmental Impact Assessment Reports.
Environmental Protection Agency, 2002, 2015. Guidelines on the Information to be Contained in Environmental Impact Statements
Environmental Protection Agency, 2017. Air Quality in Ireland 2016 – Key Indicators of Ambient Air Quality
European Union Directive (2008/50/EC).
German Federal Government Technical Instructions on Air Quality Control - TA Luft 2002
German Standard Method for determination of dust deposition rate, VDI 2129.
Greater London Authority – The Control of dust emissions from construction and demolition – Best Practice Guidelines, Nov 2006.
Transport Infrastructure Ireland (TII) 2011 Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes Revision 1.
The Irish Building Regulations Technical Guidance Document L – Conservation of Fuel & Energy – Dwellings

10 LANDSCAPE AND VISUAL ASSESSMENT

10.1 INTRODUCTION

This chapter assesses the potential effects of the proposed development on the landscape (or townscape – see below) and visual amenity in the receiving environment.

The proposed development will consist of the construction of 421 no. residential units within 9 no. blocks ranging in height from 1 – 13 storeys, retail/commercial/office units, residential amenity space, and open spaces along with all associated site development works and services provisions to facilitate the development including parking, bin storage, substations, landscaping and all services. A full description is provided in the statutory notices and in Chapter 3 of the EIAR.

The chapter was prepared by Richard Butler (BL Arch, MSc Sp Planning, MILI, MIPI) of Model Works Ltd. Richard has degrees in landscape architecture and planning and is a member of the Irish Landscape Institute and the Irish Planning Institute. He has over 20 years' experience in development and environmental planning, specialising in Landscape/Townscape and Visual Impact Assessment (LVIA).

10.2 METHODOLOGY

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

10.2.1 Key Principles of the GLVIA

Use of the Word 'Townscape'
The word 'townscape' is used to describe the landscape in urban areas. The GLVIA defines townscape as "the landscape within the built-up area, including the buildings, the relationships between them, the different types of urban spaces, including green spaces and the relationship between buildings and open spaces". Since the subject site is within the urban area, the word townscape is predominantly used in this chapter.

Use of the Term 'Effect' vs 'Impact'
The GLVIA requires that the terms 'impact' and 'effect' be clearly distinguished and consistently used. 'Impact' is defined as the action being taken, e.g. the introduction to the landscape of buildings, infrastructure or landscaping. 'Effect' is defined as the change resulting from those actions, e.g. change in townscape character or the visual amenity experienced at a vantage point.

Assessment of Both 'Townscape' and 'Visual' Effects
The GLVIA requires that effects on views and visual amenity be assessed separately from the effects on townscape, although the two topics are inherently linked. 'Townscape' results from the interplay between the physical, natural and cultural components of our surroundings. Different combinations and spatial distribution of these elements create variations in townscape character. Townscape impact assessment identifies the changes to this character which would result from the proposed development, and assesses the significance of those effects on the townscape as a resource.

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

10.2.2 Methodology for Assessment of Townscape Effects

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

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

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

Table 10.1: Categories of Townscape Sensitivity

Magnitude of Townscape Change

Magnitude of change is a factor of the scale, extent and degree of change imposed on the landscape by a development, with reference to its key elements, features and characteristics (also known as 'landscape receptors'). Landscape receptors include individual aspects of the townscape, e.g. the topography, urban grain or mix of building typologies, which may be directly changed by the development. The surrounding townscape character areas are also receptors whose character may be altered by these changes. Five categories are used to classify magnitude of change.

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

Table 10.2: Categories of Magnitude of Townscape Change

Significance of Effects

To classify the significance of effects the magnitude of change is measured against the sensitivity of the townscape using the guide in Table 10.3 below. This matrix is only a guide. The assessor also uses professional judgement informed by their expertise, experience and common sense to arrive at a classification of significance that is reasonable and justifiable.

		Sensitivity of the Landscape/View				
		Very High	**High**	**Medium**	**Low**	**Negligible**
Magnitude of Change to the Landscape/View	**Very High**	*Profound*	*Profound to Very Significant*	*Very Significant to Significant*	*Moderate*	*Slight*
	High	*Profound to Very Significant*	*Very Significant*	*Significant*	*Moderate to Slight*	*Slight to Not Significant*
	Medium	*Very Significant to Significant*	*Significant*	*Moderate*	*Slight*	*Not Significant*
	Low	*Moderate*	*Moderate to Slight*	*Slight*	*Not significant*	*Imperceptible*
	Negli-gible	*Slight*	*Slight to Not Significant*	*Not significant*	*Imperceptible*	*Imperceptible*

Table 10.3: Guide to Classification of Significance of Landscape and Visual Effects

10.2.3 Methodology for Assessment of Visual Effects

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

Sensitivity of the Viewpoint/Visual Receptor

Viewpoint sensitivity is a function of two main considerations:

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

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

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

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

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

Table 10.4: Categories of Viewpoint Sensitivity

Magnitude of Change to the View

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

Magnitude of Change	Description
Very High	Full or extensive intrusion of the development in the view, or partial intrusion that obstructs valued features or characteristics, or introduction of elements that are completely out of character in the context, to the extent that the development becomes dominant in the composition and defines the character of the view and the visual amenity.
High	Extensive intrusion of the development in the view, or partial intrusion that obstructs valued features, or introduction of elements that may be considered uncharacteristic in the context, to the extent that the development becomes co-dominant with other elements in the composition and affects the character of the view and the visual amenity.
Medium	Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity.
Low	Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context, resulting in minor alteration to the composition and character of the view but no change to visual amenity.
Negligible	Barely discernible intrusion of the development into the view, or introduction of elements that are characteristic in the context, resulting in slight change to the composition of the view and no change in visual amenity.

Table 10.5: Categories of Magnitude of Visual Change

Significance of Visual Effects

As for townscape effects, to classify the significance of visual effects, the magnitude of change to the view is measured against the sensitivity of the viewpoint, using the guide in Table 10.3 above.

10.2.4 Quality of Effects

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

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

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

10.2.5 Photomontage Methodology

The verified photomontages were produced by Model Works Ltd. The photomontage methodology is based on the Landscape Institute advice note 01/11 *Photography and Photomontage in Landscape and Visual Impact Assessment*. The method has five main steps:

- Photography
- Survey
- 3D Modelling and Camera Matching
- Rendering and Finishing of Photomontages
- Presentation

Photography

Date, Time and Conditions

The photography is timed so that the scene conditions, weather conditions and sun position allow - as far as possible - for a clear and representative baseline photograph to be captured. The date and time of each photograph are recorded so that the sun position can be accurately portrayed in the render of the 3D model.

Camera

The photographs were taken using a Canon EOS5D Mark II camera with a 21 mega pixel sensor and image resolution of 5616 x 3744 pixels. At each viewpoint the camera was positioned on a tripod with the lens 1.65m above ground level (the level of the average adult's eyes), directed at the site and levelled in the horizontal and vertical axes.

Lenses

Prime lenses (fixed focal length with no zoom function) are used as this ensures that the image parameters for every photograph are the same and that all photographs taken with the same lens are comparable. For close-up to middle distant views a 24mm prime lens is normally usually used. This lens captures a field of view of 73 degrees. This relatively wide field of view is preferred for the purpose of Landscape and Visual Impact Assessment as it shows more of the context landscape surrounding a site. For distant viewpoints a 50mm prime lens may be used, capturing a 39 degree horizontal field of view.

Survey

The coordinates of each viewpoint/camera position, including the elevation, were recorded using a survey grade GPS receiver, the Trimble Geo7X, which is accurate to within 1cm. For each viewpoint, the coordinates of several static objects in the view are also surveyed (e.g. lamp posts, bollards, corners of buildings, etc.). The coordinates of these 'markers' are used as reference points later in the process, to ensure that the direction of view of the cameras in the 3D model matches the direction of view of the photographs.

3D Model and Camera Matching

Creation of 3D Model

Using the information contained in the design team's drawings, a 3D model of the proposed development was built in the software package Autodesk 3DS Max. The 3D model is georeferenced to a survey drawing of the site and receiving environment.

3D Camera Positions

The surveyed camera positions and the markers for each view are inserted into the 3D model, with information on the focal length of the lens attributed to each camera. For each camera/view, the date and time is set to match those of the original photograph. This ensures that the direction of sunlight and shadows in the 3D model match those of the photographs.

Camera Matching

The photographs are then inserted as backdrops to the views of each camera in the 3D model. The direction of view of the cameras in the 3D model are matched with the direction of view of the photographs using the surveyed markers. This ensures that the camera positions, the direction of the views and the focal length of the cameras in the 3D model are accurate, so that the proposed development appears in the correct position and scale when montaged into the photographs.

Rendering of 3D Model and Finishing of Photomontages

For each view a render of the development is generated. This is the process of creating a photo-realistic image of the 3D model, as seen from each camera position, with sunlight and shadow applied to the model. The render of the development is then inserted into the photograph to create the photomontage. This involves masking (or cutting out) those parts of the render that are obscured by objects in the foreground of the photograph, and masking distant objects behind the render – so that the render fits seamlessly into the photograph.

10.3 RECEIVING ENVIRONMENT

10.3.1 Evolution of the Townscape Context

The site occupies a central position in the rapidly developing urban area of Citywest/Fortunestown, adjacent to the Fortunestown Luas stop and the junction of Citywest Road and Fortunestown Lane, adjacent to a public park (currently under construction) and a future urban plaza, and across the road from Citywest shopping centre.

Evolution of the Townscape

The urban development of the area began in the 1990s with the development of Citywest Business Campus a short distance to the north beside the M7 motorway (see Figure 10-1a below). Residential use was introduced to the area with the construction of the low density Verschoyle and Corbally estates in the late 1990s, followed by mixed density estates such as Carrigmore and Belfry in the early 2000s. These incorporated duplex and apartment building typologies in addition to houses (Figure 10-1b). Further industrial development took place at Magna Business Park.

An important change took place with the construction of Citywest Shopping Centre and the neighbouring Fortunes Lawn apartments in 2006 (Figure 10-1c). This established the core of the new urban district centre beside the junction of Citywest Road and Fortunestown Lane. This was reinforced in 2012 with the construction of the Luas Red Line including the Fortunestown stop across the road from the shopping centre (along the frontage of the subject site).

In 2012, South Dublin County Council published the Fortunestown Local Area Plan (LAP), seeking to maximise the area's advantages in terms of employment and transport access, and to impose a more coherent urban structure to the rapidly developing urban centre. Since then the remaining gaps in the townscape have been incrementally filled by residential developments (or permissions) of various densities/typologies, and additional social and economic infrastructure such as the neighbourhood park, Scoil Aoife and the Lidl supermarket (Figure 10-1d). This latter phase of development, having been guided by the LAP, is of generally higher quality than the earlier phases.

Resulting Townscape Character

Coherence and Legibility of the Town Centre and Public Realm

- The town centre has developed rapidly, without any pre-existing village core – no streets or blocks, land use or buildings (e.g. churches or civic buildings) that traditionally mark the centre of an urban area. The absence of such a core is a tangible characteristic of the area.

- The shopping centre has assumed the role of 'marker' of the town centre, but with limited success (see Figures 10-3 and 10-4), due to its position and design, being set back from the roads and junction behind a parking area – with a stand-alone McDonalds restaurant presenting its rear façade to the public realm.

Figure 10.1 a-d: Aerial photographs showing the rapid evolution of the site's context townscape

- The recent permission to construct two mixed use buildings in the open space around the shopping centre parking area, fronting the roads, will address this to a degree, bringing a built edge and retail use to the road edge. However, on its own this development will not deliver sufficient urban-type street frontage, activity and public realm for a successful district centre.
- For a town/district centre there is very limited publicly accessible streetscape/public realm. The public roads are wide, traffic dominated and lack retail (or similar) frontage. They also lack built enclosure, and buildings of sufficient character or scale to generate a sense of place.
- Overall, despite improvements in the design of development since the adoption of the Fortunestown LAP, the town centre lacks coherence in built form and the public realm, connectivity (across the wide roads and between developments), buildings of note, and legibility.

Mix of Building Typologies and Quality

- Although all of the built form in the area is modern, there is substantial variety in the typologies, architecture and quality of the buildings (see Figures 10-5 to 10-8). The buildings in the site environs include late 20th and 21st century houses (terraced and semi-detached), duplex blocks, apartment buildings of 4-7 storeys and diverse architecture and materials, and the shopping centre.
- The quality of architecture and the contribution of developments to the townscape (e.g. the definition of streets and spaces, the general appearance and quality of built form and public realm, legibility, permeability, etc.) has improved over time. The most recent developments are visibly elevating the townscape character and quality (see Figures 10-9 and 10-10).
- Due to the town centre's very recent emergence, there are no buildings or other elements of cultural heritage value in the area.

Historic Dominance of Road Infrastructure

- Citywest Road and Fortunestown Avenue are both wide road corridors, with two traffic lanes (widening to three approaching the junction), wide footpaths and green verges on both sides.
- One of the characteristics of the developments in the area (new and older) is the positioning of internal access roads and parking alongside the public road, with the buildings set back behind these internal roads (i.e. not addressing the public roads directly). Therefore, in places buildings are 50-60m apart across the road (Figure 10-2), resulting in a townscape lacking urban-type built enclosure. This in turn reduces legibility as corners, streets and 'places' are difficult to identify in views across the townscape.

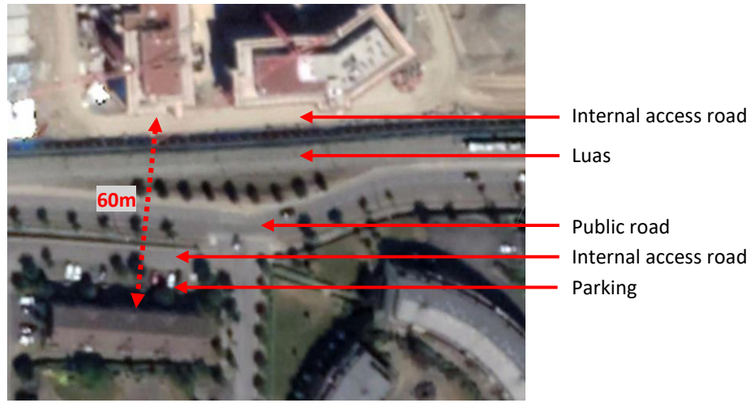

Figure 10.2: Illustration of road corridor width which reduces built enclosure and therefore legibility

Emerging Green Infrastructure

- Although currently fragmented, the Fortunestown LAP identified a Green Infrastructure (GI) Framework for the area and this is in the process of development. The most notable features of this GI framework are (a) a large new Neighbourhood Park adjacent to Citywest Road, between the road and the subject site, and (b) a long linear Neighbourhood Park east of Citywest Road to the south of the Fortunestown Lane junction, which is to be constructed as part of the permitted development Ref. ABP-306602-20.

- Both of these parks will contain stretches of the Kingswood Stream, and together they will form a spine of GI through the emerging urban area.
- Another key element of the future GI/public realm network is a District Square/Public Space Plaza located beside the junction of Citywest Road and Fortunestown Avenue, opposite the shopping centre, separated from the Neighbourhood Park by the Luas line.

Figure 10.3 & 10.4: Views of the shopping centre that currently marks the Citywest town centre




Figures 10.5, 10.6, 10.7 & 10.8: Views showing the diverse building types and architecture in the receiving environment


Figure 10.9 & 10.10: Views of the Edenbrook development under construction to the west and north of the site. The most recent developments in the area are noticeably improving the character and quality of the urban environment

10.3.2 The Site

The key characteristics of the site are as follows:

- The site is centrally located in the Citywest/Fortunestown district centre.
- Although undeveloped, there is an extant planning permission for the site and the lands are heavily disturbed by ongoing construction on the surrounding lands. The rough grassland and scrub that previously covered the site have been cleared and the topography adjusted to facilitate development.
- The site has c. 200m frontage to Fortunestown Lane to the south. Fortunestown Lane incorporates the Luas line (on its north side), and the Fortunestown Luas stop is located at the centre of this frontage. The site therefore has direct interface with the Luas stop. (The lands/developments across Fortunestown Lane are separated from the Luas stop by the road.)
- The site has c. 100m frontage to the future District Square/Public Space Plaza (as defined in the Fortunestown LAP) to the south east, across the Luas line. Beyond the urban plaza is the junction of Citywest Road and Fortunestown Lane, i.e. the current centre of the road network and public realm.
- The site has c. 130m frontage to the future Neighbourhood Park to the east and north east. The park lies between the site and Citywest Road.
- The site interfaces with the higher density portion of the large Edenbrook mixed density residential development (Cooldown Commons SHD ABP-302398) currently under construction to the west and north. This development includes seven apartment buildings of up to six storeys, arranged to the west and north of the site with strong frontage to Fortunestown Lane and Citywest Avenue (to the north).
- The site interfaces with a large, mixed (mostly low) density residential development to the north, occupying the corner between Citywest Road and Citywest Avenue.

In summary, the very large site has 200m frontage to one of the two main streets, beside the junction of these streets at the centre of Citywest, alongside the Luas stop, the future district square and the neighbourhood park.

The site's development has significant potential to (a) define the character of each of these elements of the public realm (the streets, the junction, the square, the park), (b) change the composition and quality of built form in the area, reinforcing the LAP's urban structure, and (c) change the character and quality of the townscape as a whole, affecting the area's identity and legibility.

Figure 10.11: The site environs – aerial phto

Figure 10.12: The site environs – bird's eye view

10.3.3 Key Elements and Characteristics of the Surrounding Townscape

South of the Site

Fortunestown Lane passes along the southern boundary of the site, meeting Citywest Road just to the east of the site at the core of the urban area. The Luas line runs parallel to the road, forming a wide transport corridor that carries a large volume of traffic. The internal access roads of the existing developments along Fortunestown Lane are mostly aligned adjacent and parallel to the public road, so that Fortunestown Lane is wide, traffic dominated and lacks the built enclosure and active frontage of an urban street. This is most pronounced at the Luas stop along the site frontage.

Figure 10.13: The Luas stop on Fortunestown Lane along the site frontage

To the south of Fortunestown Lane are a series of developments of diverse character. To the south east of the site, also - like the site - fronting the central junction and future District Square, is the Citywest shopping centre. The centre is set back from Fortunestown Lane behind a green strip and the surface parking area.

In townscape terms, the shopping centre is an unfortunate and ineffective marker of the urban core. It is due to undergo significant change, with the construction of two mixed use buildings of 5-7 storeys in the green strip fronting Fortunestown Lane, opposite the site. The two buildings have retail use on the ground floor, which, along with the additional built enclosure, will contribute to the urbanisation of the Fortunestown Lane streetscape. However, it is important to note that the new buildings are c. 50m from the site across Fortunestown Lane. Therefore urban-type enclosure and activity will be difficult to achieve. The two buildings are also wide apart and curved, which will limit their contribution to enclosure and definition of the streetscape.

Figure 10.14: The permitted mixed use buildings across Fortunestown Lane from the site

To the west of the shopping centre are a series of residential developments, including Fortunes Walk and Carrigmore apartments. The Fortunes Walk Block facing the site across Fortunestown Lane is three storeys, and the distinctively formed Carrigmore apartments are four storeys. Both buildings are removed from the site by some 50m. In combination with the lower density developments to the west and the shopping centre to the east, they form a diverse and inconsistent street frontage/elevation; they do not act together to define and enclose the street.

West of the Site

To the west of the site is the high density portion of the Edenbrook residential development. Three six storey blocks form a cluster fronting Fortunestown Lane, and four further blocks form a line along Citywest Avenue to the north. Together the modern apartment buildings enclose the site to the west. Further to the west is Carrig Court, a mixed density development including three four storey apartment blocks fronting Fortunestown Lane. These buildings are noticeably of lower design and finish quality compared to the Edenbrook buildings.

Figure 10.15: The Edenbrook and Carrig Court developments to the west of the site north of Fortunestown Lane. The view also shows how the lower density building typologies between the apartment blocks fail to enclose and define the wide street

East of the Site

To the south east, between the site and the junction of Fortunestown Lane and Citywest Road, is the future District Square/Public Space Plaza. This is a triangle of land enclosed by the roads on two sides and the Luas line on the third (see Figure 10-11 above). The site faces the square across the Luas line, and has the most direct interface with the square of all the surrounding lands/developments (the lands to the east and south being separated from it by the wide roads).

Directly to the east/north east of the site is the Neighbourhood Park, which forms part of the GI spine that runs along Citywest Road, incorporating the Kingswood stream. This is the main public open space in the district centre, providing passive recreation opportunities and various other ecosystem services.

Citywest Road runs to the east of the park and square, and beyond the road is the large, mostly low density Citywest Village estate, bisected by the Luas line. Rows of semi-detached houses are set back behind internal access roads, facing the park and square (and the site) across Citywest Road. In the southern corner of the estate, beside the junction of Citywest Road and Fortunestown Lane, there is a small six storey apartment building under construction. To the east of Citywest Village is the Lidl supermarket.

Figure 10.16: A view east from the Luas line beside the site across the future District Square towards the Citywest Village estate

North of the Site

To the north east of the subject site is the site of a permitted mostly low density residential development (Reg. Ref. SD16A/0210), with a small apartment building at the corner of Citywest Road and Citywest Avenue. A notable aspect of the permitted development is that the main open space is contiguous with the neighbourhood park, so that together they form a larger green area.

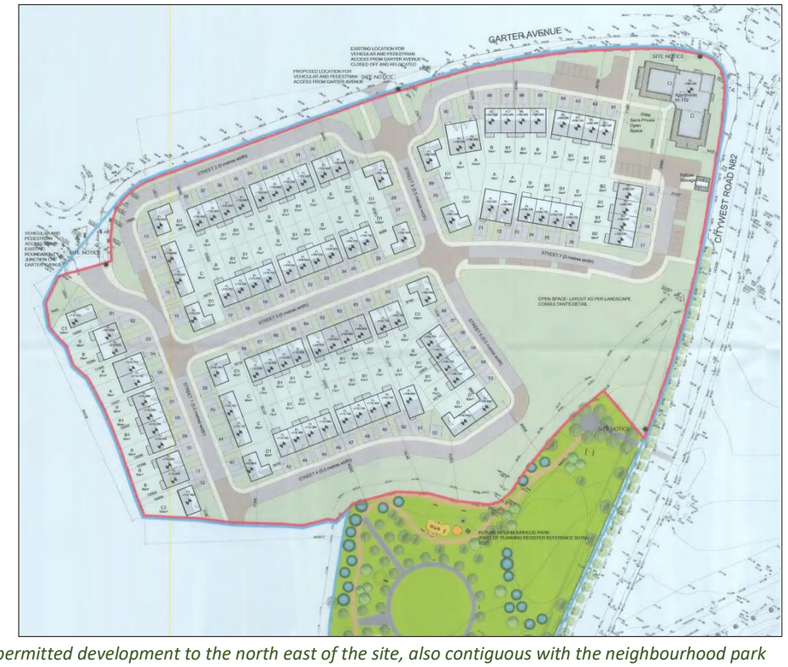

Figure 10.17: The permitted development to the north east of the site, also contiguous with the neighbourhood park

To the west of this permitted development are the row of four Edenbrook apartment buildings fronting Citywest Avenue to the north, and across the road are the Edenbrook houses. The housing estate extends to the southern edge of the Citywest Business Campus..

Figure 10.18: The Edenbrook apartments and Edenbrook houses either side of Citywest Avenue to the north of the site

10.4 RELEVANT POLICY

10.4.1 Fortunestown Local Area Plan 2012-2018

The following extracts of the LAP are most relevant to this assessment. They provide clear indication of South Dublin County Council's vision and objectives for the landscape/townscape and amenities of the Citywest/ Fortunestown District Centre.

Framework

The Fortunestown Centre Neighbourhood Framework map below shows that the site extends into the District Centre and has extensive frontage to Fortunestown Lane and the Luas, the District Square and the Neighbourhood Park (the park extends into the site). The site also includes a key Secondary Street connecting Fortunestown Lane and Citywest Avenue. This is one of the main routes of access to the central urban hub, in which the site has an important place.

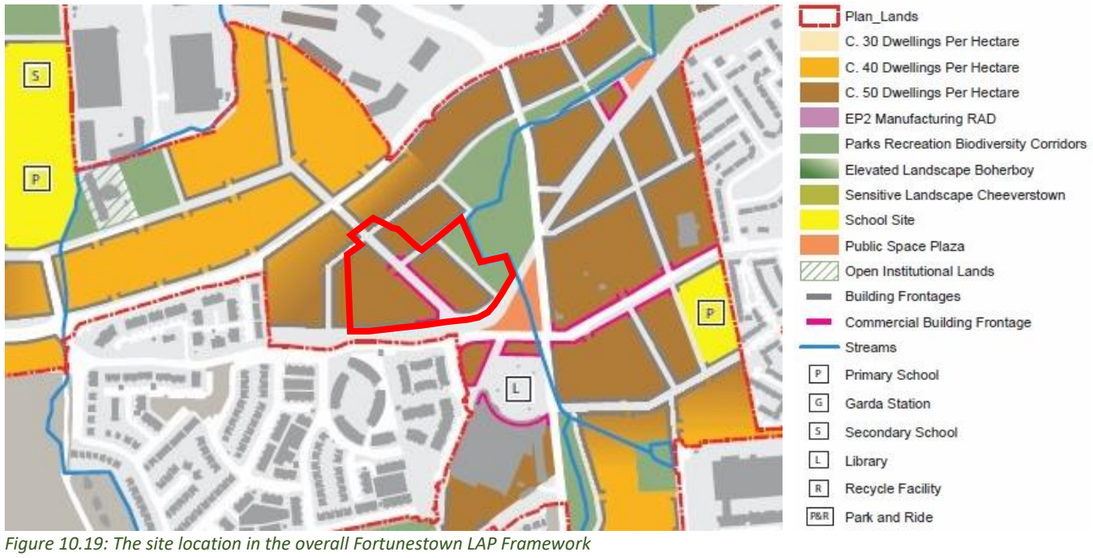

Figure 10.19: The site location in the overall Fortunestown LAP Framework

Figure 10.20: The site location in the Fortunestown Centre Neighbourhood Framework

"The Fortunestown Centre or District Centre will form a central urban hub from which four distinct neighbourhoods will emanate and through which these neighbourhoods will be linked. This neighbourhood will accommodate uses that entice people primarily on foot, by bicycle or by Luas to work, shop, visit, rest or engage in recreation…

"All routes will lead into and from this neighbourhood ensuring that it is highly accessible by pedestrians, cyclists and vehicular traffic. Development will be focused around the junction between Citywest Avenue and Fortunestown Lane with a plaza and neighbourhood park at the north-west corner of the junction."

A notable feature of the Fortunestown Centre Neighbourhood Framework is the location of a 'District Landmark' on the shopping centre site beside the junction of Fortunestown Lane and Citywest Road. The planning permission for a seven storey building in the open space in front of the shopping centre is intended to fulfil this function. However, it is questionable whether it will constitute a landmark in the sense of it being visible and recognisable from a distance, marking the district centre.

Density and Land Use

The District Centre will act like a mixed use hub with retail, civic, recreation and service facilities whilst accommodating a compact urban form…

"In order to facilitate the provision of own door housing, net residential densities of 30-50 dwellings per hectare shall apply to the Plan lands. Densities shall be at the higher end of this range within 5 minutes walk of Luas stops in accordance with Development Plan policy and National Guidance and at the lower end of this range at the extremities of the Plan Lands…

"It is an objective of the Local Area Plan to:

- *Ensure that an identifiable centre develops around the junction between Citywest Road and Fortunestown Lane/Way and the Fortunestown Luas stop with a vibrant mix of retail, service, civic, community and residential uses…*

- *Ensure that development of the Fortunestown Centre Neighbourhood shall, in consultation with the Planning Authority, include for the provision of a library building or space and a healthcare facility. These facilities shall be located within or in close proximity to the Citywest Shopping Centre. (Objective FC6a)*

• *Ensure that a minimum of 85% of all dwellings be provided as own door houses on their own site and that a maximum of 15% of all dwellings across the Plan Lands be provided as apartments/duplexes with such dwellings limited to appropriate areas or particular locations such as Luas stops and landmark junctions and sensitively designed to contribute to the broader aesthetics of the area including the nearby mountains…"*

Built Form
"The main streets and spaces around the Fortunestown Centre will be relatively urban in nature with strong and continuous built frontages…

"Buildings along and around the main streets and spaces will generally be 3 storeys in height save for a landmark building at the south-west corner of the upgraded junction between Fortunestown Lane and Citywest Road…

"The existing undeveloped land to the east of Citywest Road will be developed with buildings that front the upgraded junction and help enclose and define the junction. Buildings should also shape and define a series of secondary side streets…"

Green Infrastructure
"One of the main functions of the Fortunestown Centre will be to link all the green spaces within the Plan Lands with each other and to form a central hub to the green network…

"Heritage items that currently exist within the neighbourhood include a section of the Kingswood Stream that runs to the north of Fortunestown Lane and the hedgerow situated alongside it. These heritage elements should be retained, enhanced and incorporated as part a network of green corridors... In this instance the hedgerow and streams will run through a neighbourhood park that straddles the Luas line with soft landscaping on the northern side of the Luas line and a triangular plaza on the southern side. This park and incorporated heritage elements will act as a counterbalance to development around the Fortunestown Centre."

• *"That the Fortunestown Centre will incorporate green through routes in a manner that forms a hub for a green structure/network to permeate the Plan Lands. (Objective FC8)*

• *To ensure that the development of the Fortunestown Centre includes for a neighbourhood park that straddles the Luas line with soft and hard landscaping and incorporates Kingswood Stream with its associated hedgerow. (Objective FC9)*

• *That a 10 metre (min) biodiversity strip (measured from the top of the bank) shall be reserved on both sides of the designated sections of stream(s) that traverse the neighbourhood, for flood management, landscaping, pedestrian/cyclist movement and biodiversity reasons. (Objective FC10)"*

10.4.2 South Dublin Development Plan 2016-2022

Zoning
The site is zoned RES-N: *"To provide for new residential communities in accordance with approved area plans".*

Urban Design
Section 2.2.1 of the SDCDP sets out the policy on urban design in residential developments, which should inform the consideration of potential townscape impacts. The policies include:

H7 Objective 1: *"To ensure that residential development contributes to the creation of sustainable communities in accordance with the requirements of the Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas, DEHLG (2009) (or any superseding document) including the urban design criteria as illustrated under the companion Urban Design Manual – A Best Practice Guide, DEHLG (2009)."*

H7 Objective 2: *"To ensure that residential development provides an integrated and balanced approach to movement, place-making and streetscape design in accordance with the requirements of the Design Manual for Urban Roads and Streets, DTTAS and DEHLG (2013)."*

Residential Density and Building Height
Section 2.2.2 of the SDCDP sets out the policy on residential density, which affects building height and thus is relevant to the consideration townscape and visual impacts. It states: *"It is the policy of the Council to promote higher residential densities at appropriate locations and to ensure that the density of new residential development is appropriate to its location and surrounding context"*.

The policy objectives include:

H8 Objective 1: *"To ensure that the density of residential development makes efficient use of zoned lands and maximises the value of existing and planned infrastructure and services, including public transport, physical and social infrastructure, in accordance with the Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas, DEHLG (2009)."*

H8 Objective 2: *"To consider higher residential densities at appropriate locations that are close to Town, District and Local Centres and high capacity public transport corridors in accordance with the Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas, DEHLG (2009)."*

In Section 2.2.3 the SDCDP sets out the policy on residential building height. It states: *"Varied building heights are supported across residential and mixed use areas in South Dublin County to promote compact urban form, a sense of place, urban legibility and visual diversity"*.

H9 Objective 1: *"To encourage varied building heights in new residential developments to support compact urban form, sense of place, urban legibility and visual diversity."*

H9 Objective 2: *"To ensure that higher buildings in established areas respect the surrounding context."*

H9 Objective 3: *"To ensure that new residential developments immediately adjoining existing one and two storey housing incorporate a gradual change in building heights with no significant marked increase in building height in close proximity to existing housing."*

H9 Objective 4: *"To direct tall buildings that exceed five storeys in height to strategic and landmark locations in Town Centres, Mixed Use zones and Strategic Development Zones and subject to an approved Local Area Plan or Planning Scheme."*

The above policies on density and height have been superseded/supplemented by the publication of *Urban Development and Building Heights – Guidelines for Planning Authorities*. This national policy seeks to ensure substantially higher development density (than heretofore) in urban areas where the supporting infrastructure, public transport and services can sustain it - through increased building height.

10.4.3 National Planning Framework

Compact growth is one of the main principles and intended outcomes of the NPF. This encourages higher density - and therefore taller - development in urban areas where supporting infrastructure and services are available. National Policy Objective 11 of the NPF states:

"In meeting urban development requirements, there will be a presumption in favour of development that can encourage more people and generate more jobs and activity within existing cities… subject to development meeting appropriate planning standards and achieving targeted growth."

Regarding brownfield development the NPF states:

"The National Planning Framework targets a significant proportion of future urban development on infill/brownfield development sites within the built footprint of existing urban areas… This means encouraging more people, jobs and activity generally within our existing urban areas… and requires a change in outlook... It also requires active management of land and sites in urban areas."

10.4.4 Urban Development and Building Height Guidelines for Planning Authorities

The Guidelines state: "*Reflecting the National Planning Framework strategic outcomes in relation to compact urban growth, the Government considers that there is significant scope to accommodate anticipated population growth and development needs, whether for housing, employment or other purposes, by building up and consolidating the development of our existing urban areas… Therefore, these guidelines require that the scope to consider general building heights of at least three to four storeys, coupled with appropriate density, in locations outside what would be defined as city and town centre areas, and which would include suburban areas, must be supported in principle at development plan and development management levels…*

"A key objective of the NPF is therefore to see that greatly increased levels of residential development in our urban centres and significant increases in the building heights and overall density of development is not only facilitated but actively sought out and brought forward by our planning processes and particularly so at local authority and An Bord Pleanála levels."

In Section 3.2 of the Guidelines, 'development management criteria' are set out to guide the evaluation of development proposals for buildings taller than the prevailing heights in the area: *"In the event of making a planning application, the applicant shall demonstrate to the satisfaction of the Planning Authority/ An Bord Pleanála, that the proposed development satisfies the following criteria:*

At the scale of the relevant city/town:

- *"The site is well served by public transport with high capacity, frequent service and good links to other modes of public transport.*
- *Development proposals incorporating increased building height, including proposals within architecturally sensitive areas, should successfully integrate into/ enhance the character and public realm of the area, having regard to topography, its cultural context, setting of key landmarks, protection of key views. Such development proposals shall undertake a landscape and visual assessment, by a suitably qualified practitioner such as a chartered landscape architect.*
- *On larger urban redevelopment sites, proposed developments should make a positive contribution to place-making, incorporating new streets and public spaces, using massing and height to achieve the required densities but with sufficient variety in scale and form to respond to the scale of adjoining developments and create visual interest in the streetscape."* (emphasis added)

At the scale of district/neighbourhood/street:

- *"The proposal responds to its overall natural and built environment and makes a positive contribution to the urban neighbourhood and streetscape.*
- *The proposal is not monolithic and avoids long, uninterrupted walls of building in the form of slab blocks with materials / building fabric well considered.*
- *The proposal enhances the urban design context for public spaces and key thoroughfares and inland waterway/ marine frontage, thereby enabling additional height in development form to be favourably considered in terms of enhancing a sense of scale and enclosure...*
- *The proposal makes a positive contribution to the improvement of legibility through the site or wider urban area within which the development is situated and integrates in a cohesive manner.*
- *The proposal positively contributes to the mix of uses and/ or building/ dwelling typologies available in the neighbourhood."*

10.5 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development will consist of the construction of 421 no. residential units within 9 no. blocks ranging in height from 1 – 13 storeys, retail/commercial/office units, residential amenity space, and open spaces along with all associated site development works and services provisions to facilitate the development including parking, bin storage, substations, landscaping and all services. A full description is provided in the statutory notices and in Chapter 3 of the EIAR.

10.5.1 Site Layout and Massing

The proposed layout and arrangement of massing and height are a response to several key elements and characteristics of the townscape, including:

- The site's position beside the Luas stop in the designated district centre;
- Its frontage to Fortunestown Lane, the main thoroughfare serving the district centre – a very wide road corridor currently lacking built enclosure and a sense of place;
- Its position fronting both the district square and the neighbourhood park;
- Its position adjacent to the high density Edenbrook development to the west, and a permitted low density development to the north east;
- The mixed existing townscape character, weak urban structure and poor legibility.

In addition to these factors, the proposal responds to the vision and objectives of the Fortunestown LAP, and to the more recently published NPF and Building Height Guidelines, which seek to achieve "*greatly increased levels of residential development in our urban centres and significant increases in the building heights and overall density of development".*

The proposed development consists of nine buildings – six apartment blocks (D1, D2, D3, D4, E1 and E2) and three duplex blocks (F1, F2 and G1).

Blocks D3 (6-8 storeys), E1 (7-9 storeys) and E2 (7 storeys) are arranged to form a strong built frontage to Fortunestown Lane, to provide enclosure to the street and to strengthen the urban structure (by emphasising the alignment of the street and the Luas line). A wide gap between D3 and E1 creates an urban plaza which opens onto the Luas stop.

Block D4 is set back from Fortunestown Lane and the Luas stop, forming the third side of the plaza. The building is 6-13 storeys tall. The height is located in this position to (a) concentrate the residential density adjacent to the public transport node, and (b) function as a landmark, identifying the district centre (particularly the Luas stop) in local views and views from the outer neighbourhoods of the district.

Blocks D4 and D3 also combine with D2 to form a courtyard internal to the site, behind the street-front buildings.

D2 and D1 in turn combine with the neighbouring (existing) Edenbrook apartment buildings to the north and west to form another, larger courtyard, which includes the neighbourhood playground.

Figure 10.21: The proposed site layout

Figure 10.22: Excerpt of the photomontage for Viewpoint 7, showing (a) the strong building line to Fortunestown Lane, (b) the increase in development height/intensity towards the Luas stop, and (c) the landmark effect of Block D4, indicating a place of significance in the townscape.

Figure 10.23: Aerial CGI showing the response of the layout and massing to Fortunestown Lane, the existing Edenbrook apartment buildings, and the permitted low density scheme (the site in the foreground to the left).

Blocks D1 and D4 together form one side of a north-south aligned street (effectively an extension of Cul Duin Avenue) that enters the site from Citywest Avenue to the north. This street is a key objective of the LAP, and while the road does not connect to Fortunestown Lane, a pedestrian route deviates from the street, along the side of the plaza, to provide a pedestrian link across the site between the district centre and the outer neighbourhoods to the north west. This link across the site is clearly visible in the aerial view above.

The other side of the street is formed by two duplex buildings (F1 and F2). These are 3 storey buildings, which together with G1 (another duplex block) form the lower density portion of the development. The three buildings respond to the permitted lower density development to the north east of the site, so that the transition is not too abrupt.

There is substantial variation in height across the site, but the arrangement of height responds demonstrably to the surrounding context (the local and wider townscape), and to the policy of compact growth which seeks to deliver density adjacent to public transport.

10.5.2 Façade Treatment

The proposed development is conceived as an extension to the existing Edenbrook development. The buildings have a façade treatment of similar character and quality to the Edenbrook buildings, which have appreciably improved the quality of the Citywest townscape.

The main proposed façade material is a mottled tan brick. A number of measures are used to articulate the facades, including (a) horizontal bands of darker brick (the ground level of some of the buildings, and bands

beneath some of the windows); (b) vertical bands of patterned brick and dark render. The large windows and generous balconies (with metal railings) add further articulation to the facades. Block D4 is clad in red brick to differentiate it from the other buildings and reinforce its landmark function (which derives also from its position overlooking the plaza alongside the Luas stop).

Figure 10.24: CGI showing the façade treatments of Blocks D1, D4 and E1, which are arranged to enclose the plaza alongside the Luas stop.

10.5.3 Landscape Proposals

A key element of the proposal is the provision of underground parking for the apartments. This allows the space between the buildings to be dedicated to open space provision rather than road/parking infrastructure. The landscape masterplan includes a range of open spaces of varying character, designed to (a) provide passive and recreation opportunities for different age groups, (b) provide residential amenity and privacy, (c) create a legible environment for people to live in and move through, (d) incorporate SUDs features such as swales, attenuation areas and permeable paving, and (e) provide habitat.

The spaces are located and designed to complement existing open spaces on the adjacent lands, to maximise their collective value as a network. The key spaces include:

- The plaza. This is a hard open space contiguous with the Luas stop and Fortunestown Lane, intended to add to the public realm of the district centre (with retail uses fronting the space);
- The local park. This is a large area of parkland character behind Blocks E1 and E2, connecting to the plaza to the west, and the neighbourhood park to the east.
- The Kingswood Stream buffer zone. This is a 10-25m wide belt of open space along the west side of the stream, in which habitat provision and water management are the main objective of the landscape proposals.
- The two courtyards. The courtyards formed between the D blocks provide pedestrian circulation and green amenity space for the apartment residents. The larger courtyard includes a playground and a green space large enough to function as a kick-about area. Perimeter planting is used to provide privacy for ground floor apartments.
- The north eastern communal space. This is a linear space inside the northern boundary (which is shared with a permitted low density estate to the north). The space is densely planted to provide a green buffer between the developments.

In addition to the above spaces, green roofs are proposed on all the apartment buildings.

Figure 10.25: CGI showing the Kingswood Stream buffer zone in the foreground and the large, internal 'local park' which connects the neighbourhood park to the plaza.

Figure 10.26: CGI showing the linear space inside the northern boundary, providing a green buffer between the proposed duplex blocks and the permitted residential estate on the neighbouring site.

10.6 POTENTIAL IMPACTS - TOWNSCAPE

10.6.1 Construction Phase

The site is already largely enclosed by hoarding and disturbed by construction activity. The construction period is expected to be up to 5 years, and would entail the following:

- Erection of supplementary hoarding if required;
- Set up site construction compound, tree protection measures, internal transport routes;
- Excavation;
- Site services installations;
- Construction of new buildings, frames and envelopes;
- Interior fit-out of buildings;
- Exterior streetscape, landscaping and site boundary works.

During construction the site would be disturbed by the above activities. Outside of the site, the surrounding area would be affected by visible construction activity and the incremental growth of the buildings on site. The magnitude of change to the townscape in the immediate vicinity of the site would be high, with the effects reducing with increased distance from site. Overall, the sensitivity of the townscape is medium (refer to 10.3.4 above). Therefore, the effects on the townscape would be 'significant' and negative in the immediate vicinity of the site, reducing in significance with distance from the site. These effects would be temporary.

10.6.2 Operational Phase

Townscape Sensitivity

There are several factors that suggest a high capacity to accommodate townscape change of the type proposed in the receiving environment. These include:

- The site's RES-N zoning (new residential communities in accordance with approved area plans) in the South Dublin County Development Plan;
- The site's zoning in the Fortunestown LAP for the highest density of residential development in the plan area, with commercial uses along some of the street-fronts;
- The site's location within/adjacent to the identified District Centre in the Fortunestown LAP;
- The site's location alongside the Luas stop; it is the land parcel with the most direct relationship with the Luas – more so than the shopping centre across Fortunestown Lane or any of the surrounding residential developments;

The location in the district centre adjacent to the Luas stop and within walking distance from Scoil Aoife and St Aidan's Community School, the neighbourhood and district parks, the shopping centre and Lidl, and numerous employment opportunities, indicates that high density on the site is justified.

- The site's location fronting one of the two main thoroughfares in the district centre, and the existing character of Fortunestown Lane, which is very wide, traffic dominated, lacking in built enclosure and active street frontage;
- The site's location adjacent to the future District Square (beside the junction of the two main thoroughfares); it is the land parcel with the most direct relationship to the square – the lands to the east and south being separated from the square by wide road corridors;
- The site's location adjacent to the Neighbourhood Park;

The combination of the wide urban thoroughfares and public open spaces to the south and east of the site has two implications: (1) they function as spatial buffers to development on the site, and (2) they would benefit from built enclosure, so that they are more clearly defined and legible in the townscape.

- The mix of building typologies, scale, architecture and materials in the surrounding townscape, and the mixed quality of development. This diversity creates capacity to accommodate further change;
- The relative lack of sensitive landscape receptors such as historic buildings or other cultural heritage features, due to the recent and rapid development of the urban area with no pre-existing village core;
- The site's separation from existing sensitive residential neighbourhoods. The nearest existing dwellings are 50m+ to the south across Fortunestown Lane (Fortunes Walk and Carrigmore Crescent), and 80m to the east across Citywest Road (Citywest Village). To the west and north is the high density portion of Edenbrook (still under construction), and to the north east, beyond the neighbourhood park, is a permitted low density estate yet to be built;
- The currently mixed or indistinct townscape character, in which - despite improvements in the contribution of developments since the adoption of the LAP - there is a notable lack of (a) coherence in the built form (e.g. strong building lines defining streetscapes), (b) a lack of continuity and concentrated activity in the public realm, and (c) a general lack of legibility of the urban structure. There are notably few landmarks, and weak enclosure/definition of streets and spaces, so that wayfinding is difficult.

All of these factors suggest that a significant intervention, such as the proposed development, is warranted, and may be accommodated on the site.

For the same reasons however, and due to the site's large scale, its development has considerable potential to affect the townscape character and quality of the emerging district centre. This requires the design response to be carefully considered.

Furthermore, some of the elements in the townscape can be considered sensitive receptors. These include:

- The neighbourhood park incorporating the Kingswood stream (and the LAP requirement that development in the district centre incorporate 'green through routes' so that the centre functions as a 'hub of the green network');
- The future district square;
- The residential neighbourhood south of Fortunestown Lane;
- The permitted residential development to the north east of the site, which is separated from the site by the neighbourhood park in places, but abuts the site elsewhere.

In conclusion, the townscape sensitivity can be classified 'medium' (definition: *Areas where the townscape has certain valued elements, features or characteristics but where the character is mixed or not particularly strong, or has evidence of alteration, degradation or erosion of elements and characteristics. The townscape character is such that there is some capacity for change. These areas may be recognised in policy at local or county level and the principle management objective may be to consolidate townscape character or facilitate appropriate, necessary change.* See 10.2.2 above).

Magnitude of Townscape Change

The potential changes which the proposed development would cause to the key elements and characteristics of the townscape are discussed below:

The District Centre

- The main effect of the proposed development would be to (a) expand and diversify the District Centre, and (b) shift its epicentre away from the shopping centre and the junction of Fortunestown Lane and Citywest Road, west along Fortunestown Lane towards the Luas stop.
- These are significant positive changes: (1) The junction itself is traffic dominated and has limited active frontage. Even when the District Square is developed, there will not be sufficient built enclosure, active frontage and accessible public realm to function well as a centre (the square will be surrounded by wide roads). The shopping centre, while a valuable functional part of the district centre, has a poor public realm and is to be partly enclosed from the public roads by the two new permitted buildings.
- The Luas stop and adjacent plaza fronted by retail/commercial use (orientated towards Fortunestown Lane), are a suitable addition to the district centre, to complement the shopping centre, the junction, square and neighbourhood park - providing high quality new public realm with active frontage, and built enclosure.

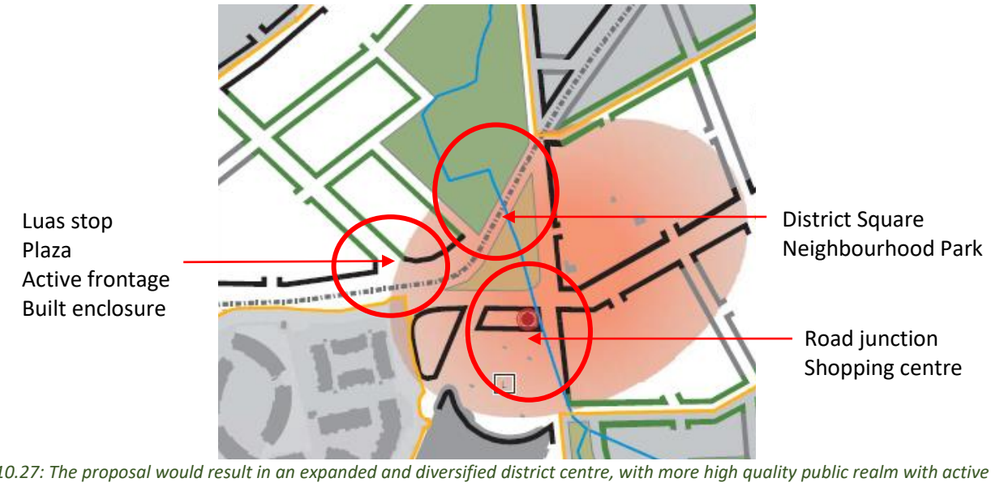

Figure 10.27: The proposal would result in an expanded and diversified district centre, with more high quality public realm with active frontage and built enclosure

Mix of Building Typologies, Scale and Quality

- The scale of the proposed buildings is large, but the built form is a considered response to the existing surrounding development and infrastructure, and the opportunities presented by the site and environs (e.g. the wide roads and open space to south and east) to address the weaknesses in the townscape.
- The duplex blocks F1, F2 and G respond in their positioning and scale to the low density permitted development adjacent to the north east.
- Blocks D1, D2 and D3 respond in their positioning and scale to the Edenbrook apartments, combining with those existing buildings to define streets and spaces.
- Blocks D3, E1 and E2 respond to the requirement for meaningful built enclosure of Fortunestown Lane, to strengthen the urban character of the road, which is currently weak (due to the width of the road, the small scale of development south of the road, and the indistinct building line south of the road).
- Block D4 is intended to function as a landmark, rising noticeably above the streetfront buildings, therefore visible from nearby and from distance, identifying the Luas stop and the new plaza (and therefore the district centre as a whole - refer to the photomontages for Viewpoints 1, 5, 6, 8, 11). Currently, the largest buildings, of most urban character, are the Edenbrook apartments. These draw the eye and suggest the location of the centre, while the shopping centre at the actual district centre is hard to identify except from its immediate environs.
- Block E2 responds to the scale of the apartment building in Citywest Village to the east and the permitted building in front of the shopping centre to the south.
- Overall, the development would introduce a composition of built form of diverse typology and scale, that responds appreciably to its context. It would increase the built enclosure of (a) Fortunestown Lane, (b) the District Square, (c) the Neighbourhood Park, and (d) the main route across the site – to an extent suitable for an urban centre. It would add variety and visual interest to the townscape, and improve legibility with its strong building lines and by employing height in a considered manner – avoiding dominance of any sensitive existing buildings, spaces or land use.

Historic Dominance of Road Infrastructure and Poor Definition of Spaces

- The arrangement and scale of the buildings would contribute to correcting the balance between road space and built form in the townscape. Currently the two main public road corridors are very wide and lacking in built enclosure (with buildings 50-60m apart across the roads).

Green Infrastructure and Public Realm

- The development would contribute a substantial new area to the Neighbourhood Park, in the form of the Stream Buffer Zone, meeting a key GI requirement of the LAP.
- One of the main proposed internal open spaces, the Local Park, is spatially connected to the Neighbourhood Park on one side and the new plaza on the other. This space will thus function as one of several 'green through routes' across the site and the neighbouring Edenbrook development, thus achieving the LAP's objective of the district centre to be a 'hub for a green structure/network to permeate the Plan Lands'.
- The proposed plaza and associated strips of footpath in front of the retail units (fronting Fortunestown Lane/the Luas) would be an important addition to the public realm. Currently, there is very limited public realm with active frontage in the district centre, other than the pavement in front of the shopping centre (between the shops and parking area). The development would introduce a new area of public realm contiguous with the Luas stop and the wider Fortunestown Lane road corridor.

In summary, due to a number of factors including (a) the site's large scale, (b) its position in the district centre, (c) the scale of the buildings proposed, and (d) the character of the existing development in the area, the magnitude of townscape change which would result from the development is 'high' (definition: *Change that is moderate to large in extent, resulting in major alteration to key elements, features or characteristics of the*

townscape, and/or introduction of large elements considered uncharacteristic in the context. Such development results in change to the character of the townscape. See 10.2.2 above).

Significance and Quality of Townscape Effects

Measuring the magnitude of change against the sensitivity of the receiving environment, the potential townscape effects can be classified 'significant'. Considering the effects discussed above, the impact would be positive.

Policy Objective H7 1 of the County Development Plan states: *"To ensure that residential development contributes to the creation of sustainable communities in accordance with the requirements of the Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas… including the urban design criteria as illustrated under the companion Urban Design Manual – A Best Practice Guide, DEHLG (2009)."*

Many of the urban design criteria in the Manual relate to a development's landscape and visual characteristics. For a further assessment of the appropriateness and quality of the townscape change the proposed development is considered against the relevant Urban Design Manual criteria below.

Urban Design Criteria and Indicators *(Urban Design Manual - A Best Practice Guide)*		**Yes/ No**	**Comment**
01 Context - How does the development respond to its surroundings?			
01a	The development seems to have evolved naturally as part of its surroundings	Yes & No	While the development does respond (in its density, building typology and layout) to certain elements and opportunities in its surroundings, e.g. the Luas line and station, Fortunestown Lane and Citywest Road, the neighbouring Edenbrook development, the district square and neighbourhood park, there are elements with which it would contrast in character. These are mostly the developments which occurred prior to the arrival of the Luas, the adoption of the Fortunestown LAP and the shift towards a national policy of compact growth. It would not be appropriate for the development to conform with these earlier development types/patterns. It is rather an intention of the proposal that the development would contribute (along with other developments currently under construction or permitted) to a change of character in the district centre – a strengthening of the urban structure.
01b	Appropriate increases in density respect the form of buildings and landscape around the site's edges and the amenity enjoyed by neighbouring users	Yes	The density is greatest alongside the Luas stop, fronting the main thoroughfare, and interfacing with the existing neighbouring high density development. The density is lowest around the north eastern boundary where the site interfaces with a permitted low density residential development. This is an appropriate arrangement of density on the site. The proposal takes advantage of the buffering effect of the wide road corridors and the public open spaces to the south and east of the site. The nearest existing dwellings are 50m+ to the south across Fortunestown Lane, and 80m to the east across Citywest Road. Therefore, while views from these neighbourhoods would change, their amenities would not be significantly affected.
01c	Form, architecture and landscaping have been informed by the development's place and time	Yes	The built form achieves the site's zoning objective, and realises the national policy of compact growth, while responding to the key elements of the urban context. The architecture is of the 21st century but uses traditional materials (e.g. brick and render) characteristic of existing residential development in the area. The landscape strategy follows the principles of green infrastructure (connectivity and multi-functionality), for example by: - locating the open spaces (the Local Park, the plaza, etc.) contiguous with existing public or open spaces on adjacent lands, thereby increasing the spaces' and collective value, and - introducing a broad (min 10m) planted buffer zone, in which the priority ecosystem services are habitat provision and water management, along the Kingswood Stream along the east boundary.
01d	The development positively contributes to the character and identity of the neighbourhood	Yes	There are several factors that suggest a high capacity (indeed a requirement) for townscape change of the type proposed in the receiving environment. The proposed development would be a significant intervention, strengthening the urban structure, character, identity and legibility of the district centre.
01e	Appropriate responses are made to the nature of specific boundary conditions	Yes	- A strong building line, substantial building height and ground floor retail/commercial and residential amenity uses are employed along the southern boundary to strengthen the urban streetscape character of Fortunestown Lane. - A seamless boundary is proposed where the development interfaces with the Edenbrook development to the west, in order that they function and feel like a single neighbourhood. - A landscaped strip (of stream buffer zone planting) is proposed along the Kingswood Stream where the site interfaces with the neighbourhood park. - Along the northern boundary, shared with a permitted low density estate, the treatment focusses on protection of the amenities of the neighbouring houses. A 2m wall and hedge are proposed along the boundary, with a linear green amenity space between the boundary and the proposed duplex blocks.
02 Connections - How well connected is the new neighbourhood?			
02a	There are attractive routes in and out for pedestrians and cyclists	Yes	There is generous provision of pedestrian and cycle routes across the site and connecting to the surrounding townscape, catering for all desire lines.
02b	The development is located in or close to a mixed-use centre	Yes	The development is located within - and is intended to expand and form part of an – the designated mixed use district centre.
02c	The development's layout makes it easy for a bus to serve the scheme	Yes	The district centre served by several bus routes with stops located on Citywest Road and Citywest Drive within minutes' walk from the site. Additionally, the site is adjacent to the Fortunestown Luas stop.
02d	The layout links to existing movement routes and the places people will want to get to	Yes	The layout allows for pedestrian and cycle movement north to south and east to west across the site, with the plaza beside the Luas stop functioning as a hub. The development would substantially enhance pedestrian connectivity and permeability in the area.
02e	Appropriate density, dependent on location, helps support efficient public transport	Yes	It is a fundamental objective of the proposed development to maximise the value of the site's access to public transport infrastructure/services.
05 Efficiency - How does the development make appropriate use of resources, including land?			
05a	The proposal looks at the potential of higher density, taking into account appropriate accessibility by public transport and the objectives of good design	Yes	See 01b and 02e above.

05b	Landscaped areas are designed to provide amenity and biodiversity, protect buildings and spaces from the elements and incorporate SUDs	Yes	The landscape masterplan includes a range of open spaces of varying character, designed to (a) provide passive and recreation opportunities for different age groups, (b) provide residential amenity and privacy, (c) create a legible environment for people to live in and move through, (d) incorporate SUDs features such as swales, attenuation areas and permeable paving, and (e) provide habitat, e.g. the stream buffer zone. The spaces are located and designed to complement existing open spaces on the adjacent lands, to maximise their collective value as a network.
05c	Buildings, gardens and public spaces are laid out to exploit the best solar orientation	Yes	A key objective of the LAP, and the proposal, is to establish a strong building line along the southern site boundary to provide enclosure to Fortunestown Lane. Arising from this, some overshadowing of the open space internal to the site is unavoidable. The east-west aligned building lines proposed include gaps (e.g. between E1 and E2) which would allow sunlight into the affected spaces. Additionally, the open spaces are large and connected – so that open space in sunlight would always be within reach. A key benefit of the proposal is the south facing aspect of the plaza.
06 Distinctiveness - How do the proposals create a sense of place?			
06a	The place has recognisable features so that people can describe where they live and form an emotional attachment to the place	Yes	The proposal is intended to function and to read as part of the district centre. It incorporates a building of substantial height, intended to function as a landmark, identifying the Luas stop (and adjacent plaza) as a key element of the urban district. The site also benefits from its adjacency to the district square and the neighbourhood park, which provide additional references for place identity and description.
06b	The scheme is a positive addition to the identity of the locality	Yes	See 01d above.
06c	The layout makes the most of the opportunities presented by existing buildings, landform and ecological features to create a memorable layout	Yes	See 01a-e above.
06d	The proposal successfully exploits views into and out of the site	Yes	The development is intended to establish a strong building line along Fortunestown Lane, to strengthen the street enclosure and urban structure. However, three wide gaps are retained along this frontage (between D3 and the existing Edenbrook Block A1; between D3 and E1; between E1 and E2), linking Fortunestown Lane with the open spaces internal to the site. This arrangement of built form creates spatial and visual connections between the site and Fortunestown Lane/the district centre. Along the east boundary, there is no built frontage, so that the internal open space connects with the adjoining neighbourhood park. This allows views into and out of the site from the park, another key element of the townscape.
06e	There is a discernible focal point to the scheme, or the proposals reinforce the role of an existing centre	Yes	The proposed development incorporates the Luas stop as a focal point and seeks to supplement/reinforce its public realm activation effect by locating a plaza space with retail/commercial frontage beside the stop. This strategy is intended to complement the shopping centre across Fortunestown Lane, which currently functions as the district centre.
07 Layout - How does the proposal create people friendly streets and spaces?			
07a	Layout aligns routes with desire lines to create a permeable interconnected series of routes that are easy and logical to navigate around.	Yes	See 02a and 02d above.
07b	The layout focuses activity on the streets by creating active frontages with front doors directly serving the street	Yes	See 06e 07c.
07c	The streets are designed as places instead of roads for cars, helping to create a hierarchy of space with less busy routes having surfaces shared by pedestrians, cyclists and drivers	Yes	The main street internal to the site gives equal priority to pedestrians and cyclists (with dedicated lanes for both) as it does to cars. The two internal streets include green verges and street trees to soften and green the spaces.
07d	Block layout places some public spaces in front of building lines as squares or greens, and some semi private space to the back as communal courts	Yes	The proposal includes a public space (the plaza) in front of the Fortunestown Lane building line at the Luas stop, partially enclosed by Blocks D3, D4 and E1, with shop and office frontage to activate the space. This would be a significant addition to the public realm of the district centre. Internally, a number of communal courtyard spaces and a 'local park' are defined by the layout of the buildings, each space with its own character and function.
08 Public Realm - How safe, secure and enjoyable are the public areas?			
08a	All public open space is overlooked by surrounding homes so that this amenity is owned by the residents and safe to use	Yes	All public open spaces are overlooked.
08b	The public realm is considered as a usable integrated element in the design of the development	Yes	See 05b above.
08c	Children's play areas are sited where they will be overlooked, safe and contribute to the amenities of the neighbourhood	Yes	The play area in the large courtyard space to the north west of the site would be overlooked by buildings on four sides. This play area is surrounded by planting, including sensory planting at the entrance, to contribute to the neighbourhood's amenities. A toddler play space is proposed inside the north east boundary, and informal play opportunities will be afforded throughout the network of open space.
08d	There is a clear definition between public, semi private, and private space	Yes	The arrangement of buildings and streets/circulation routes creates a clear distinction between public and semi-private space. Privacy planting strips are employed in front of ground floor apartments for additional privacy/definition of private space.
08e	Roads and parking areas are considered as an integral landscaped element in the design of the public realm	Yes	The main street internal to the site gives equal priority to pedestrians and cyclists (with dedicated lanes for both) as it does to cars. The two internal streets include green verges and street trees to soften and green the spaces.
12 Detailed Design - How well thought through is the building and landscape design?			
12a	The materials and external design make a	Yes	The proposed buildings and landscape are of high design and material quality and would elevate the quality of the built environment locally.

	positive contribution to the locality		
12c	Open car parking areas are considered as an integral element within the public realm design and are treated accordingly	Yes	Parking for the apartments is mostly located underground, with surface car parking for the duplexes and Block E2 distributed along the internal road network. This avoids any requirement for a 'parking area' and allows the space between the buildings to be dedicated to open space/amenity uses.

Table 10.6 Urban Design Criteria

The assessment of the proposed development against the relevant Urban Design Manual criteria confirms that the potential townscape effects can be classified positive.

An additional set of criteria, for the assessment of proposals for buildings taller than the prevailing height in their area, is contained in Section 3.2 of the Building Height Guidelines. The proposal is considered against these criteria below.

Building Height Guidelines *Section 3.2*	**Yes/ No**	**Comment**
At the scale of the relevant city/town:		
The site is well served by public transport with high capacity, frequent service and good links to other modes of public transport.	Yes	The site is adjacent to the Fortunestown Luas stop and walking distance from several bus stops.
Development proposals incorporating increased building height… should successfully integrate into/ enhance the character and public realm of the area, having regard to topography, its cultural context, setting of key landmarks, protection of key views… *Such development proposals shall undertake a landscape and visual assessment, by a suitably qualified practitioner such as a chartered landscape architect.*	Yes	The proposal responds to several key elements and characteristics of the townscape, including: - Its position beside the Luas stop in the designated district centre; - Its frontage to Fortunestown Lane, the main thoroughfare serving the district centre – a very wide road corridor lacking built enclosure; - Its position fronting both the district square and the neighbourhood park; - Its position adjacent to the high density Edenbrook development to the west, and a permitted low density development to the north east; - The mixed existing townscape character, weak urban structure and poor legibility. The proposal responds to these factors and to the LAP and national policy, in a coherent manner. The development would integrate successfully with the varied surrounding conditions, but, as intended, it would also contribute to a significant change in townscape character. The Landscape/Townscape and Visual Impact Assessment has been carried out by a qualified landscape architect and member of the Irish Landscape Institute.
On larger urban redevelopment sites, proposed developments should make a positive contribution to place-making, incorporating new streets and public spaces, using massing and height to achieve the required densities but with sufficient variety in scale and form to respond to the scale of adjoining developments and create visual interest in the streetscape.	Yes	The strong built frontage to the south and south east would strengthen the definition of Fortunestown Lane and the district square, enhancing these public spaces, contributing to place-making. The development would introduce a new public plaza, alongside the Luas stop and Fortunestown Lane, expanding and diversifying the public realm in the district centre. The positioning of a landmark tall building beside this square would mark its location (and the location of the Luas stop) in views from the surrounding area, contributing to place-making and legibility. The arrangement of height responds to the context, with density concentrated along Fortunestown Lane, at the Luas stop and adjoining the existing high density development to the west. Height is used for the specific purposes of place-making and legibility. The photomontages (e.g. Views 1, 7, 9) illustrate that the height of Block D4 would crease visual interest in the streetscape, without detriment to any sensitive building or space.
At the scale of district/neighbourhood/street:		
The proposal responds to its overall natural and built environment and makes a positive contribution to the urban neighbourhood and streetscape.	Yes	In addition to its response to the built elements and characteristics of the townscape, the proposal responds to the Kingswood Stream which runs along the eastern site boundary. A broad (10-25m) belt of 'stream buffer zone planting' is proposed in this area, effectively dedicating this space to the local Green Infrastructure network. By locating the main internal open space contiguous with this boundary and the adjacent neighbourhood park, the development would add value to both spaces (the on-site space and the neighbourhood park), making a positive contribution to the neighbourhood. The provision of the plaza alongside the Luas stop and Fortunestown Lane would have similar positive effect on the streetscape/public realm.
The proposal is not monolithic and avoids long, uninterrupted walls of building in the form of slab blocks, with materials / building fabric well considered.	Yes	It is an objective of the development that it would present a strong building line to Fortunestown Lane, to generate urban-type enclosure of the street. The proposal achieves this without an excessively long, uninterrupted wall of building. There are substantial gaps between D3 and the existing Edenbrook Block A1, between D3 and E1, and between E1 and E2, which provide relief in the built frontage. The façade treatments and materials are of high quality.
The proposal enhances the urban design context for public spaces and key thoroughfares and inland waterway/ marine frontage, thereby enabling additional height in development form to be favourably considered in terms of enhancing a sense of scale and enclosure...	Yes	The proposal would enhance the character - through enclosure/definition by buildings f high design and material quality, active frontage and passive surveillance - of Fortunestown Lane, the district square, and the new plaza beside the Luas stop.
The proposal makes a positive contribution to the improvement of legibility through the site or wider urban area within which the development is situated and integrates in a cohesive manner.	Yes	Massing and height are used to (a) strengthen the definition of, or (b) identify the position of, key elements of the townscape, e.g. Fortunestown Lane, the future district square, the Luas stop and plaza, and the street and green links across the site. The development would considerably improve the legibility of the urban area, from both the immediate environs of the site (i.e. within the district centre) and in certain distant views.
The proposal positively contributes to the mix of uses and/ or building/ dwelling typologies available in the neighbourhood."	Yes	The development would contribute a large number of apartment units to the urban district – appropriately located in the centre adjacent to the Luas stop. The apartment buildings, including the tower of Block D4, would contribute to the mix of built form in the area, strengthening the urban character, generating visual interest and improving legibility.

Table 10.7 Building Heights Guidelines Assessment

The assessment of the proposed development against Building Height Guidelines criteria confirms that the potential townscape effects can be classified positive.

10.7 POTENTIAL IMPACTS - VISUAL

11 no. viewpoints have been selected for detailed assessment of the potential visual effects of the proposal, informed by verified photomontages. The viewpoints were selected to represent the key townscape character areas and groups of visual receptors in the receiving environment, and to provide photomontage views from a range of angles and distances.

Figure 10.28: Viewpoints for visual impact assessment

The viewpoint assessments should be read in conjunction with the photomontage booklet provided under separate cover (Appendix 10.1).

For the methodology, terminology and assessment criteria used refer to Section 10.2.3 of this chapter.

Viewpoint 1 - Fortunestown Lane and Adjacent Developments to the West of the Site

Existing View and Viewpoint Sensitivity

- The view is taken from in front of Carrigmore Lawns to the west of the site. It represents views from Fortunestown Lane and the residential neighbourhod south of the road.
- The road corridor is comprised of the Carrigmore access road, Fortunestown Lane and the Luas line. There are three tree lines in this corridor providing visual amenity and screening/ softening the adjacent developments.
- The 6 storey Edenbrook building is prominent across the road, the building of high design and material quality and the typology distinctly urban. Edenbrook has established a pattern of increasing land use intensity on the approach to the district centre, and achieves a degree of street enclosure, but this is not reciprocated by the other developments in view.
- On the near side of the road the buildings are of diverse type, lesser scale and variable quality, and there is no continuity of building line/built enclosure.
- In the distance the houses and apartment building of Citywest Village can be seen. The apartment building succeeds to a limited extent in marking the district centre.
- The viewpoint sensitivity is medium.

Proposed View and Magnitude of Change

- Blocks D3, E1 and E2 form a strong building line, complementing the Edenbrook building in the foreground.
- The step up from 6 storeys (Edenbrook) to 8 (D3) to 9 (E1) indicates an intensification of land use towards the urban core. The tall Block D4 protrudes above the street-front buildings, set back behind a break in the building line, indicating a place of significance in the townscape – the Luas stop and the new plaza on the site.
- The view shows that the Fortunestown Lane corridor can comfortably accommodate the 7 and 9 storey street-front blocks without excessive enclosure, and the D4 tower adds a landmark element to the composition, adding variety and visual interest to the townscape without dominating any sensitive elements (buildings or spaces).
- The turn in the facade of D3 and the break between D3 and E1 suggest new streets/routes leading off the main thoroughfare.
- The new buildings are of high design and material quality, complementing Edenbrook and elevating the overall quality of the building stock and the townscape generally.
- The magnitude of change would be high.

Significance and Quality of Visual Effects

Measuring the magnitude of change against the viewpoint sensitivity, the visual effects can be classified 'significant'. The development would make a positive contribution to the townscape character, quality and legibility, enclosing/defining streetscapes and adding buildings of high quality to the view.

Potential Cumulative Effects

The assessment above takes account of the Edenbrook development. No permitted but not yet constructed developments would be visible from this location.

Viewpoint 2 - Fortunestown Lane Approaching the District Centre

Existing View and Viewpoint Sensitivity

- The view is taken from Fortunestown Lane across from the site's south west corner, in front of the Carrigmore Crescent apartments.
- The road corridor widens as it approaches and passes the Luas stop along the site frontage.
- To the left (out of the frame of view) are the 6 storey Edenbrook buildings, which have established a pattern of increasing land use intensity approaching the district centre.

- To the right the 3 storey Fortunes Lawn duplex block is set well back from the road behind an internal access road and parking. The development fails to enclose/define the road and contributes to a lack of urban street character and activity (given the district centre location, counteracting the effect of Edenbrook). There are taller, 5 storey apartment blocks behind the duplex cluster (to the right out of the frame of view), but these are too far removed from Fortunestown Lane to generate urban character.
- In the middle distance the Citywest Village apartment building and a 4 storey apartment building across the road - both of modest scale - form an eastern gateway to the district centre.
- The viewpoint sensitivity is medium.

Proposed View and Magnitude of Change

- The new plaza opening onto the Luas stop is a significant addition to the public realm.
- Blocks D3, E1 and E2 form a strong building line north of the road, and the height is comfortably in scale with the wide road corridor. The D4 tower, set back from the road, adds a locally dominant landmark element, marking the location of the Luas stop and the plaza.
- The new buildings and public realm are of high design and material quality, strengthening the urban character and elevating the townscape quality overall.
- The magnitude of change would be high.

Significance and Quality of Visual Effects

The visual effects can be classified 'significant'. The development would make a positive contribution to the townscape character and legibility, enclosing/defining the streetscape and plaza, and adding buildings of high quality to the view.

Potential Cumulative Effects

The permitted buildings in front of the shopping centre will be visible in the middle distance to the right of the road. In combination, the proposed development, the permitted development, and the apartment buildings beyond the Citywest Road junction will form a critical mass of urban development, establishing a district centre of substance. The proposed development will make a key contribution to this shift in character, by adding diversity and quality to the built form, additional retail/commercial use, and new elements of public realm.

Viewpoint 3 - Citywest District Centre

Existing View and Viewpoint Sensitivity

- The view is taken from the road between the shopping centre and the Fortunes Lawn apartments, in the district centre. (This is the access road to the new apartment development permitted on the shopping centre site. The view will be experienced daily by the residents of that development.)
- The view is framed by the Fortunes Lawn apartment and duplex buildings to the left and the shopping centre and restaurant to the right.
- Fortunestown Lane passes across the field of view beyond these buildings but without built frontage it is not legible. The Luas stop is behind the duplex block, just out of view.
- Overall, for an urban district centre, there is a lack of built enclosure, coherence and legibility in the urban structure.
- The viewpoint sensitivity is low-medium.

Proposed View and Magnitude of Change

- Blocks E1 and E2 form a strong building line on the far side of the road. The gap between the buildings affords a glimpse of the Local Park internal to the site and contiguous with the Neighbourhood Park beyond the site. The turn in the facade of E2 indicates the alignment of the Luas line (as it diverts from Fortunestown Lane).
- The scale of the buildings can be comfortably accommodated in a townscape characterised by wide roads/spaces and diverse building types and scale. The increase in built enclosure is appropriate for the urban centre location.
- The step in height of E1 suggests a continuation of the district centre along the road to the west, in the direction of the Luas stop and the new plaza on the site.
- The magnitude of change would be medium-high.

Significance and Quality of Visual Effects

The visual effects can be classified 'moderate'. The development would make a positive contribution to the townscape character and legibility, improving the urban land use mix, enclosing/defining the streetscape and adding buildings of quality to the view.

Potential Cumulative Effects

The permitted building in front of the shopping centre will be prominent in the foreground to the right, having the intended effect of increasing the built enclosure to strengthen the urban structure. In combination, the proposed development and this permitted development would establish a district centre of substance, with the diversity of built form contributing to the urban character.

Viewpoint 4 - Citywest Shopping Centre

Existing View and Viewpoint Sensitivity

- The view is taken from the pavement in front of the shopping centre. This is a view experienced by a large number of people. It illustrates the inadequacy of the shopping centre as the central/defining development in the district centre in its current form.
- The foreground is occupied by the parking area, framed to the left by the shopping centre building. The restaurant is an unfortunate feature. In combination with the parked cars it hides Fortunestown Lane from view.
- Overall, for an urban district centre, there is a lack of built enclosure, and the urban structure appears sparse/incomplete.
- The viewpoint sensitivity is low.

Proposed View and Magnitude of Change

- Blocks D1, E1 and E2 form a strong building line on the far side of the road. The turn in the facade of E2 indicates the turn of the Luas line as it diverts from Fortunestown Lane.
- Block D4 protrudes above the street-front buildings, indicating another place of significance (additional/ complementary to the shopping centre) in the expanded district centre.
- The scale of the buildings can be comfortably accommodated in a townscape characterised by wide spaces and diverse building types and scale. The increase in built enclosure is appropriate for the urban location, strengthening the urban structure.
- The magnitude of change would be high.

Significance and Quality of Visual Effects

The visual effects can be classified 'moderate'. The development would make a positive contribution to the townscape character and legibility, enclosing the streetscape and adding buildings of high quality to the view.

Potential Cumulative Effects

The two permitted buildings in front of the shopping centre will be prominent in the view, flanking the restaurant at the edge of the parking area, having the intended effect of strengthening the urban structure (in views external to the shopping centre). However, this will enclose the shopping centre site (an important part of the existing public realm) from the surrounding townscape. This negative effect would be counteracted by the proposed development: The scale of the buildings, allowing them to be seen from within the shopping centre

site, would create a visual connection between the shopping centre and Fortunestown Lane. They would also have the effect of increasing the visible extent and diversity of the district centre, so that it reads more as an urban quarter.

Viewpoint 5 - Verschoyle Green

Existing View and Viewpoint Sensitivity

- The view is taken from Verschoyle Green at the southern edge of Carrigmore Park, designated the District Park in the Fortunestown LAP. The viewpoint represents the existing suburban area to the south of the district centre.
- The parkland occupies the foreground, extending into the middle distance where a strip of urban development forms the backdrop. Buildings of diverse type (houses, duplex and apartment blocks and the shopping centre) are visible, but there is little differentiation in scale, nor any other indication of the urban core.
- The viewpoint sensitivity is medium.

Proposed View and Magnitude of Change

- The roofline of E1 protrudes marginally above the existing roofline, and Block D4 rises prominently above the other buildings, indicating a place of significance in the townscape.
- In a wide panorama of open space and diverse buildings the magnitude of change would be low-medium.

Significance and Quality of Visual Effects

The visual effects can be classified 'slight'. The development would make a positive contribution to the view, adding visual interest to the skyline and improving legibility.

Potential Cumulative Effects

The cluster of four permitted buildings to the rear of the shopping centre will be a prominent addition to the view, increasing the enclosure of the park and screening the unsightly rear facade of the shopping centre. In combination, the proposed development and this permitted development would increase the extent and diversity of the district centre. Block D4 would retain its landmark effect.

Viewpoint 6 - Citywest Drive Approaching the District Centre from the East - Distant View

Existing View and Viewpoint Sensitivity

- Citywest Drive is the main corridor of entry to the district centre from the east. The viewpoint also represents the residential neighbourhoods to north and south of the road (e.g. the Mac Uilliam and Árd Mor estates) which would experience similar views in places.
- In the foreground to the left is a 4 storey apartment building, behind which (hidden from view) is Scoil Aoife. To the right of the road is a house at the entry to the Árd Mor estate, and beyond that the Lidl supermarket. The recently completed houses of Citywest Village form the backdrop as the road curves towards the junction with Citywest Road, and the apartment block at the corner protrudes marginally above the houses' roofline.
- The higher density typologies and the supermarket suggest an intensification of urban land use ahead along the road, but the townscape character is mixed/indistinct and there is no clear indication of the urban core.
- The viewpoint sensitivity is medium.

Proposed View and Magnitude of Change

- The cluster of buildings of distinctly urban typology and scale protrudes above the houses of Citywest Village, to the side of the apartment building. Block D4 stands out prominently within the cluster, and among the diverse buildings of the wider townscape, indicating a place of significance.
- In the already complex composition of built form along a main road approaching a district centre the magnitude of change would be low-medium.

Significance and Quality of Visual Effects

The visual effects can be classified 'slight-moderate'. There would be a noticeable intensification of land use in the District Centre, strengthening the townscape character and improving legibility.

Potential Cumulative Effects

The permitted buildings in front of the shopping centre would be perceivable but indistinct from this distance and screened by the foreground trees. There would be no significant accumulation of visual effects with the proposed development.

Viewpoint 7 - Citywest Drive Approaching the District Centre from the East – Close-up View

Existing View and Viewpoint Sensitivity

- Citywest Drive widens as it approaches the junction with Citywest Road – the eastern gateway to the district centre. The two new apartment buildings in the foreground frame the view west along Fortunestown Lane, which currently lacks the built enclosure required of a main street in an urban centre.
- The McDonalds restaurant and a part of the shopping centre are visible to the left of the road and in the distance beyond the site the Edenbrook apartments represent a new stage in the district centre's development.
- The future urban square to the right across the junction is visible but also lacks the built enclosure required to strengthen its presence in the townscape.
- The viewpoint sensitivity is medium.

Proposed View and Magnitude of Change

- Blocks E2, E1 and D3 form a strong building line, the typology and scale of the buildings establishing a distinctly urban character.
- The step up from 7 storeys (E2) to 9 (E1) indicates an intensification of land use, with Block D4 protruding above the street-front buildings indicating a new place of significance in the townscape, i.e. the plaza beside the Luas stop.
- The view shows that the Fortunestown Lane corridor can comfortably accommodate the 7 and 9 storey street-front blocks without excessive enclosure, and the D4 tower adds a landmark element to the composition, adding visual interest and legibility to the townscape. A lower building would not achieve this effect.
- The turn in the facade of E2 indicates the alignment of the Luas line as it diverts from Fortunestown Lane, and by creating enclosure it adds definition to the future town square. It also complements the buildings in the foreground in marking the junction.
- The magnitude of change would be medium-high.

Significance and Quality of Visual Effects

The visual effects can be classified 'moderate-significant'. The development would make a positive contribution to the townscape character, quality and legibility, enclosing the streetscape and square, and adding buildings of high quality to the view.

Potential Cumulative Effects

The permitted buildings in front of the shopping centre will be prominent in the view, screening the less attractive existing buildings south of the road, establishing a new building line and adding built enclosure and active frontage to the street. In combination, the proposed development, the permitted development, and the buildings in the foreground would form a critical mass of urban development in the district centre. The proposed

development will make a key contribution to this shift in character, adding scale and diversity to the district centre and strengthening the urban structure.

Viewpoint 8 - Citywest Road Approaching the District Centre from the North - Distant View

Existing View and Viewpoint Sensitivity

- Citywest Drive is the main corridor of entry to the district centre from the north. The road's junction with Citywest Avenue is the gateway between the original business district and the residential area, leading towards the mixed use centre. The view is taken from this junction.
- Due to the current absence of development on the site to the right of the road, the view is panoramic.
- The houses of the Citywest Village estate are to the left, set back from the public road behind the internal estate access road, so that the combined road corridor is very wide. The 6 storey apartment building under construction beside the Fortunestown Lane junction can be seen in the distance along the road, but it is of modest scale.
- Beyond the vacant site to the right of the road is a diverse strip of urban development, seen against the backdrop of the Dublin Mountains. The urban strip comprises buildings of various types, scale and quality.
- The buildings of most urban character and scale are the Edenbrook apartments to the right, furthest from the designated district centre. Conversely, the shopping centre in the district centre is the least conspicuous building. There is thus a lack of coherence and legibility in the urban structure.
- The viewpoint sensitivity is medium.

Proposed View and Magnitude of Change

- The distance and angle of view, and the (temporary) absence of buildings in the foreground afford an unobstructed view of the development, showing its diversity of typologies, form and scale.
- Closest to the viewer are the duplex blocks F1, F2 and G, responding to the low density permission on the adjacent site.
- Behind the duplex blocks, to the right, the 6 storey Block D1 responds to the neighbouring Edenbrook buildings (in typology, scale and positioning). D4 is aligned with D1, the buildings combining with the duplex blocks to define a new street across the site. There is a gradation in height along that street towards the site's frontage to Fortunestown Lane and the Luas stop, with the tower of D4 indicating a place of significance in the townscape.
- Blocks E1 and E2 form a strong building line along Fortunestown Lane and the Luas line, completing the definition of the street. E2, at 7 storeys, complements the Citywest Village apartment block across the road to the east.
- The scale of the buildings – the D4 tower in particular - is substantial, and the development would shift the townscape character towards a more dense, contemporary urban condition – contrasting with the earlier developments in the district centre but in keeping with the scale established by Edenbrook.
- Due to the buildings' scale they would block parts of the mountains from view, protruding above the horizon line in places. This is an inevitable effect of the lands' development at a sustainable density. (The existing Edenbrook development had a similar effect in views from the north of that site.) The view of the mountains is retained along the road corridor, and between the buildings, so the mountains' presence in not lost in the view.
- The magnitude of change would be medium-high.

Significance and Quality of Visual Effects

The visual effects can be classified 'moderate-significant'. The development would transform the townscape character, adding a composition of built form that, although large in scale, responds in a considered manner to the context (and to the spatial framework of the LAP). It would strengthen the urban structure and legibility.

Potential Cumulative Effects

The permitted apartment building and adjacent houses in the near corner of the site in the foreground (see Figure 10-17 above) will screen the entire proposed development in this view, reducing the visual effect to none at this particular vantagepoint.

However, a similar visual effect, without the screening, would be experienced approximately 100m south along Citywest Road, where the road passes the permitted development's open space.

The cumulative effect of the two developments, along with Edenbrook, would be to reinforce the pattern of increasing intensity of land use along the roads approaching the district centre and the Luas stop. This pattern is in keeping with the LAP's overall density strategy.

Viewpoint 9 – Fortunestown Centre Neighbourhood Park

Existing View and Viewpoint Sensitivity

- The view is taken from the eastern edge of the neighbourhood park along Citywest Drive. The main body of the park, approximately 100m across (east-west) occupies the foreground of the view. Beyond this is the site, which wraps around the west and south boundaries of the park.
- Beyond the vacant site is a diverse strip of urban development, with the Dublin Mountains rising in the distance to the south. The urban area comprises buildings of various types, scale and quality. The buildings most urban in character and of highest quality, are the Edenbrook apartments to the right, furthest from the designated district centre.
- To the left of these, along the southern side of Fortunestown Lane, are the Carrigmore and Fortunes Lawn developments, and the shopping centre (the latter largely hidden by trees in the foreground). These form an inconsistent building line along the road. They also appear under-scaled alongside the Edenbrook buildings, considering the district centre context.
- At this location, compared to further north at Viewpoint 8, the mountains are less prominent in the view, and the built form correspondingly more prominent.
- Although people will be attracted to the park to spend time enjoying the amenities and observing the surroundings, it is a factor that the park is located in the district centre and that the site is zoned for development. Substantial change to the view is therefore accepted in principle, and the viewpoint sensitivity is classified medium.

Proposed View and Magnitude of Change

- The open space affords an unobstructed view of the development, so that its full spatial extent, diversity of typologies/form and height are appreciable.
- A key element of the proposal is the Local Park on the site. This is a large, linear space crossing the site diagonally from the new plaza beside the Luas stop, connecting to the Neighbourhood Park. In the proposed view, this corridor of space is flanked by the duplex block G to the right, and Blocks E1 and E2 to the left, with the landmark tower of D4 at the far end of the space, where the local park meets the urban plaza. Block D1 extends to the right of D4 behind the duplex blocks F1 and F2. The mountains to the south remain visible to the left of the field of view.
- In combination, the buildings form a pleasing composition of built form, with variations in form and height, and gaps of sky space between buildings. The development responds appreciably to the context, including the open space and the alignment of roads.
- However, the scale of the buildings is substantial, and the development would shift the townscape character towards a more dense, contemporary urban condition.
- The magnitude of change would be high.

Significance and Quality of Visual Effects

The visual effects can be classified 'significant'. The development would make a positive contribution to the townscape character, quality and legibility, enclosing/defining the public open spaces and streets, and adding buildings of high quality to the view.

Potential Cumulative Effects

The permitted building in front of the shopping centre would be perceivable, but filtered by the trees in the foreground to the left. This would constitute a minor accumulation of visual effect, and would contribute to strengthening the urban townscape character in the district centre.

Viewpoint 10 – Luas Crossing on Citywest Road

Existing View and Viewpoint Sensitivity

- The view is taken from the Luas crossing on the east side of Citywest Road. It represents the views Luas passengers would experience approaching the Fortunestown Luas stop. It also represents the views from the street-facing houses in Citywest Village.
- After crossing the road the Luas passes between the future district square (currently an unused triangle of land) and the neighbourhood park, then along the site frontage where the Luas stop is located.
- To the left (out of view) beyond the square and Fortunestown Lane is Citywest shopping centre, the building set back behind the parking area. It has little presence in the townscape from this vantage point.
- To the right, beyond the neighbourhood park and the vacant site, is an urban townscape comprised of buildings of various type, scale and quality. The buildings most urban in character, and of highest quality, are the Edenbrook apartments to the right, furthest from the district centre. To the left of these, south of Fortunestown Lane (and closer to the district centre), are the Carrigmore and Fortunes Lawn developments. These appear under-scaled alongside the Edenbrook buildings, and are an inadequate marker of the district centre on this important axis.
- The viewpoint sensitivity is medium.

Proposed View and Magnitude of Change

- This vantage point shows the proposal's response to Fortunestown Lane and the district centre to one side, and the neighbourhood park to the other.
- Block E2 to the left provides built frontage to the Luas line/Fortunestown Lane as it arrives in the district centre (as well as providing definition and passive surveillance of the district square across the Luas line). Beyond E2, Block E1 turns to run parallel with Fortunestown Lane, and the building steps up towards the Luas stop and the plaza.
- The two buildings together frame a view along the site's open space to the right, with the D4 tower closing the vista, its height suggesting a place of significance in the townscape. Block D1 extends to the right of D4 behind the duplex blocks G, F1 and F2.
- In combination, the buildings form a pleasing composition of built form, with variations in form and height responding appreciably to the context and the objective to improve. However, the scale of the buildings is substantial - particularly D4, and the development would shift the townscape towards a more dense, contemporary urban condition.
- The magnitude of change would be high.

Significance and Quality of Visual Effects

The visual effects can be classified 'significant'. The development would make a positive contribution to the townscape character, quality and legibility, enclosing/defining the public open spaces and streets, and adding buildings of high quality to the view.

Potential Cumulative Effects

Although out of frame in the photomontage, the permitted buildings in front of the shopping centre would be visible to the left of the Luas track, beyond the district square and Foretunestown Lane. The two developments in combination would have the effect of expanding and diversifying the district centre, so that at this point of arrival, it would read more as an urban quarter than just a densification at the junction.

Viewpoint 11 – Cuil Duin Avenue, Edenbrook to North West of the Site

Existing View and Viewpoint Sensitivity

- Cuil Duin Avenue aligns with the north-south route through the site, together forming a key 'secondary street' (identified in the LAP) providing a direct pedestrian and cycle route from the north western residential area to the district centre.
- The view is taken from Cuil Duin Avenue as it approaches its junction with Citywest Avenue. The viewpoint also represents the adjacent street-facing houses in the estate.
- The junction is marked by two Edenbrook apartment buildings of 5 and 6 storeys, forming a gateway into the higher density area south of Citywest Avenue. The two buildings establish the alignment of the street identified in the LAP leading to the district centre.
- The vacant site lies beyond these buildings and in the distance the shopping centre can be seen against a backdrop of the Dublin Mountains.
- The viewpoint sensitivity is medium.

Proposed View and Magnitude of Change

- The 6 storey Block D1 is to the right behind the Edenbrook building. To the left are the duplex terraces F1 and F2, combining with the D blocks to define a new street across the site.
- The vista is closed at the end of the street by Block E1, stepping from 7 to 9 storeys. This generates a high degree of built enclosure - appropriate to an urban centre. However, the building screens the distant mountain from view, and this is a significant loss from the composition.
- To the right, protruding above D1 is the tower of D4, its height suggesting a place of significance in the townscape, i.e. the connection to Fortunestown Lane through the plaza, and the Luas stop. (There is an appreciable gradation of density/height towards the district centre at the end of the street.)
- The magnitude of change would be medium-high.

Significance and Quality of Visual Effects

The visual effects can be classified 'significant'. The screening of the mountains is a significant loss from the view composition, and of visual amenity. However, the positioning of Block E1 has been determined by the objective to align the plaza (between D1 and E1) with the Luas stop (among other design considerations) and to ensure a strong building line to Fortunestown Lane as it approaches the junction with Citywest Road. Meeting these objectives places E1 at the end of the street in this view, closing the vista. The development would have both positive and negative visual effects on this view. The effect is therefore classified neutral.

Potential Cumulative Effects

The effects of the Edenbrook apartment development currently under construction are considered in the above assessment. There are no other relevant developments or permissions in view.

10.8 POTENTIAL CUMULATIVE IMPACTS

There are several recent developments, developments under construction, and permitted developments with which the proposed development would interact, resulting in cumulative townscape and visual impacts.

Most significantly, the development would interact with the Edenbrook apartments under construction to the west and north, and the permitted buildings in front of the shopping centre to the south east across

Fortunestown Lane. The development would also interact – although to a lesser extent (due to their separation distance) – with the two small apartment buildings to the east of the Citywest Road junction. In combination these developments would:

- Generate a much higher degree of built enclosure along Fortunestown Lane than exists currently, shifting the character of the road corridor towards a more urban condition. This would be reinforced by the ground floor retail and office uses in the street-front buildings of the proposed development and the new buildings in front of the shopping centre.
- Expand the district centre. The physical (and perceived) extent of the urban core would be expanded, and its diversity of built form and public realm increased. The district centre would read more as an urban quarter than just a crossroads and a shopping centre.
- Generally elevate the quality of the buildings and the public realm in the district centre. There has been a noticeable improvement in the design and material quality of development in the area since the publication of the LAP. These developments would continue this trend and ultimately negate the detracting effect of some of the earlier developments which are of lesser quality.

In summary, the proposed development would interact with a number of recent, ongoing and permitted developments to cause a significant change in townscape character and the composition of key views in the area. This change is plan-led and not inappropriate.

10.9 MITIGATION MEASURES

10.9.1 Construction Phase

No mitigation measures are proposed other than standard best practice construction site management.

10.9.2 Operational Phase

The proposed development is the culmination of a considered design process, weighing the development opportunity of the strategic land resource and certain characteristics of the receiving environment (refer to 'Townscape Sensitivity', Section 10.6.2 above) against the sensitivities. Much of the guidance relevant to townscape and visual amenity in the Fortunestown LAP and County Development Plan has been incorporated in the proposal, adapted to comply with the more recently published national policy (NPF and Building Height Guidelines). No significant negative townscape or visual effects have been identified. Therefore no mitigation measures are recommended.

10.10 PREDICTED IMPACTS

10.10.1 Townscape Impacts

Construction Phase
Since no mitigation measures have been proposed, the predicted impacts during construction are the same as the potential impacts discussed in 10.6.1 above.

Operational Phase
Since no mitigation measures have been proposed (as no negative impacts were identified), the predicted impacts during operation are the same as the potential impacts discussed in 10.6.2 above.

10.10.2 Visual Impacts

The predicted visual impacts are the same as the potential impacts described in detail in Section 10.7 above. The predicted impacts are summarised in the table below.

Viewpoints	Viewpoint Sensitivity	Magnitude of Change	Significance & Quality of Visual Effects		
			Construction (Temporary)	Operation (Permanent)	Residual (Permanent)
1. Fortunestown Lane and Adjacent Developments to the West of the Site	Medium	High	Significant negative	Significant positive	Significant positive
2. Fortunestown Lane Approaching the District Centre	Medium	High	Significant negative	Significant positive	Significant positive
3. Citywest District Centre	Low-medium	Medium-high	Moderate negative	Moderate positive	Moderate positive
4. Citywest Shopping Centre	Low	High	Moderate negative	Moderate positive	Moderate positive
5. Verschoyle Green	Medium	Low-medium	Significant negative	Significant positive	Significant positive
6. Citywest Drive Approaching the District Centre from the East - Distant View	Medium	Low	Slight negative	Slight-moderate positive	Slight-moderate positive
7. Citywest Drive Approaching the District Centre from the East – Close-up View	Medium	Medium-high	Moderate-significant negative	Moderate-significant positive	Moderate-significant positive
8. Citywest Road Approaching the District Centre from the North - Distant View	Medium	Medium-high	Moderate-significant negative	Moderate-significant positive	Moderate-significant positive
9. Fortunestown Centre Neighbourhood Park	Medium	High	Significant negative	Significant positive	Significant positive
10. Luas Crossing on Citywest Road	Medium	High	Significant negative	Significant positive	Significant positive
11. Cuil Duin Avenue, Edenbrook to North West of the Site	Medium	Medium-high	Significant negative	Significant neutral	Significant neutral

Table 10.8 Predicted Visual Impacts

10.11 'DO NOTHING' SCENARIO

Were the site not to be developed it would remain in a disturbed condition and a large gap in the emerging Citywest townscape, with significant negative townscape and visual effects.

The existing permission for the site (Reg. Ref. SD16A/0078) could be implemented. This would have far less of a presence (the tallest buildings, fronting Fortunestown Lane, are four storeys), and therefore less effect on the townscape character and views/visual amenity. The development, being of lower density and lesser scale than

the Edenbrook apartments, but closer to the district centre and the Luas stop, would result in an imbalance in the arrangement of built form, with negative effects on the area's character and legibility. The permitted development was also designed and permitted before publication of the NPF and Building Height Guidelines, which encourage higher density, taller development on sites such as the subject site. The townscape and visual change resulting from the permitted development would therefore not be supported by current national policy, which encourages more significant change.

10.12 WORST CASE SCENARIO

No worst case scenario has been identified.

10.13 MONITORING & REINSTATEMENT

No monitoring of townscape and visual impacts is proposed.

10.14 DIFFICULTIES IN COMPILING INFORMATION

No difficulties were encountered in compiling the information.

10.15 REFERENCES

- Fortunestown Local Area Plan 2012, South Dublin County Council.
- Guidelines for Landscape and Visual Impact Assessment, 3rd edition, 2013, Landscape Institute and Institute of Environmental Management and Assessment.
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, 2017, Environmental Protection Agency.
- South Dublin County Development Plan 2016-2022, South Dublin County Council.
- Townscape Character Assessment, Technical Information Note 05/2017, Landscape Institute.
- Urban Design Manual – A Best Practice Guide, Department of Environment, Heritage and Local Government, 2009.
- Urban Development and Building Height Guidelines for Planning Authorities, December 2018, Department of Housing, Planning and Local Government.

11 TRAFFIC AND TRANSPORTATION

11.1 INTRODUCTION

This Chapter of the EIAR comprises an assessment of the likely impact of the proposed development on the local transport environment as well as identifying proposed mitigation measures to minimise any potential impacts. The purpose of this Chapter is to quantify the existing transport environment and to detail the results of assessment work undertaken to identify the potential level of any transport impact generated as a result of the proposed development. This section has been completed by Mark McKenna of DBFL who is a competent expert in this area, with BEng (Hons) MSc MIEI.

11.2 METHODOLOGY

Our approach to the study accords with policy and guidance both at a national and local level. Accordingly, the adopted methodology responds to best practices, current and emerging guidance, exemplified by a series of publications, all of which advocate this method of analysis. Key publications consulted include;

- 'Traffic and Transport Assessment Guidelines' (May 2014) National Road Authority / TII;
- 'Traffic Management Guidelines' Dublin Transportation Office & Department of the Environment and Local Government (May 2003);
- 'Guidelines for Traffic Impact Assessments' The Institution of Highways and Transportation;
- Fortunestown Local Area Plan 2012; and
- South Dublin County Council Development Plan 2016-2022.

Our methodology incorporated a number of key inter-related stages, including;

- **Background Review**: This important exercise incorporated three parallel tasks which included (a) an examination of the local regulatory and development management documentation; (b) an analysis of previous 'transport' related, strategic and site specific studies of development and transport infrastructure proposals across the Citywest area, and (c) a review of planning applications to establish the legal status of various third party development schemes that were either considered within the strategic 'transport' studies or which have emerged and received full planning permission since.
- **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:** Junction traffic counts in addition to vehicle queue length surveys were undertaken and analysed with the objective of establishing local traffic characteristics in the immediate area of the proposed residential development.
- **Trip Generation:** A trip generation exercise has been carried out to establish the potential level of person trips and subsequently vehicle trips generated by the proposed residential development.
- **Trip Distribution:** Based upon both the existing and future network characteristics, a distribution exercise has been undertaken to assign site generated vehicle trips across the local road network.
- **Network Analysis:** Further to quantifying the predicted impact of vehicle movements across the local road network for the adopted site access strategy more detailed computer simulations have been undertaken to assess the operational performance of key junctions in the post development 2022, 2027 and 2037 development scenarios.

11.3 RECEIVING ENVIRONMENT

Land Use

The subject lands are zoned "Objective RES-N – *"To provide for new residential communities in accordance with approved area plans"* within the South Dublin County Development Plan 2016-2022.

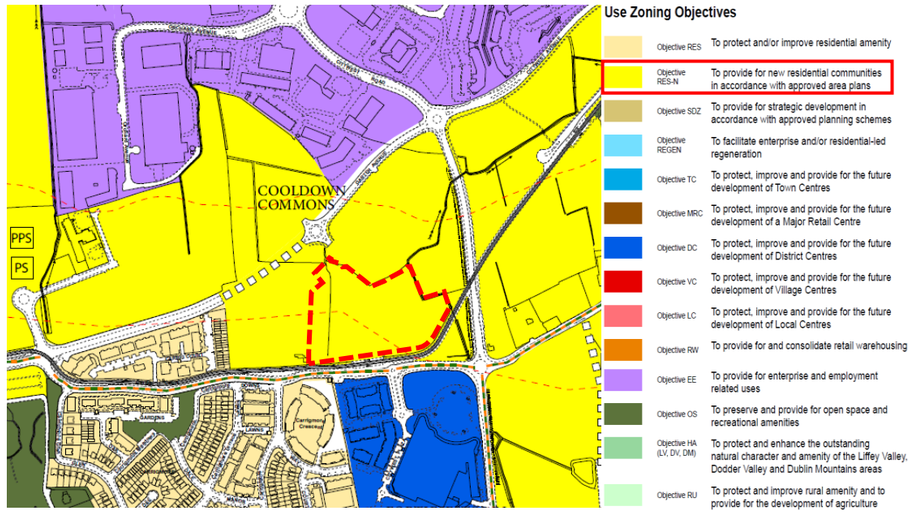

Figure 11.1: SDCC Land Use Zoning (Extract: Map 8 SDCC Development Plan 2016-2022)

The surrounding area predominantly consists of a mix of residential developments, residentially zoned lands and business parks. A number of the Citywest Business Campus units are located to the north and northeast of the subject site. The permitted Cooldown Commons Phase 2 development lands (Pl. Ref. ABP302398) are situated immediately to the west of the subject development site (a section of which is proposed to be amended as part of the subject proposals) whilst the permitted development Pl. Ref. SD16A/0210 lands are situated immediately to the northwest of the subject development site.

Location

The general location of the subject site in relation to the surrounding road network is illustrated in Figure 11-2 below whilst Figure 11-3 indicatively shows the extent of the subject site boundary and neighbouring lands. The subject site is located approximately 6.6km west of Tallaght and 14.8km southwest of Dublin City Centre.

The development site is bounded to the south by the Fortunestown Lane corridor and LUAS Red Line whilst the north / eastern boundaries comprise undeveloped (permitted development) residentially zoned lands. The western boundary comprises a residential development (Pl. Ref. ABP 302398) which is currently under construction.

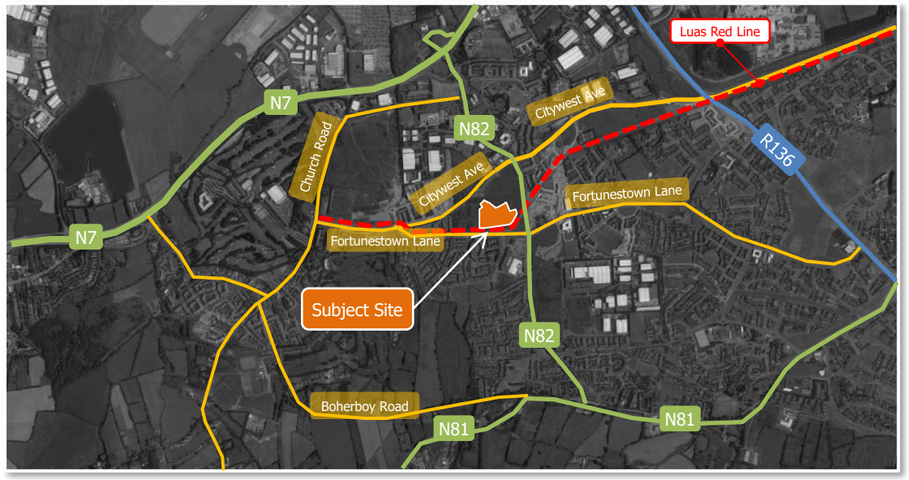

Figure 11-2: Site Location (Source: Google Maps)

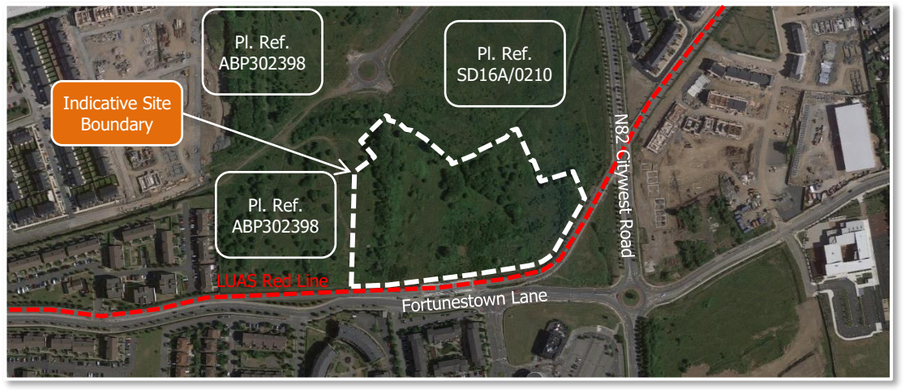

Figure 11-3: Site Boundary

Existing Transportation Infrastructure

Road Network

To the north of the subject site, the Citywest Avenue Extension corridor runs in an East-West direction. The central section of this corridor has recently been constructed as part of the adjacent development site (Pl. Ref. ABP 302398) which provide a through route between the N82 Citywest Road corridor to the east and the Fortunestown Lane corridor to the west. Travelling in a westerly direction on Citywest Avenue leads to the Fortunestown Lane / Citywest Avenue signal controlled junction and subsequently the Fortunestown Lane / Garter Lane signal controlled junction. To the north Garter Lane provides a direct route to the N7 southbound carriageway, whilst to the south Garter Lane / Church Road leads to the village of Saggart, located approximately 1.5km away.

Travelling eastbound on Citywest Avenue Extension from the subject site leads to a four-arm roundabout junction with the N82 Citywest Road. Travelling southbound from this roundabout junction, Citywest Road terminates at a three-arm junction with N81 Blessington Road providing access to Blessington (located approx. 17km to the south west) and Tallaght (located approx. 5km to the north east).

Travelling north on the N82 Citywest Road provides access to the N7 northbound and southbound carriageways via Junction 3. The N7 provides convenient access to destinations including Rathcoole, Naas and Kildare to the southwest (as well the strategic M7, M8 & M9 motorways). The strategic M50 motorway (northbound and southbound) is accessible via the M50 Junction 9 located approximately 6km to the northeast whilst Dublin City Centre is accessible via the Naas Road corridor and is located approx. 16km away.

Existing Cycling and Pedestrian Facilities

The recently constructed section of Citywest Avenue in the vicinity of the subject site benefits from dedicated verge segregated pedestrian / cycle facilities on both sides of the corridor as presented in Figure 11-4 below. The cycle and pedestrian facilities are differentiated by surface type and provided at the same level.

Figure 11-4: Citywest Avenue Cycle / Pedestrian Facilities

Fortunestown Lane currently benefits from a footway and cycle track on the southern side of the corridor (Figure 11-5). Currently pedestrian only facilities are in place on the northern side of this corridor.

Figure 11-5: Pedestrian & Cycle Facilities on Fortunestown Lane

The Citywest Road corridor benefits from verge segregated footways on both sides of the road carriageway in addition to street lighting.

Figure 11-6: Pedestrian Facilities on N82 Citywest Road

The Greater Dublin Area Cycle Network Plan details the GDA's existing and proposed Cycle Network incorporating Urban, Inter-urban and Greenroute networks. The subject site is located within the sector designated as the "Dublin South West". Figure 11-7 illustrates the existing cycle infrastructure in the vicinity of the subject site at the time the Plan was published in December 2013.

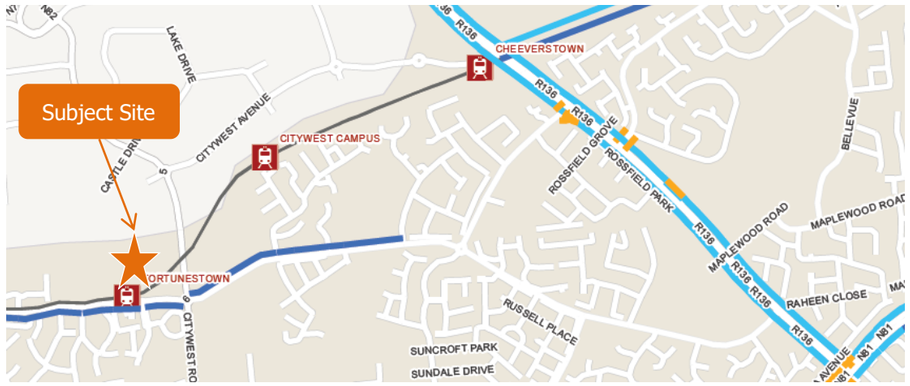

Figure 11-7: GDA Cycle Network Plan Existing Cycle Facilities (Extract: GDA Sheet E6)

Public Transport - Bus

The subject site benefits from excellent public transport accessibility levels including both light rail and bus-based services. Dublin Bus operates three routes that serve the subject site locale including the number 69 (Fleet Street – Rathcoole), the number 65b (Citywest – Poolbeg Street) and the number 77a (Citywest – Ringsend Road). All three routes provide links from the subject site's general vicinity to the city centre via alternative routes thereby serving different catchment areas between Citywest and the City Centre including Clondalkin (Route 69), Terenure (Route 65b) and Firhouse (Route 77a).

There is also a route number 77x which provides a daily weekday service from Citywest to UCD Belfield from Mondays to Fridays only. Go-Ahead Bus route 175 is also easily accessible from the subject site which operates between Citywest and UCD. A summary of the aforementioned bus service frequencies is presented in Table 11-1.

Bus Route	Weekdays		Saturdays		Sundays & Bank Holidays	
	To City Centre	From City Centre	To City Centre	From City Centre	To City Centre	From City Centre
DB 65b	18	20	17	19	15	15
DB 69	24	17	24	17	10	10
DB 77a	56	52	46	46	32	34
DB 77x	1 service	-	-	-	-	-
GA 175	34	35	17	16	16	15

DB = Dublin Bus, GA = Go-Ahead Bus

Table 11-1: Bus Service Frequency (No. of Services per Day)

The local Bus stops are all within walking distance of the subject site are illustrated in Figure 11-8 below.

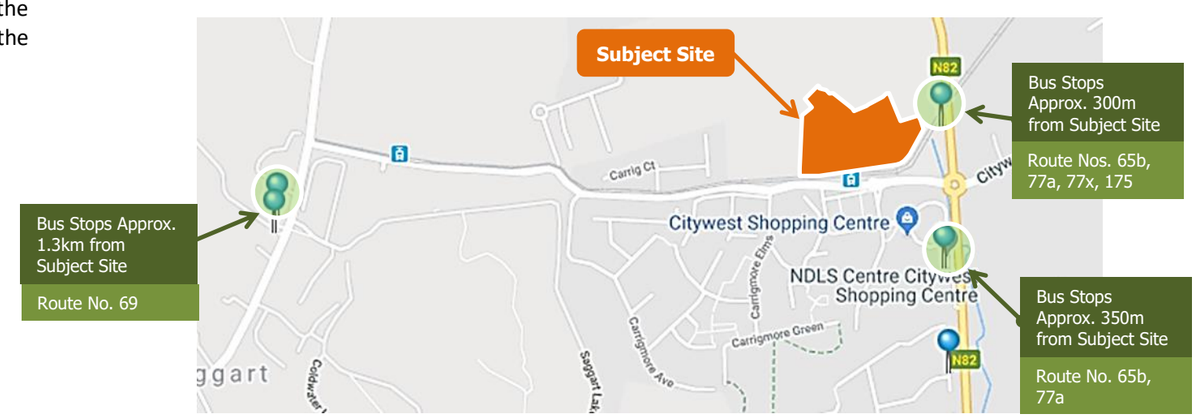

Figure 11-8: Bus Stop Locations

In addition, Dualway Transport provides a daily service (Route 311) from Newcastle/Rathcoole to The Square, Tallaght from Mondays to Fridays only, with the exception of Wednesdays when there are 2 services.

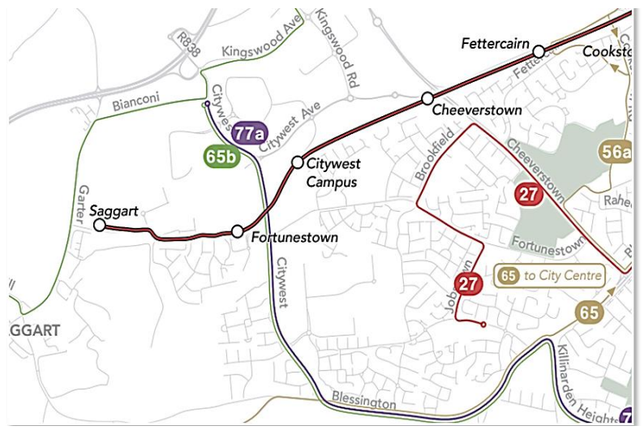

Figure 11-9: Existing Bus Network (Extract: Map 1 Bus Connects Dublin Bus Network Redesign)

Public Transport - Luas

The subject site is conveniently located to benefit from LUAS Red Line services. The 'Fortunestown' interchange is located immediately adjacent to the subject site accessible via a new dedicated pedestrian connection as presented in Figure 11-10 below. The Red Line currently operates between Saggart / Tallaght and The Point. At the Belgard interchange, the LUAS Red line branches in two directions; to Saggart and to Tallaght. Table 11-2 below lists the frequency with which the Fortunestown LUAS service operates.

Figure 11-10: LUAS Interchange in the Vicinity of the Subject Site

Link	Weekdays		Saturdays		Sundays & Bank Holidays	
	Peak	Off-Peak	Peak	Off-Peak	Peak	Off-Peak
Saggart – Belgard	9-10	10-15	12	12-15	10-12	12-15
Belgard – Busáras	3-5	6-15	6-7	6-15	10-11	10-15
Busáras – The Point	4-10	10-15	12	12-15	10-12	11-15

Table 11-2: LUAS Service Frequency (In Minutes)

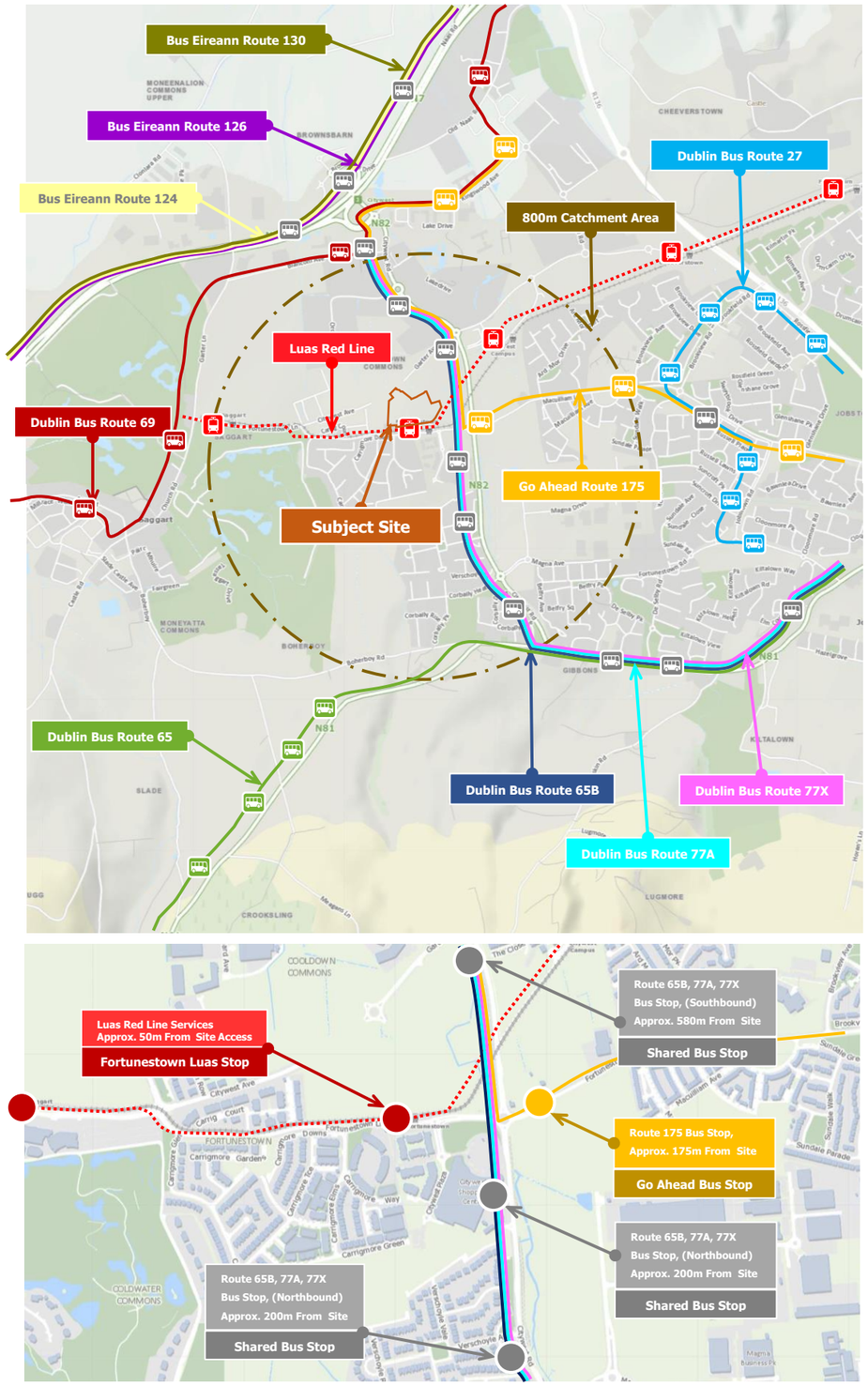

Figure 11-11: Surrounding Public Transport Linkages

Future Transportation Infrastructure

Cycle Network Proposals

In December 2013, the NTA published the report entitled *'Greater Dublin Area Cycle Network Plan'*. The report summarises the findings of a comprehensive body of work detailing a proposed Cycle Network incorporating Urban, Interurban and Green route networks covering the six county council areas that together form the defined Greater Dublin Area (GDA).

The subject site lies within the *"Dublin South West Sector"* as outlined within the Dublin Greater Area Cycle Network Plan (2013). Figure 11-12 below illustrates the cycle network proposals in the vicinity of the subject site as outlined within the Plan.

The Dublin South West Sector *"extends outward from the twin corridors of Camden Street and Clanbrassil Street in the city centre, through the inner suburbs of Rathmines and Harold's Cross, to serve the areas of Terenure, Kimmage, Walkinstown, Tallaght, Firhouse and Rathfarnham."*

Routes **9C** and **9D** pass the subject site (Figure 11-12) on Fortunestown Lane and Citywest Road (N82) respectively. Route 9C "*is an alternative to the Harold's Cross route from Route 8C at Clogher Road via Stannaway Road west of Kimmage and then along Wellington Lane to join Route 9A at Spawell to connect to Tallaght. It also provides a continuation from Route 9A west of Tallaght via Fortunestown and Citywest to Saggart*". Route 9D *"would provide a traffic-free option branching off Route 9A at Kimmage Cross Roads and following the River Poddle Greenway to Tymon Park where a new bridge is required over the M50 in the centre of the park to connect with Castletymon Road and rejoin Route 9A. West of Tallaght it provides a loop through Jobstown along the N81 and then northward into Citywest".*

Route **8A** and a **Greenway** is proposed to pass the subject site to the north on Citywest Avenue Extension. Route 8A "*follows Crumlin Road past the Children Hospital, Bunting Road to Walkinstown, through Ballymount to cross the M50 at Junction 10 and out to Citywest/Fortunestown via Belgard*".

Furthermore, there are proposals for the **Slade Valley Trail** located to the west of the subject site. The Slade Valley Trail is a *"potential route southward from the villages of Rathcoole and Saggart along the upper reaches of the Camac River to Brittas at the edge of the Dublin Mountains. This route is an alternative to the very busy N81 Blessington Road and opens up access to a network of quiet rural roads in West Wicklow.*

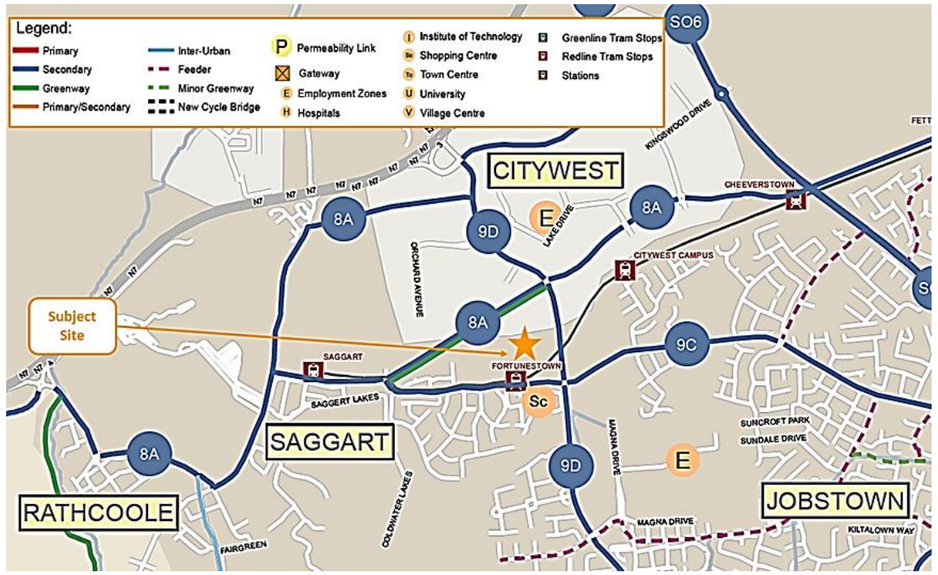

Figure 11-12: Proposed Cycle Routes (Extract: Map N6 GDA Cycle Network Plan)

The Fortunestown LAP proposes a "Green Link" through the subject site boundary which joins with proposed green links on the Citywest Road. The LAP also proposes the link to run alongside the existing LUAS lines as indicatively illustrated in Figure 11-13 below. It is an objective of the LAP to *"Achieve an integrated network of safe pedestrian and cycle routes in line with 'A Proposal for Connected Walking and Cycling Routes through the Parks, Open Spaces and Roads of South Dublin County' (2006) by utilising links through and along parks, open spaces and green corridors. (Objective AM8)".*

Figure 11-13: Green Infrastructure Framework (Extract: Fig 5.5 Fortunestown LAP)

Road Infrastructure Proposals

The Fortunestown Local Area Plan (2012) included the objective *"AM10"* for the provision of a new Primary Road (Figure 11-14) which will run in an east-west direction from Fortunestown Way to Citywest Road. Objective AM10 states:
"That Citywest Avenue (and its extension when constructed) will act as a primary movement corridor that bypasses the District Centre and allows the junction between Fortunestown Way/Lane and Citywest Road to be upgraded to a pedestrian and cyclist friendly junction."
This section of the Citywest Avenue has been implemented as part of the adjacent permitted development scheme Pl. Ref. ABP 302398.

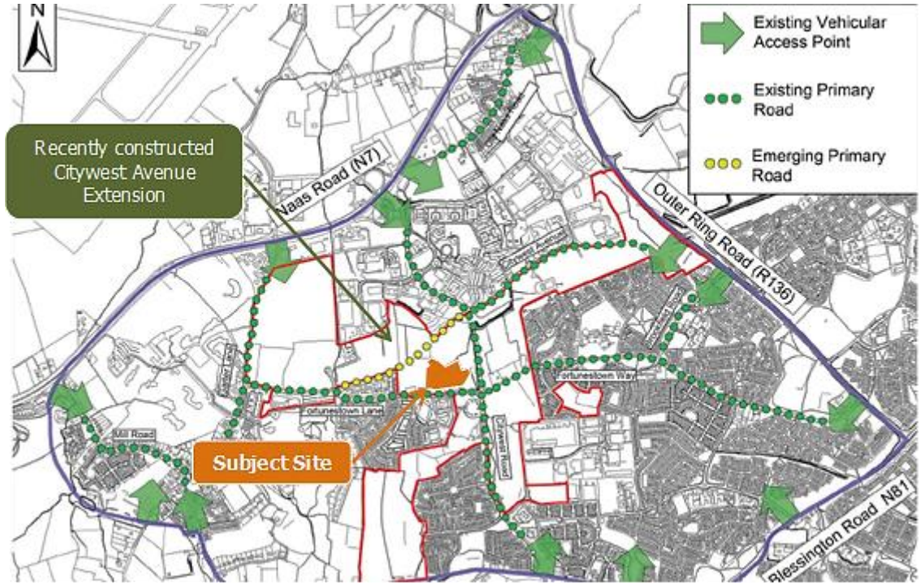

Figure 11-14: Proposed Road Infrastructure (Extract of Fig 4.2 Fortunestown LAP)

Bus Network Proposals

The Dublin Area Bus Network Redesign (which has gone through three rounds of public consultation before reaching the now final version) aims *"to provide a network designed around the needs of Dublin today and tomorrow, rather than based on the past".* Figure 11-15 below presents the proposed public transport provision in the vicinity of the subject development site as per the emerging Dublin Area Bus Network Redesign.

As part of the BusConnects proposals, the proposed development will benefit from branch **D2** which will operate between Citywest and Clare Hall via City Centre. The route will operate along Citywest Road every 15 minutes on weekdays and 15-20 minutes on weekends. A new orbital route **S8** will provide a link between Citywest Road and Dún Laoghaire via Tallaght and Sandyford. This all-day service will have a frequency of one service every 20 minutes on weekdays (every 15 minutes at peak) and every 30 minutes on weekends. Orbital route **W6** is a western orbital operating between Maynooth, Celbridge, Saggart, Citywest, and Tallaght via Celbridge, Saggart and Citywest. The W8 is proposed to operate one service every 30 minutes.

Radial route **58** is proposed to operate every 60 minutes between Rathcoole and Dublin City Centre whilst peak hour express route **X58** (existing route 69X) will offer a direct route between Rathcoole and Dublin City Centre.

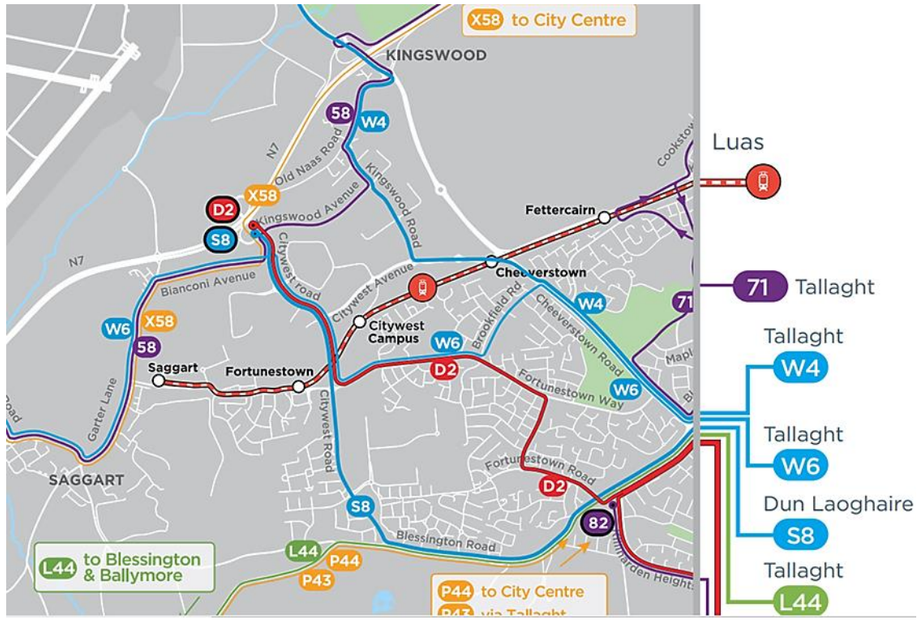

Figure 11-15: Dublin Bus Network Redesign (Extract: Map 2 of Bus Connects)

11.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development will consist of the construction of 421 no. residential units within 9 no. blocks ranging in height from 1 – 13 storeys, retail/commercial/office units, residential amenity space, and open spaces along with all associated site development works and services provisions to facilitate the development including parking, bin storage, substations, landscaping and all services. A full description is provided in the statutory notices and in Chapter 3 of the EIAR. The residential development units comprise two different dwelling types as presented in Table 11-3 below. The duplex units have been allocated within 3 no. blocks. The aforementioned neighbourhood centre facilities are proposed to be located within Block D3 and E1.

Block		1 bed	2 bed	3 bed	Total
Apartments	D1	31	41	-	72
	D2	17	39	-	56
	D3	16	48	-	64
	D4	4	46	10	60
	E1	28	42	-	70
	E2	30	33	-	63
Duplex	F1	-	6	6	12
	F2	-	6	6	12
	G	-	6	6	12
Total		126	267	28	421

Table 11-3: Proposed Accommodation Schedule

Further details of the subject proposals including site accessibility and parking provision is available in the Traffic and Transport Assessment report submitted as part of this planning application.

Proposed Development Trip Generation

Due to the subject site's convenient location and its high levels of accessibility to LUAS services, a review of trip generation rates at comparable located residential sites which exhibit comparable accessibility opportunities was undertaken in order to determine the most realistic trip generation levels for the proposed development. Following an analysis of existing residential developments which are located in close proximity to Luas lines, the following sites have been adopted by DBFL as representing appropriate 'donor' sites in terms of trip generation characteristics. As such the selected sites are as follows:-

- Elmfield Residential Development (153 no. apartments) is conveniently located within 170m walking distance from the Gallops Luas interchange; and
- Tullyvale Residential Development (400 no. apartments) is conveniently located within 220m walking distance from the Cherrywood Luas interchange.

In order to determine the potential trip generation for the subject development site, the average trip rates for the two 'donor' sites has been used. Based on the trip rates calculated from the adopted donor sites (Table 11-4), potential peak hour traffic generation is calculated on a development of 418 no. apartments.

Residential Development	AM Peak Hour			PM Peak Hour		
	Arr	Dep	2-Way	Arr	Dep	2-Way
Elmfield (153 apartments)	0.040	0.283	0.323	0.198	0.131	0.329
Tullyvale (400 apartments)	0.067	0.241	0.308	0.107	0.092	0.199
Average Trip Rate	**0.054**	**0.262**	**0.315**	**0.152**	**0.111**	**0.264**

Table 11-4: Donor Site & Proposed Residential Development Vehicle Trip Rates

In order to estimate the potential non-residential trip rates, a review of trip generation factors contained within the TRICS database was carried out. The TRICS derived non-residential vehicle trips assume that all trips generated by the non-residential land uses will be new external vehicle trips. Notwithstanding the above, it is predicted that the non-residential land uses will predominantly serve the proposed new residential units and the existing residential units in the vicinity of the subject development site. Accordingly, the non-residential TRICS predicted vehicle trips have been discounted to take this into account. Table 11-5 below presents the predicted non-residential vehicle trip rates incorporated in the subject assessment.

Land Use	AM Peak Hour			PM Peak Hour		
	Arr	Dep	2-Way	Arr	Dep	2-Way
Retail / Commercial	3.874	3.503	7.377	5.614	5.985	11.599
Discounted Retail / Commercial	2.324	2.102	4.426	3.368	3.591	6.959
Office	1.790	0.505	2.294	0.165	1.771	1.936
Discounted Office	1.074	0.303	1.376	0.099	1.063	1.162

Table 11-5: TRICS derived Non-Residential Trip Rates

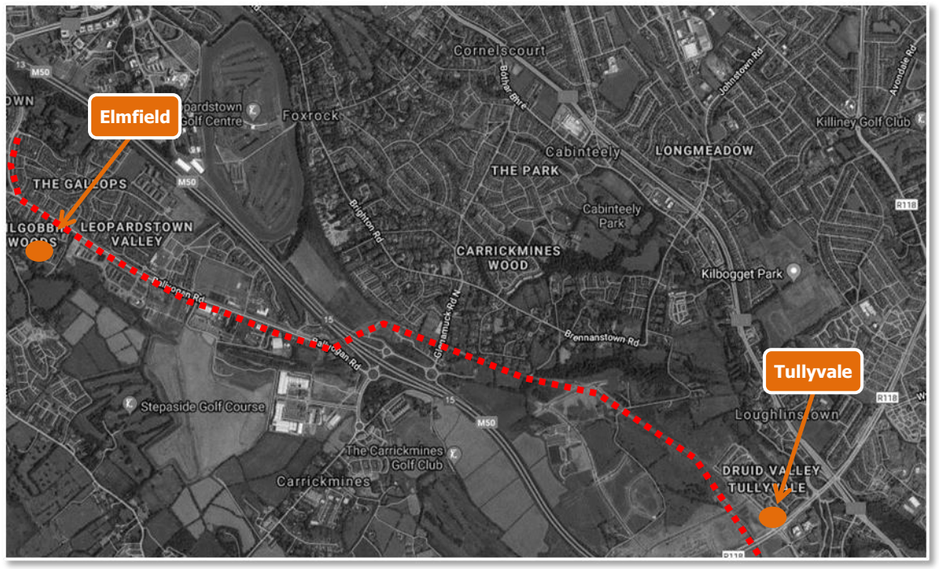

Figure 11-16: Location of Adopted Apartment Donor Sites

Person Trips

Based on the mode share proportions derived from the Census 2016 data in Section 5.1 of the Traffic and Transport Assessment, the total person trips can be estimated. As introduced above, the vehicle trip rates have been predicted using the TRICS database.

It has been assumed that the predicted vehicle trips generated by the subject residential development correspond to the proportion of vehicle trips derived within the Census mode share data. Table 11-6 below presents the predicted person trips generated by the subject residential development during the AM and PM peak hours.

Mode of Travel	Mode Share (%)	AM Peak Hour		PM Peak Hour	
		Arr	Dep	Arr	Dep
On Foot	10.10%	7	26	17	14
Bicycle	1.8%	1	5	3	2
Bus, minibus or coach	6.4%	5	16	11	9
Train, DART or LUAS	12.8%	9	32	22	18
Motorcycle or scooter	0.7%	1	2	1	1
Car / Van driver	47.2%	34	119	81	65
Car passenger	20.8%	15	53	36	29
Other	0.2%	0	1	0	0
Total Person Trips		**72**	**253**	**172**	**138**

Table 11-6: Proposed Development Predicted Person Trips

Vehicle Trips

For the purpose of this assessment and utilising typical construction rates it has been assumed that the 36 no. duplex apartments and apartment / non-residential units within Blocks E1 & E2 (133 apartments) could be complete and occupied by the end of the adopted 2022 Opening Year, whilst the remaining 252 apartments and Block D3 retail unit could be constructed sometime before the adopted 2027 Future Design Year.

Based on the above trip rates (Table 11-4 & 11-5), potential peak hour vehicle traffic flow has been calculated based on the total development quantities. Table 11-7 summarises the predicted AM and PM peak hour traffic generated by the proposed development.

Year	AM Peak Hour			PM Peak Hour		
	Arr	Dep	2-way	Arr	Dep	2-way
2022 Opening Year	11	38	49	27	22	49
2027 Future Design Year	34	119	153	81	65	146
2037 Future Design Year	34	119	153	81	65	146

Table 11-7: Proposed Development Trips Per Design Year

11.5 POTENTIAL IMPACTS

Construction Phase

During the general excavation of the foundations there will be additional HGV movements from the site. All suitable material will be used for construction and fill activities where possible and appropriate. All spoil material will be removed to a registered landfill site which will be agreed in full with the Local Authority. In addition to the traffic generated by the disposal of surplus subsoil from the site, there will be traffic generated from deliveries of construction materials and equipment. It should be pointed out that construction traffic generated during the development works tends to be outside of peak hours. Such trips would generally be spread out over the full working day and will not be higher than the peak hour predicted volumes for the operational stage.

Construction traffic will consist of the following categories:

- Private vehicles owned and driven by site construction staff and by full time supervisory staff. On-site employees will generally arrive before 08:00, thus avoiding the morning peak hour traffic. These employees will generally depart after 18:00.
- Excavation plant and dumper trucks 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.

Deliveries would arrive at a dispersed rate during the course of the day.

The potential construction stage effects are characterised as being 'direct' and 'negative' but 'imperceptible' as the vehicle generation during the construction will be significantly lower than that predicted by the subject development proposals once operational. These effects are 'likely' to occur however they will be 'temporary' in nature only lasting for the duration of the construction stage.

Operational Phase

In order to establish the existing up to date local road networks traffic characteristics and subsequently enable the identification of the potential impact of the proposed residential development, a traffic surveys were commissioned and undertaken by an independent specialist survey firm Tracsis Ltd over two number three-hour survey periods from 07:00 to 10:00 in the AM and again from 16:00 to 19:00 in the PM period on Tuesday 11th February 2020 at the following six junctions:

- Junction 1 – Citywest Avenue / Fortunestown Lane signalised junction;
- Junction 2 – N82 Citywest Road/ Citywest Avenue 4-arm roundabout junction;
- Junction 3 – Fortunestown Lane / N82 Citywest Road/ Citywest Drive 4-arm signal controlled junction;
- Junction 4 – Fortunestown Lane / Garter Lane signal controlled junction;
- Junction 5 – N82 Citywest Road/ Bianconi Avenue 3-arm priority controlled junction
- Junction 6 – Citywest Avenue / Pl. Ref. ABP302398 permitted emerging development signal controlled junction

The analysis of the survey results established that the local weekday AM and PM peak hours currently occur between 08:15 – 09:15 and 16:30 – 17:30 respectively. In order to analyse and assess the predicted traffic generation from the proposed residential development upon the local road network, an area wide traffic model incorporating these local junctions have been created by DBFL.

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 document entitled *Traffic and Transport Assessment Guidelines* (2014).

In accordance with the IHT and TII guidelines we have undertaken an assessment to establish the potential level of impact upon the key junctions of the local road network. To enable this calculation to be undertaken we have based the analysis upon the 2022 Opening Year and the 2027 and 2037 Future Design Year scenarios. The analysis has demonstrated that the proposals will generate a subthreshold impact upon all off-site junctions during the AM and PM peak hours during all adopted design years. Table 11-8 below details the specific scale of network impact predicted at each of the key local junctions during the 2022, 2027 and 2037 design years

Ref.	Junction	Design Year	AM Peak Hour	PM Peak Hour
1	Cúil Dúin View / Citywest Avenue / Fortunestown Lane signal controlled Junction	2022	1.20%	1.69%
		2027	3.45%	4.79%
		2037	3.26%	4.56%
2	Citywest Avenue / Citywest Road / Citywest Avenue roundabout Junction	2022	1.39%	1.39%
		2027	4.09%	4.05%
		2037	3.85%	3.81%
3	Citywest Road (N) / Fortunestown Lane (E) roundabout Junction	2022	0.50%	0.45%
		2027	1.49%	1.32%
		2037	1.39%	1.23%
4	Garters Lane / Fortunestown Lane signalised Junction	2022	0.61%	0.92%
		2027	1.82%	2.76%
		2037	1.70%	2.59%
5	Citywest Road / Bianconi Avenue priority controlled Junction	2022	0.24%	0.51%
		2027	0.71%	1.50%
		2037	0.66%	1.41%
6	Citywest Avenue / Edenbrook Green / Cooldown Commons Phase 3	2022	7.79%	9.46%
		2027	20.93%	24.77%
		2037	20.18%	24.08%

Table 11-8: Proposed Developments Network Impact

In Table 11-9 (AM Peak Hour) and Table 11-10 (PM Peak Hour) the predicted impacts have been categorised for the 2037 Future Design Year. During the AM peak hour, with the exception of Junction 6, the subthreshold impacts range from ***Not Significant*** to ***Imperceptible***, whilst impacts at Junction 6 are classified as ***Very Significant***.

Junction - Nature of Impact (Additional Vehicular Traffic on key Junctions)		Impact Scale	Impact Significance
1	Cúil Dúin View / Citywest Avenue / Fortunestown Lane signal controlled junction	3.26%	Not Significant
2	Citywest Avenue / Citywest Road / Citywest Avenue roundabout junction	3.85%	Not Significant
3	N82 Citywest Rd/ Bianconi Avenue	1.39%	Not Significant
4	Garters Lane / Fortunestown Lane	1.70%	Not Significant
5	N82 Citywest Rd/ Fortunestown Lane	0.66%	Imperceptible
6	Citywest Avenue / Edenbrook Green / Cooldown Commons Phase 3	20.18%	Very Significant

Table 11-9: Network Impact Categorisation 2037 AM Peak Hour

Similar to the AM peak hour, during the PM peak hour, with the exception of Junction 6, the subthreshold impacts categorised as ***Not Significant***, whilst impacts at junction 6 are classified as ***Very Significant***.

Junction		Impact Scale	Impact Significance
1	Cúil Dúin View / Citywest Avenue / Fortunestown Lane signal controlled junction	4.56%	Not Significant
2	Citywest Avenue / Citywest Road / Citywest Avenue roundabout junction	3.81%	Not Significant
3	N82 Citywest Rd/ Bianconi Avenue	1.23%	Not Significant
4	Garters Lane / Fortunestown Lane	2.59%	Not Significant
5	N82 Citywest Rd/ Fortunestown Lane	1.41%	Not Significant
6	Citywest Avenue / Edenbrook Green / Cooldown Commons Phase 3	24.08%	Very Significant

Table 11-10: Network Impact Categorisation 2037 PM Peak Hour

Figure 11-17 details the total amount of two-way vehicle trips that will pass through the key off-site junctions in the 2037 Future Design Year and the resulting percentage increase in traffic flows as a result of the traffic generated by the proposed development.

Figure 11-17: Increase in Vehicle Trips Generated Through Key Of-Site Junctions (2037 Future Design Year)

Network Analysis

The operational assessment of the local road network has been undertaken using the Transport Research Laboratory (TRL) computer package Junctions 9.0 (PICADY) for priority controlled junctions and TRANSYT for signal controlled junctions.

CÚIL DÚIN VIEW / CITYWEST AVENUE / FORTUNESTOWN LANE SIGNAL CONTROLLED JUNCTION

The results of the operational assessment of Cúil Dúin View / Citywest Avenue / Fortunestown Lane Signal Controlled Junction during the weekday morning and evening peaks are summarised in Tables 11-11 to 11-13 below. The arms were labelled as follows within the TRANSYT model:

Arm A: Fortunestown Lane (South-East)
Arm B: Fortunestown Lane (West)
Arm C: Cúil Dúin View (North)
Arm D: Citywest Avenue

2022 Opening Year

The 2022 Opening Year TRANSYT results indicate that the existing Cúil Dúin View / Citywest Avenue / Fortunestown Lane Signal Controlled Junction will operate well within capacity for both the "Do-Nothing" AM and PM peak hour scenarios with maximum Degree of Saturation (DoS) values of 65% and 50% accordingly predicted.

The introduction of the subject development traffic in the 2022 Opening Year results in zero increase in the maximum DOS value during the AM peak hour and a 2% increase predicted in the PM peak hour.

Peak Hour	Arm		Movement	Do-Nothing			Do-Something		
				DOS (%)	Mean Delay (s)	MMQ (PCU)	DOS (%)	Mean Delay (s)	MMQ (PCU)
AM	A	Fortunestown Lane (E)	L	33	20.10	4.83	33	20.10	4.83
			S,R	62	70.69	7.46	62	70.86	7.51
	B	Fortunestown Lane (W)	S,L	34	44.12	6.09	35	44.24	6.19
			R	40	50.51	6.96	40	50.51	6.96
	C	Cúil Dúin View	S,L	65	57.66	11.87	65	57.85	11.96
			R	28	47.11	4.66	28	47.11	4.66
	D	Citywest Ave	S, L	57	82.58	3.65	64	88.07	4.25
			R	34	70.36	2.16	37	71.22	2.34
PM	A	Fortunestown Lane (E)	L	45	18.26	7.08	45	18.81	7.19
			S,R	20	56.06	2.41	21	56.18	2.48
	B	Fortunestown Lane (W)	S,L	21	38.62	3.69	22	38.81	3.88
			R	40	46.75	7.66	41	47.72	7.73
	C	Cúil Dúin View	S,L	42	64.91	4.23	44	65.25	4.38
			R	27	60.87	2.69	27	60.87	2.69
	D	Citywest Ave	S, L	50	66.71	5.08	52	66.39	5.53
			R	24	57.87	2.44	24	57.93	2.48

Table 11-11: 2022 Opening Year Peak Hour TRANSYT Analysis

2027 Future Design Year

The 2027 Future Design Year TRANSYT results indicate that the existing Cúil Dúin View / Citywest Avenue / Fortunestown Lane Signal Controlled Junction will operate well within capacity for both the "Do-Nothing" AM and PM peak hour scenarios with maximum Degree of Saturation (DoS) values of 75% and 55% accordingly predicted.

The introduction of the subject development traffic in the 2027 Future Design Year results in an increase in the maximum DOS value of 1% during the AM peak hour and a 2% increase predicted in the PM peak hour.

Peak Hour	Arm		Movement	Do-Nothing			Do-Something		
				DOS (%)	Mean Delay (s)	MMQ (PCU)	DOS (%)	Mean Delay (s)	MMQ (PCU)
AM	A	Fortunestown Lane (E)	L	36	22.42	5.73	42	24.97	6.12
			S,R	69	75.02	8.6	70	75.51	8.71
	B	Fortunestown Lane (W)	S,L	43	50.48	6.98	47	53.1	7.44
			R	48	54.87	7.95	55	60.26	8.36
	C	Cúil Dúin View	S,L	75	59.63	15.64	76	60.43	16.06
			R	26	43.80	4.66	26	43.8	4.66
	D	Citywest Ave	S, L	65	91.84	4.04	66	83.32	5.32
			R	43	70.86	3.17	44	68.79	3.6
PM	A	Fortunestown Lane (E)	L	51	20.15	8.25	53	22.32	8.84
			S,R	25	56.08	3.11	27	56.41	3.33
	B	Fortunestown Lane (W)	S,L	31	51.66	4.3	31	47.92	4.92
			R	48	50.89	8.87	52	54.38	9.13
	C	Cúil Dúin View	S,L	51	64.81	5.94	54	65.95	6.38
			R	24	57.59	2.66	24	57.59	2.66
	D	Citywest Ave	S, L	55	69.82	5.46	57	66.38	6.66
			R	27	49.51	3.88	31	53.5	4.09

Table 11-12: 2027 Future Design Year Peak Hour TRANSYT Analysis

2037 Future Design Year

The 2037 Future Design Year TRANSYT results indicate that the existing Cúil Dúin View / Citywest Avenue / Fortunestown Lane Signal Controlled Junction will operate well within capacity for both the "Do-Nothing" AM and PM peak hour scenarios with maximum Degree of Saturation (DoS) values of 77% and 55% accordingly predicted.

The introduction of the subject development traffic in the 2037 Future Design Year results in an increase in the maximum DOS value of 1% during the AM peak hour and a 4% increase predicted in the PM peak hour.

Peak Hour	Arm		Movement	Do-Nothing			Do-Something		
				DOS (%)	Mean Delay (s)	MMQ (PCU)	DOS (%)	Mean Delay (s)	MMQ (PCU)
AM	A	Fortunestown Lane (E)	L	43	23.47	6.36	45	25.46	6.62
			S,R	74	78.61	9.41	74	79.25	9.53
	B	Fortunestown Lane (W)	S,L	45	51.21	7.53	48	52.76	7.87
			R	54	57.24	8.81	59	61.76	9.11
	C	Cúil Dúin View	S,L	77	61.44	16.54	78	62.22	16.82
			R	28	44.13	4.99	28	44.13	4.99
	D	Citywest Ave	S, L	63	87.45	4.19	68	85.27	5.56
			R	43	71.07	3.22	47	71.38	3.77
PM	A	Fortunestown Lane (E)	L	55	21.51	9.24	57	23.15	9.75
			S,R	26	57.24	3.21	28	57.58	3.44
	B	Fortunestown Lane (W)	S,L	30	50.01	4.44	31	46.33	5.04
			R	51	51.76	9.55	54	54.16	9.81
	C	Cúil Dúin View	S,L	52	65.17	6.11	55	66.35	6.51
			R	25	57.89	2.87	25	57.89	2.87
	D	Citywest Ave	S, L	55	68.77	5.7	59	67.3	6.98
			R	28	50.45	3.91	32	54.56	4.13

Table 11-13: 2037 Future Design Year Peak Hour TRANSYT Analysis

CITYWEST AVENUE / SITE ACCESS SIGNAL CONTROLLED JUNCTION

The results of the operational assessment of Citywest Avenue / Site access Signal Controlled Junction during the weekday morning and evening peaks are summarised in Tables 11-14 to 11-16 below. The arms were labelled as follows within the TRANSYT model:

Arm A: Citywest Avenue (East)
Arm B: Site Access (South)
Arm C: Citywest Avenue (West)
Arm D: Cúil Dúin Avenue (North)

2022 Opening Year

The 2022 Opening Year TRANSYT results indicate that the Citywest Avenue / Site Access Signal Controlled Junction will operate well within capacity for both the "Do-Nothing" AM and PM peak hour scenarios with maximum Degree of Saturation (DoS) values of 41% and 35% accordingly predicted.

The introduction of the subject development traffic in the 2022 Opening Year results in 4% increase in the maximum DOS value during the AM peak hour and a 2% increase predicted in the PM peak hour.

Peak Hour	Arm		Movement	Do-Nothing			Do-Something		
				DOS (%)	Mean Delay (s)	MMQ (PCU)	DOS (%)	Mean Delay (s)	MMQ (PCU)
AM	A	Citywest Ave (E)	S,L	26	20.31	2.83	30	22.99	3.21
			R	4	38.20	0.16	4	38.20	0.16
	B	Site Access	S,L,R	28	42.65	1.06	35	40.82	1.83
	C	Citywest Ave (W)	S, L	41	22.55	5.02	45	25.40	5.30
			R	2	37.98	0.00	4	38.20	0.16
	D	Cúil Dúin Ave	S,L,R	17	40.41	0.64	17	40.41	0.64
PM	A	Citywest Ave (E)	S,L	35	21.6	3.97	37	21.97	4.32
			R	6	38.44	0.25	6	38.44	0.25
	B	Site Access	S,L,R	13	39.5	0.46	28	42.65	1.06
	C	Citywest Ave (W)	S, L	19	19.37	2.02	19	19.39	2.04
			R	7	38.5	0.28	11	39.02	0.46
	D	Cúil Dúin Ave	S,L,R	8	38.77	0.28	8	38.77	0.28

Table 11-14: 2022 Opening Year Peak Hour TRANSYT Analysis

2027 Future Design Year

The 2027 Future Design Year TRANSYT results indicate that the Citywest Avenue / Site Access Signal Controlled Junction will operate well within capacity for both the "Do-Nothing" AM and PM peak hour scenarios with maximum Degree of Saturation (DoS) values of 53% and 43% accordingly predicted.

The introduction of the subject development traffic in the 2027 Future Design Year results in an increase in the maximum DOS value of 16% during the AM peak hour and a 9% increase predicted in the PM peak hour.

Peak Hour	Arm		Movement	Do-Nothing			Do-Something		
				DOS (%)	Mean Delay (s)	MMQ (PCU)	DOS (%)	Mean Delay (s)	MMQ (PCU)
AM	A	Citywest Ave (E)	S,L	31	21.00	3.45	39	24.29	4.30
			R	4	38.26	0.18	4	38.26	0.18
	B	Site Access	S,L,R	28	42.65	1.06	69	55.66	4.27
	C	Citywest Ave (W)	S, L	53	24.90	6.99	59	28.52	7.45
			R	2	37.98	0.00	7	38.57	0.30
	D	Cúil Dúin Ave	S,L,R	19	40.68	0.69	19	40.68	0.69
PM	A	Citywest Ave (E)	S,L	43	23.03	5.15	51	24.47	6.33
			R	6	38.44	0.25	6	38.44	0.25
	B	Site Access	S,L,R	13	39.5	0.46	52	51.31	2.19
	C	Citywest Ave (W)	S, L	25	20.17	2.79	25	20.2	2.82
			R	7	38.5	0.28	21	40.81	0.93
	D	Cúil Dúin Ave	S,L,R	8	38.86	0.3	8	38.86	0.3

Table 11-15: 2027 Future Design Year Peak Hour TRANSYT Analysis

2037 Future Design Year

The 2037 Future Design Year TRANSYT results indicate that the Citywest Avenue / Site Access Signal Controlled Junction will operate well within capacity for both the "Do-Nothing" AM and PM peak hour scenarios with maximum Degree of Saturation (DoS) values of 55% and 45% accordingly predicted.

The introduction of the subject development traffic in the 2037 Future Design Year results in an increase in the maximum DOS value of 14% during the AM peak hour and a 7% increase predicted in the PM peak hour.

Peak Hour	Arm		Movement	Do-Nothing			Do-Something		
				DOS (%)	Mean Delay (s)	MMQ (PCU)	DOS (%)	Mean Delay (s)	MMQ (PCU)
AM	A	Citywest Ave (E)	S,L	32	21.21	3.61	40	24.58	4.48
			R	4	38.26	0.18	4	38.26	0.18
	B	Site Access	S,L,R	28	42.65	1.06	69	55.66	4.27
	C	Citywest Ave (W)	S, L	55	25.34	7.25	61	29.11	7.84
			R	2	37.98	0.00	7	38.57	0.30
	D	Cúil Dúin Ave	S,L,R	20	40.94	0.74	20	40.94	0.74
PM	A	Citywest Ave (E)	S,L	45	23.28	5.39	52	24.78	6.53
			R	7	38.5	0.28	7	38.5	0.28
	B	Site Access	S,L,R	13	39.5	0.46	52	51.31	2.19
	C	Citywest Ave (W)	S, L	26	20.24	2.88	26	20.28	2.94
			R	7	38.5	0.28	21	40.81	0.93
	D	Cúil Dúin Ave	S,L,R	8	38.86	0.3	8	38.86	0.3

Table 11-16: 2037 Future Design Year Peak Hour TRANSYT Analysis

WESTERN PRIORITY CONTROLLED SITE ACCESS JUNCTION

The results of the operational assessment of Citywest Avenue / Site access Western Priority Controlled Junction during the weekday morning and evening peaks are summarised in Tables 11-17 to 11-19 below. The arms were labelled as follows within the PICADY model:

Arm A: Citywest Avenue (East)
Arm B: Western Site Access
Arm C: Citywest Avenue (West)

2022 Opening Year

The 2022 Opening Year PICADY results indicate that the Citywest Avenue / Site Access Western Priority Controlled Junction will operate well within capacity for both the "Do-Nothing" AM and PM peak hour scenarios with maximum Ratio of Flow to Capacity (RFC) values of 0.2 and 0.1 accordingly predicted.

The introduction of the subject development traffic in the 2022 Opening Year results in a zero increase in the maximum RFC value during the AM and PM peak hours.

Peak Hour	Arm	Do-Nothing			Do-Something		
		Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
AM	Western Site Access	0.2	9.69	0.14	0.2	9.69	0.16
	Citywest Ave (W)	0.0	5.4	0.01	0.0	5.45	0.01
PM	Western Site Access	0.1	8.81	0.06	0.1	8.73	0.07
	Citywest Ave (W)	0.0	5.61	0.02	0.0	5.67	0.03

Table 11-17: 2022 Opening Year Peak Hour PICADY Analysis

2027 Future Design Year

The 2027 Future Design Year PICADY results indicate that the Citywest Avenue / Site Access Western Priority Controlled Junction will operate well within capacity for both the "Do-Nothing" AM and PM peak hour scenarios with maximum RFC values of 0.2 and 0.1 accordingly predicted.

The introduction of the subject development traffic in the 2027 Future Design Year again results in a zero increase in the maximum RFC value during the AM and PM peak hours.

Peak Hour	Arm	Do-Nothing			Do-Something		
		Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
AM	Eastern Site Access	0.2	10.13	0.15	0.2	10.26	0.19
	Citywest Ave (W)	0.0	5.47	0.01	0.0	5.59	0.02
PM	Eastern Site Access	0.1	9.18	0.07	0.1	9.05	0.09
	Citywest Ave (W)	0.0	5.74	0.02	0.0	5.91	0.04

Table 11-18: 2027 Future Design Year Peak Hour PICADY Analysis

2037 Future Design Year

The 2037 Future Design Year PICADY results indicate that the Citywest Avenue / Site Access Western Priority Controlled Junction will operate well within capacity for both the "Do-Nothing" AM and PM peak hour scenarios with maximum RFC values of 0.2 and 0.1 accordingly predicted.

The introduction of the subject development traffic in the 2037 Future Design Year again results in a zero increase in the maximum RFC value during the AM and PM peak hours.

Peak Hour	Arm	Do-Nothing			Do-Something		
		Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
AM	Eastern Site Access	0.2	10.23	0.15	0.2	10.36	0.19
	Citywest Ave (W)	0.0	5.49	0.01	0.0	5.61	0.02
PM	Eastern Site Access	0.1	9.24	0.07	0.1	9.1	0.09
	Citywest Ave (W)	0.0	5.76	0.02	0.0	5.93	0.04

Table 11-19: 2037 Future Design Year Peak Hour PICADY Analysis

In summary, the introduction of the subject Cooldown Commons Phase 3 traffic is predicted to result in a an 'imperceptible' effect on the operational performance of both the site access junctions and the key off-site Citywest Avenue / Fortunestown Lane / signal controlled junction. The predicted 'imperceptible' effect on the local road network is characterised as 'direct' and 'negative'. Nevertheless, the duration of this scale of effect is predicted to be 'short-term' as once the mobility management plan objectives are implemented, it is predicted to result in fewer vehicle trips than those considered within the subject worst case assessment.

11.6 POTENTIAL CUMULATIVE IMPACTS

The analysis detailed above under Section 11.5 (Operational Stage) represents an appraisal in terms of potential cumulative impacts for a typical weekday as it is focused upon the key two busiest periods of the day (i.e. AM and PM peak hours). During the other 22 hours of the day, traffic flows are predicted to be significantly lower resulting in the network operating with additional reserve capacity to that forecast for the peak hour periods.

The committed development schemes as introduced below have been incorporated into the analysis in Section 11.5 ensuring the cumulative impact of potential additional vehicular movements as a result of the implementation of both the subject proposals and the committed development have been assessed.

The committed developments, as introduced below comprise different development land uses including;

- Site 1 – Residential Development (Planning Ref: SD15A/0095) – 224 no. dwellings
- Site 2 – Residential Development (Planning Ref: SD16A/0210) – 112 no. dwellings
- Site 3 – Residential Development (Planning Ref: SD15A/0127) – 400 no. dwellings
- Site 4 – Office Development (Planning Ref: SD16A/0420) – 4 storey office building of 13,250m2
- Site 5 – Residential Development (Planning Ref: SHD3ABP-302398) – 459 no. dwellings
- Site 6 – Residential Development (Planning Ref: ABP-300555-18) – 526 no. dwellings
- Site 7 – Residential Development (Planning Ref: SD18A/0014) – 78 no. dwellings
- Site 8 – Mixed Use Development (Planning Ref: ABP-30555619) – 290 no. apartment units and associated residential amenity facilities, a childcare facility, 4 retail units and 2 café/restaurant units
- Site 9 – Residential Development (Planning Ref: SHD3ABP-305563-19) – 488 no. dwellings.

Figure 11-18: Committed Development Locations

11.7 MITIGATION MEASURES

Construction Phase

The Construction 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.

In order to ensure satisfactory operation of the construction stage the following is proposed:

- Provision of sufficient on-site parking and compounding to ensure no potential overflow onto the local network.
- It is likely that some numbers of the construction team will be brought to/from the site in vans/minibuses, which will serve to reduce the trip generation potential.
- Site offices and compound will be located within the site boundary. The site will be able to accommodate employee and visitor parking throughout the construction period through the construction of temporary hardstanding areas.
- Finally, truck wheel washes will be installed at construction entrances and any specific recommendations with regard to construction traffic management made by the Local Authority will be adhered to.

Operational Phase

With the objective of mitigating the potential impact of the proposed development as predicted in Section 11.5 and 11.6 above during its operational stage, the following initiatives and associated timescale for their implementation have been identified and subsequently form an integral part of the subject development proposals.

- Management – A Mobility Management (MMP) is to be compiled with the aim of guiding the delivery and management 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.
- Car Share – The proposed apartment car parking provision, is lower than the development plans maximum standards. This reduction is due to developments' close proximity to the Fortunestown Luas Stop; the proposed high cycle parking provision and the DHPLG's guidelines for apartment developments which states; "*planning authorities must consider a reduced overall car parking standard and apply an appropriate maximum car parking standard*". Due to these factors, should the demand arise at a future time, 1 no. proposed duplex visitor space could be reassigned in order to accommodate a car share facility.
- Cycle parking provision – A total of 650 no. bicycle parking spaces are proposed as part of the development scheme comprising 330 no. long stay spaces at basement level, 200 no. long stay at surface level and 120 no. short stay spaces at surface level. The proposals is 502 spaces higher than the SDCC' development plan minimum requirement of 148 cycle parking spaces and represents a compromise between the development plan requirements and the DHPLG requirements (974 spaces). Accordingly, the generous provision of cycle parking will help promote cycling as a viable mode of travel to / from the subject development site.

11.8 PREDICTED IMPACTS

Construction Phase

Implementation of the measures outlined in Section 11.7 will ensure that the potential impacts of the proposed development on the local transport network are minimised during the construction phase and that any residual impacts will be short term.

Operational Phase

Implementation of the measures outlined in Section 11.7 will ensure that the potential impacts of the proposed development on the local transport network are minimised during the operational phase.

11.9 'DO NOTHING' SCENARIO

In the absence of the proposed development, the overall operational performance of the existing junctions on the surrounding road network will be affected by the impact caused by committed development and forecast background network traffic growth (should that growth arise).

11.10 WORST CASE SCENARIO

The analysis detailed above under Section 11.5 (Operational Stage) represents an appraisal in terms of potential worst case impacts for a typical weekday as it is focused upon the key two busiest periods of the day (i.e. AM and PM peak hours). During the other 22 hours of the day, traffic flows are predicted to be significantly lower resulting in the network operating with additional reserve capacity to that forecast for the peak hour periods.

The analysis assumes that all committed development schemes will be constructed, and the base traffic has been subject to TII growth factors. It is likely that not all committed developments will be constructed as a number have yet to commence. In addition, the TII growth factors applied to the base traffic flows on the surrounding road network incorporate potential traffic growth as a result future development. Accordingly, the predicted traffic on the surrounding road network as incorporated into the subject analysis is likely to be overestimated and therefore represents a worst case assessment.

11.11 MONITORING & REINSTATEMENT

Construction Stage

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;
- Timings of construction activities in terms of start / finish times; and
- Third Party monitoring should take place during construction around the LUAS line.

Operational Stage

As part of the MMP process, bi-annual post development travel surveys are recommended to be carried out by the appointed mobility manager in order to determine the success of the measures and initiatives as set out in the proposed MMP document. The surveys should be circulated among residents. The information obtained from the monitoring surveys will be used to identify ways in which the MMP measures and initiatives should be taken forward in order to maintain and further encourage sustainable travel characteristics.

Reinstatement is not applicable to this chapter.

11.12 DIFFICULTIES IN COMPILING INFORMATION

There were no material difficulties encountered in compiling and assessing the data for this EIAR chapter sufficient to prevent modelling of the likely transportation effects of the proposed development.

11.13 REFERENCES

TII (NRA) Traffic & Transportation Assessment Guidelines; (May 2014)
TII Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections (PE-PAG-02017); TII (May 2019)
'Traffic Management Guidelines' Dublin Transportation Office & Department of the Environment and Local Government (May 2003)
South Dublin County Development Plan 2016-2022
Fortunestown Local Area Plan 2012
Bus Eireann Website; www.buseireann.ie
Irish Rail Website; www.irishrail.ie
Luas Website; www.Luas.ie
Transport Infrastructure Ireland; www.tii.ie
Transport for Ireland; www.transportforireland.ie
Guidelines on the Information to be contained in Environmental Impact Assessment Reports Draft August 2017 Environmental Protection Agency

12 MATERIAL ASSETS

12.1 INTRODUCTION

This chapter of the EIAR assesses and evaluates the likely impact of the proposed development on existing surface water and foul drainage, and utility services in the vicinity of the site, as well as identifying proposed mitigation measures to minimize any impacts.

The material assets considered in this chapter include Surface Water Drainage, Foul Drainage, Water Supply, Power, Gas and Telecommunications. A separate chapter on transportation has also been prepared.

This chapter was prepared by DBFL Consulting Engineers - Deirdre Walsh BA BAI MSc, CEng, MIEI.

12.2 METHODOLOGY

The methodology followed for this section is in accordance with current EPA Guidelines and Advice Notes (and takes into consideration the draft reports issued in 2017 and 2015 respectively). Information on built assets in the vicinity of the development lands was assembled from the following sources:

- A desktop review of Irish Water Utility Plans, ESB Networks Utility Plans, Gas Networks Ireland Service Plans, Enet-Maps and Virgin Media Maps;
- Consultation with Irish Water and South Dublin County Council;
- Submission of a Pre-Connection Enquiry Application to Irish Water;
- Review of ESB Network Utility Plans;
- Review of Enet Maps;
- Review of Virgin Media Record drawings;
- Site Inspection / Walkover;

As part of assessing the likely impact of the proposed development, surface water runoff, foul drainage discharge and water usage calculations were carried out in accordance with the following guidelines:

- Greater Dublin Strategic Drainage Study (GDSDS);
- IS EN752, “Drain and Sewer Systems Outside Buildings”;
- Irish Water’s Pre-Connection Enquiry Application (water demand and foul water loading);

12.3 RECEIVING ENVIRONMENT

Surface Water Drainage

There are existing surface water sewers to the west and north of the site within the phase 1 and phase 2 development currently under construction under ABP-302398-18. These surface sewers run in a northerly direction (in series) and outfall to an existing open drain which forms the north western boundary of the existing phase 1 development. This drainage system approved and under construction under ABP-302398-18 includes provision for unattenuated runoff from a portion of the subject site, which is then attenuated and stored in the surface water drainage system for Phase 2 and Phase 1. This portion of the subject site is referred to as Surface Water Catchment “A” and comprises a circa 0.24ha area of the subject site which is common to both this application and the previously approved planning application for the phase 2 development.

The Baldonnell Upper Stream forms the north-eastern boundary of the subject site and provides a suitable discharge point for attenuated surface water runoff from the balance of the subject site (referred to as Surface Water Catchment “B”. This open channel continues in a northerly direction before discharging to the Camac River, which in turn discharges to the River Liffey.

Foul Water Drainage

There is an existing 225mm diameter foul sewer at the north east corner of the subject site. This sewer continues in a north easterly direction and connects to a 300mm diameter foul sewer on Citywest Avenue.

There is existing 225mm diameter foul sewer at the north west corner of the subject site which forms part of the foul sewerage system for the phase 2 development. This sewer continues in a northerly direction and connects to the foul sewerage system on Citywest Avenue.

There is also an existing 225mm diameter foul sewer at the south west corner of the subject site which forms part of the foul sewerage system for the phase 2 development. This sewer continues in a northerly direction through the phase 2 development and eventually connects to the existing foul sewerage system on Citywest Avenue.

Water Supply

A copy of the Irish Water record drawing showing existing watermains in the vicinity of the site is included in Figure 12-1.

There is a 200mm diameter watermain on Citywest Avenue. This 200mm diameter main continues in a southerly direction through the Phase 2 development (along the Green Link) and will form the connection point for the phase 3 development (subject site). There is also a 200mm watermain at the south west corner of the site within phase 2 which will form the second connection point for the watermain for the subject site.

Power

Existing ESB services in the vicinity of the site are included in the ESB record map included in Figure 12-2.

There are MV/LV underground ESB lines located to the north west of the subject site. There are also underground ESB MV/LV lines to the south and east to the site.

Gas

Existing Gas Networks services in the vicinity of the site are included in the GAS Networks Ireland map included in Figure 12-3.

There is an existing high-pressure transmission gas main located to the north of the site. The gas pipeline located along Citywest Road to the East of the subject site contains 180mm Aurora Telecoms inserted gas pipe.

There is no gas infrastructure traversing the site.

Telecommunications

Enet services in the vicinity of the site are included in Figure 12-4. There is an Enet duct located east of the site in Citywest Road.

Virgin Media services in the vicinity of the site are included in Figure 12-5. Virgin Media infrastructure is located to the south and east of the site, in Citywest Road and Fortunestown Lane.

Figure 12-1 Surface Water, Foul Water and Water Supply records (Courtesy of Irish Water)

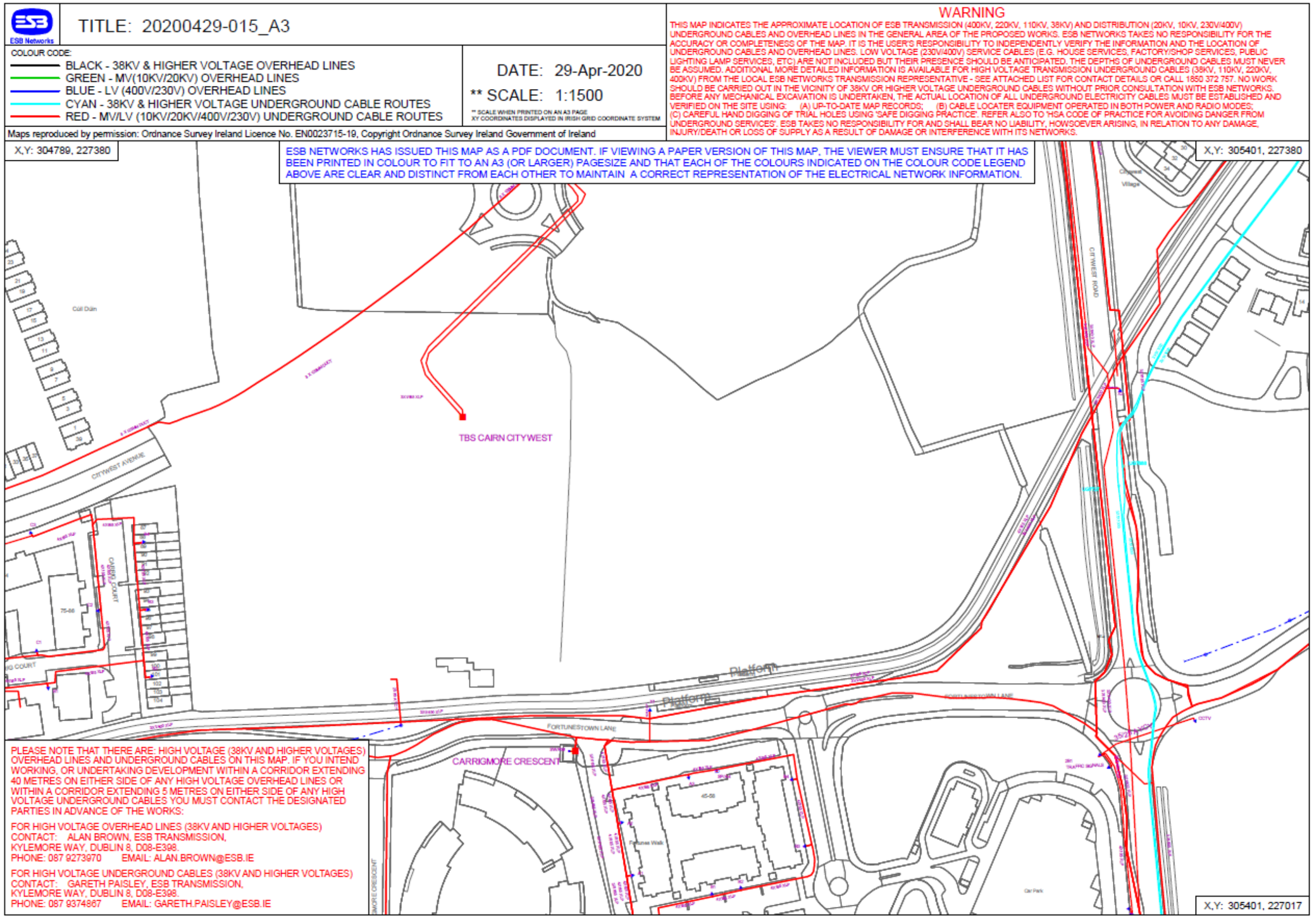

Figure 12-2 Power Supply Network records (Courtesy of ESB)

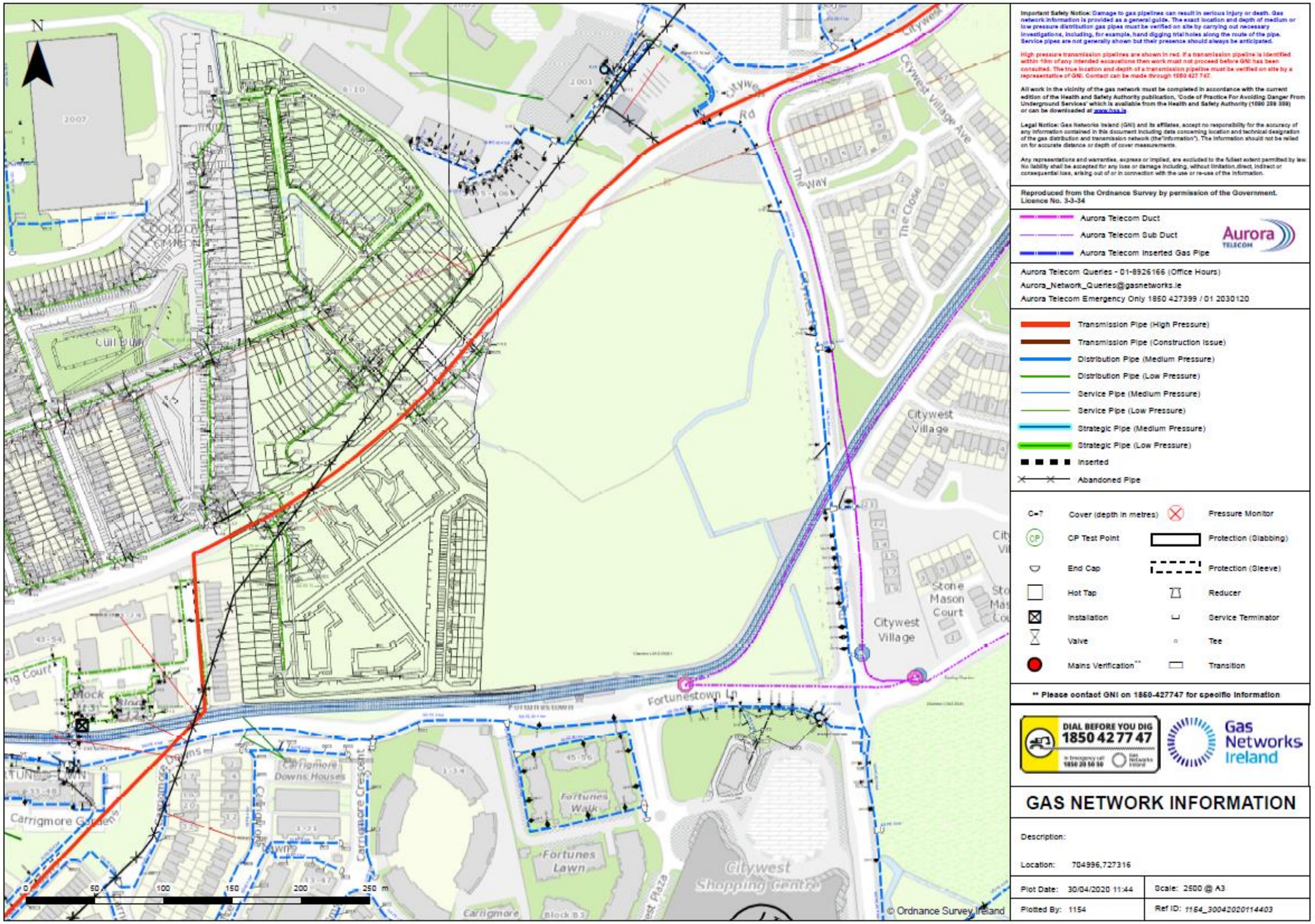

Figure 12-3 Gas Networks records (Courtesy of Gas Networks Ireland and Aurora)

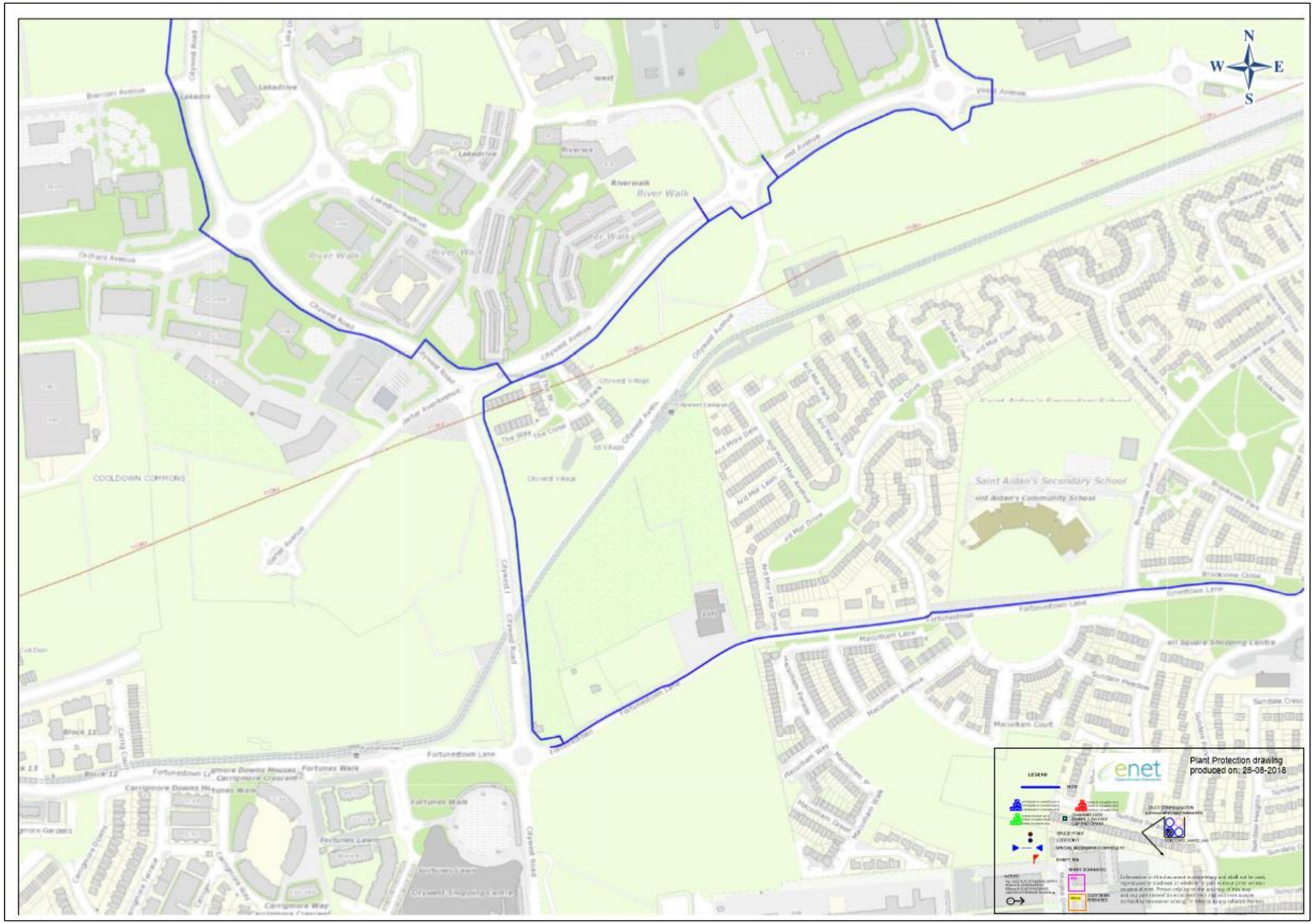

Figure 12-4 Telecommunication Services records (Courtesy of Enet)

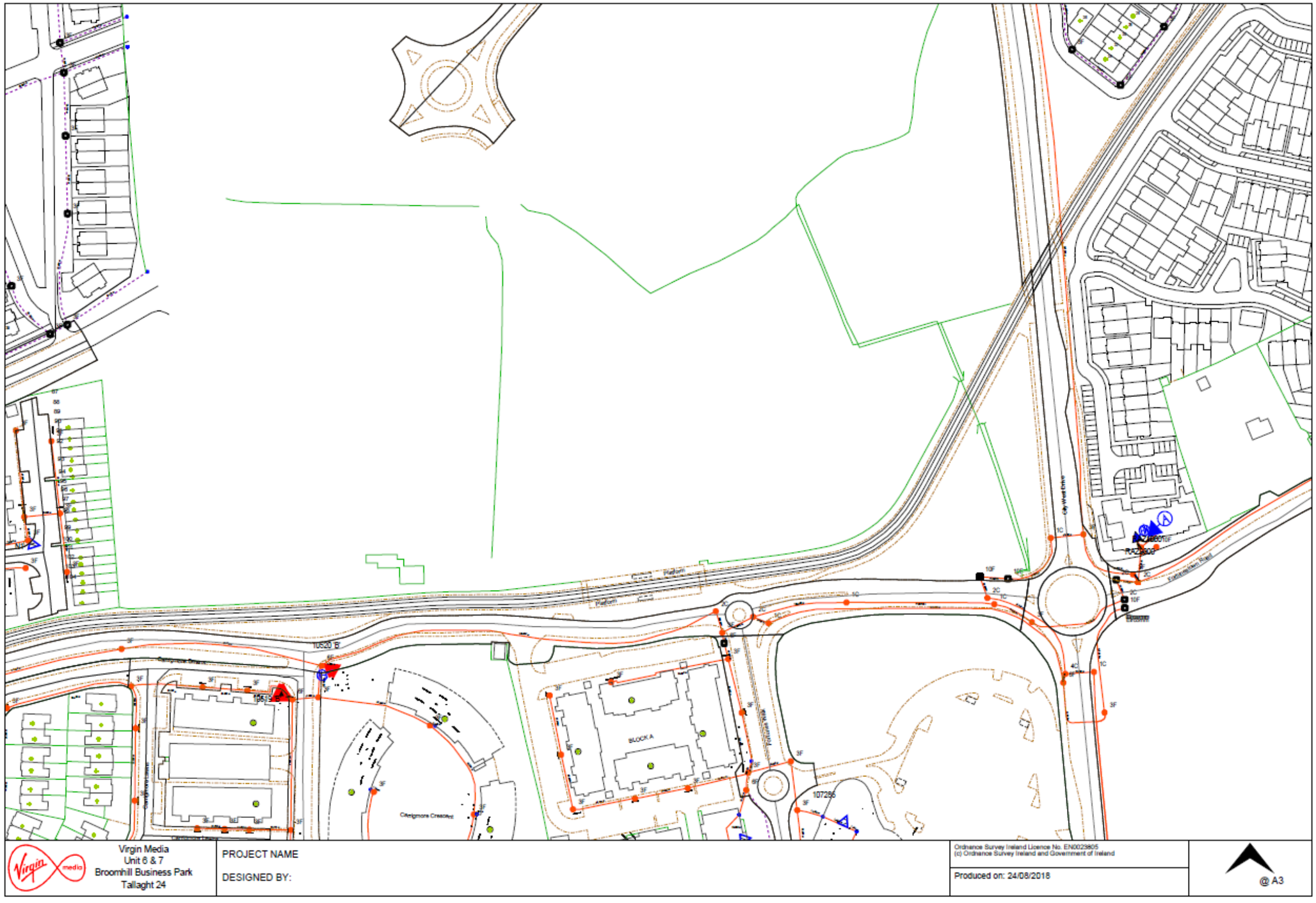

Figure 12-5 Telecommunication Services records (Courtesy of Virgin Media

12.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

Refer to Chapter 3 (Description of Development) for a detailed site and development description.

In terms of determining the impact of the development of the lands on built assets, a quantum of circa 421 no. residential units and other limited non-residential uses are assumed for the site.

Surface Water Drainage

The development will include the construction of a surface water sewer network throughout the lands, which will collect surface water runoff from all hard-standing areas. The surface water management strategy for the proposed development is outlined in Chapter 7: Hydrology.

Foul Water Drainage

It will be necessary to provide a suitably designed foul sewer network for the development lands. Foul flows from site be collected through a network of 225mm diameter pipes and flow under gravity to three connection points.

There are two connection points comprising existing 225mm diameter foul sewers approved and under construction under ABP-302398-18 (Phase 2) and the third connection point is the existing 225mm diameter in the north east corner of the site which continues to the 300mm diameter foul sewer in Citywest Avenue.

The foul sewer network has been designed to cater for 6 times average dry weather flow (6 x DWF) and the projected peak effluent discharge will be in the order of 13.13l/s for the subject site.

A daily foul discharge volume from site of 188.97m³ has been estimated with a total BOD loading of 31.83kg/day.

The foul drainage network for the proposed development has been designed in accordance with the Building Regulations and specifically in accordance with the principles and methods as set out in the Irish Water Connection and Developer Services Code of Practice and Standard Details, IS EN752 (2008), IS EN12056: Part 2 (2000), the recommendations of the 'Greater Dublin Strategic Drainage Study (GDSDS)' and the DOE "Recommendations for Site Development Works for Housing Areas".

Water Supply

Water supply for the application site will be from the 200mm diameter watermain approved and under construction under ABP- 302398-18 (Phase 2). A 200mm watermain will be provided along the main street with 150mm / 100mm diameter branch loops offset as required.

The watermain layout and connections, valves, hydrants, meters etc. are designed in accordance with Irish Water's Connection and Developer Services Code of Practice / Standard Details and the Department of the Environment's Building Regulations "Technical Guidance Document Part B Fire Safety".

An additional average daily domestic water supply requirement for the site, is estimated at approximately 171.72m³. Similarly, peak week flow requirement for the site is estimated at 12.42l/s. This is based on an average occupancy rate of 2.7 PE (population equivalent) per residential unit and a water usage rate of 150l/person/day.

The new site watermain network will also adequately serve the firefighting requirements of the development.

Power

Power supply, and the requirement for any alterations to the existing power supply network for the development of the subject site, will be agreed with ESB Networks in advance of construction. All power supply related works will be carried out in accordance with ESB Networks relevant guidelines. An Electrical Diversified Load of 2488 kVA is required which will be split over a minimum of 3 site sub stations.

Gas

Gas supply, and the requirement for any alterations to the existing gas supply network for the development of the subject site, will be agreed in advance of construction with Gas Networks Ireland. All gas supply related works will be carried out in accordance with Gas Networks Ireland relevant guidelines. A Gas diversified load of 1200kW is required to accommodate the site.

Telecommunications

Telecommunications supply, and the requirement for any alterations to the existing telecommunications network for the proposed development, will be agreed in advance of construction with the relevant telecommunications providers. All telecommunications related works will be carried out in accordance with relevant guidelines.

12.5 POTENTIAL IMPACTS

Construction Phase

Potential impacts of the proposed development during the construction phase include:

Surface Water:

- The installation of the surface water sewers for the development will be conducted in parallel with the other services. This will mainly involve construction of pipes and manholes using trench excavation.
- Damage to existing underground and over ground infrastructure resulting in possible contamination of the existing systems (including watercourses) with construction related materials. This likely adverse impact would be temporary, regionally short term and moderate.

Foul Water:

- The installation of the foul sewers will be conducted in parallel with other services. This will mainly involve construction of pipes and manholes using trench excavation. The potential adverse impact on the local foul sewerage network during the construction phase would therefore be short term and minimal.
- The site compound will require a foul connection. This likely adverse impact will be temporary and negligible.
- Improper discharge of foul drainage from contractor's compound. This could contaminate groundwater and streams. The likely adverse impact on the streams would be temporary, regionally short term and moderate.

Watermain:

- Provision of a new water main distribution network would involve construction activities within the subject lands mainly involving trench excavations conducted in parallel with the other services. The potential adverse impact on the local public water supply network would be short term and imperceptible.
- There is a risk of contamination of the public water supply during the construction and the connection of the watermain network for the scheme to the public supply.
- The site compound will require a water connection. This likely adverse impact will be temporary and negligible.

Power, Gas & Telecommunications:

- The installation of the utilities will be conducted in parallel with the other services. This will mainly involve construction of ducting and chambers using trench excavation. The potential adverse impact on the local network would be short term and imperceptible.
- Relocation or diversions to existing overhead ESB lines may lead to loss of connectivity to and / or interruption of supply from the electrical grid. Potential loss of connection to the Gas Networks Ireland and Telecommunications infrastructure while carrying out works to provide service connections. This likely adverse impact may be characterised as a temporary, regionally short term, moderate impact.
- The site compound will require a power and telecommunications connection. This likely adverse impact will be temporary and negligible.

Operational Phase

Potential operational phase impacts on the water infrastructure are noted below:

Surface Water:

- Adequate capacity exists in the existing surface water drainage network within Phase 2 to accommodate surface water runoff from Surface Water Catchment "A". The existing surface water storage system within phase 2 is designed to store surface water runoff for a 1% AEP (Annual Exceedance Probability) from surface water catchment "A". Surface water runoff from Surface Water Catchment "B", will be attenuated to greenfield runoff (Qbar), and will discharge to the Baldonnell Upper Stream along the north eastern boundary of the subject site. Any adverse impact will be permanent and slight.
- Increased impermeable areas will reduce local ground water recharge and potentially increase surface water runoff (if not attenuated to greenfield runoff rate –refer to Chapter 7.0 Hydrology). Any unlikely adverse impact will be permanent and slight.
- Accidental hydrocarbon leaks and subsequent discharge into piped surface water drainage network (e.g. along roads and in driveway areas).

Foul Water:

- The impact of the proposed development on the public foul sewerage system will be to increase the quantity of wastewater discharging to Ringsend Wastewater Treatment Works for treatment and disposal. The estimated loading from completion and occupancy of the proposed development site would be circa 194m^3/day.
- The development will add to the environmental and financial costs associated with treatment and disposal before final discharge at the WWTP.
- There also exists a minor risk associated with the possibility of leakage from damaged foul sewers and drains within the development site. Any foul water leakage could result in minor contamination of groundwater in the area.
- The potential impact from the operational phase of the development is therefore likely to be long term and minimal.

Watermains:

- The impact of the operational phase of the proposed development on the public water supply is likely to be to increase the demand on the existing supply by circa 176m^3/day for the site. As such additional water quantities would need to be treated and supplied through the existing network to the site. This will require an extra cost as well as increasing abstraction volumes from the existing source. The potential adverse impact of the proposed development on the public water supply network is likely to be long term and minimal.

Power, Gas & Telecommunications:

- The impact of the operational phase of the proposed development on the power supply network would be the requirement for an Electrical Diversified Load of 2488kVA which will be split over a minimum of 3 site sub stations.
- The impact of the operational phase of the proposed development on the gas supply would be the requirement for a Gas diversified load of 1200 kW to accommodate the development of the lands.
- The impact of the operational phase of the proposed development on the telecommunications network would be to increase the demand on the existing network.

12.6 POTENTIAL CUMULATIVE IMPACTS

There will be no cumulative impacts arising from the construction phase. The impact of the development on local utilities has been discussed with utility providers. The overall cumulative operational impact will be an increase on the demand of the Gas / Power / Comms in the area, which would be slight, adverse and permanent. The cumulative impact on the existing foul and water supply infrastructure has been assessment by Irish Water in their Confirmation of Feasibility.

12.7 MITIGATION MEASURES

Construction Phase

Mitigation measures proposed in relation to the drainage and water infrastructure include the following:

- A detailed "Construction Management Plan" will be prepared by the Contractor and implemented during the construction phase. Site inductions will include reference to the procedures and best practice as outlined in the "Construction Management Plan".
- 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.
- In the event of groundwater being encountered during the construction phase, mitigation measures will include dewatering by pumping to an appropriate treatment facility prior to discharge. Other measures would include excluding contaminating materials such as fuels and hydrocarbons from sensitive parts of the site i.e. highly vulnerable groundwater areas.
- In order to reduce the risk of defective or leaking sewers, all new sewers should be laid in accordance with the relevant standards, pressure tested, and CCTV surveyed to ascertain any possible defects.
- 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 removed 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.
- Where possible backup network supply to any services will be provided should the need for relocation or diversion or existing services be required otherwise relocation or diversion works will be planned to incur minimal impact, with users notified in advance of any works.
- Connections to the existing gas and telecommunications networks will be coordinated with the relevant utility provider and carried out by approved contractors.

Operational Phase

Please refer to Chapter 7 Hydrology for mitigation measures associated with the surface water treatment.

- All new drainage lines (foul and surface water) will be pressure tested and will be subject to a CCTV survey to identify any possible defects prior to being made operational.
- Chapter 7 includes the mitigation measures associated with the surface water system for the development.

- It is envisaged that the development would take place and be occupied over a reasonable time period, and therefore the downstream foul sewerage system (foul sewer network and wastewater treatment facility) would be gradually loaded.
- Water conservation methods such as the use of low flush toilets and low flow taps should be incorporated into dwellings to reduce water volumes and related treatment and abstraction costs of the development.
- Similarly, water conservation methods would reduce the loading on the foul sewer network and the treatment works at Ringsend.
- On completion of the construction phase no further mitigation measures are proposed in relation to the electrical, gas and telecommunications infrastructure.

12.8 PREDICTED IMPACTS

Construction Phase

Implementation of the mitigation measures will ensure that the potential impacts of the proposed development on the site's material assets do not occur during the construction phase and that any predicted impacts will be short term.

Operational Phase

Whilst the demand on water services, power, telecommunications and transport infrastructure will all increase due to the development, on the basis that the specified mitigation measures are incorporated then the operation of the proposed development is predicted to have a neutral-long term impact on material assets.

12.9 'DO NOTHING' SCENARIO

There are no predicted impacts on these material assets should the proposed development not proceed.

12.10 WORST CASE SCENARIO

Worst case scenarios for individual material assets are outlined in individual chapters of the EIAR. In relation to power and telecommunications a worst-case scenario would be where the works involved during construction resulted in an extended outage for existing properties in the area due to unforeseen delays on site.

12.11 MONITORING & REINSTATEMENT

Construction Phase

Please refer to Chapter 7.0 Hydrology for the proposed monitoring in relation to the surface water. There is no specific monitoring is proposed in relation to the remaining material assets infrastructure.

Operational Phase

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

- All drainage works will be approved by SDCC, Sanitary Services Division, and will be carried out in accordance with the GDRCOP (Greater Dublin Regional Code of Practice for Drainage Works).
- The surface water and foul drainage systems will be monitored by way of observation of any flooding events if such occur and the establishment of a proper maintenance programme for all sewers / Suds features etc.
- Regular cleaning of pipe networks within the development taken in charge will ensure no blockage will obstruct any flow from surface and foul networks.
- On-going water usage within the proposed development will be monitored by bulk water meters. Water usage will be monitored by the relevant authority to avoid waste and leaks etc.
- All drainage works will be approved by SDCC and will be carried out in accordance with the GDRCOP (Greater Dublin Regional Code of Practice for Drainage Works).
- All foul and surface water sewers will be CCTV surveyed prior to being 'taken in charge' by South Dublin County Council.

12.12 DIFFICULTIES IN COMPILING INFORMATION

No difficulties in compiling information occurred.

12.13 REFERENCES

- Water.ie, 2016, Irish Water Code of Practice for Water Infrastructure, Available at https://www.water.ie/connections/Code-of-Practice-for-Water-Supply.pdf, Accessed 30th April 2020.
- Building Regulations, 2006, Technical Guidance Document B Fire Safety, Available at http://www.housing.gov.ie/sites/default/files/migrated-files/en/Publications/DevelopmentandHousing/BuildingStandards/FileDownLoad%2C1640%2Cen.pdf, Accessed 30th April 2020.

13 WASTE MANAGEMENT

13.1 INTRODUCTION

This chapter of the EIAR was prepared by Ian Byrne MSc, MIOA, Dip Environmental & Planning Law and presents the Material Assets - Waste Management Assessment for the control and management and monitoring of waste associated with a proposed residential development at Cooldown Commons, Fortunestown Lane, Citywest, Dublin 24 during both the Construction and Operational Phases of the development.

The proposed development will consist of the construction of 421 no. residential units within 9 no. blocks ranging in height from 1 – 13 storeys, offices, retail/commercial units, and public open space along with all associated site development works and services provisions to facilitate the development including parking, bin storage, substations, landscaping and all services. A full description of the development is provided in Chapter 3 of the EIAR.

Waste Management Plans have been developed to be implemented throughout the construction phase and operational 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 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 Waste Management Plan for the development which will ensure that users of the development are provided with sufficient facilities to store, segregate at source and recycle waste.

13.2 METHODOLOGY

A Construction and Demolition Waste and By-Product Management Plan has been prepared to demonstrate how the management of Construction Phase waste 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.

The proposed Operational Waste Management Plan has been prepared to demonstrate how the Operational Phase will comply with the following relevant guidance and South Dublin County Council's Waste Management Policies and Objectives.

- 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.
- South Dublin County Council Development Plan 2016 - 2022

Each section of the Waste Management Plan presents the potential environmental impacts, proposed monitoring methodologies, limit values where applicable, based on the concept of Best Practice and the proposed mitigation measures to be implemented at the development site. Reference to National and International Standards are also included where relevant.

The projection of material assets of human origin was conducted and resource use and management of wastes generated were assessed for both the constructional and operational phases of the proposed development and their associated impacts assessed. Mitigation and best practice waste management are proposed where appropriate.

13.3 RECEIVING ENVIRONMENT

The construction and operational phases of the proposed residential development will introduce new aspects of waste to 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.

The South Dublin County 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.

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.

There are a number of regional licenced and permitted facilities that accept and process construction waste materials including Integrated Materials Solutions, Hollywood, Dublin and Panda, Ballymount, Dublin.

The Citywest area is currently served by a number of domestic and commercial waste collection operators who have transfer stations located in the south Dublin area within 10km of the subject development site. Options for the disposal of domestic waste include the Poolbeg, Dublin and Duleek, Co. Meath incinerators.

There is sufficient waste collection, recycling and re-use and disposal infrastructure in the Dublin Region that can serve the waste requirements of the construction and operational phases of the subject development.

13.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development will consist of the construction of 421 no. residential units within 9 no. blocks ranging in height from 1 – 13 storeys, retail/commercial/office units, and public open space along with all associated site development works and services provisions to facilitate the development including parking, bin storage, substations, landscaping and all services. The development is described in more detail in Chapter 3 of this EIAR.

13.5 POTENTIAL IMPACTS

Construction Phase

The development of the subject site will initially require the stripping of top and subsoils and the excavation of ground to basement level. The range of works required for the Construction Phases are summarised in Table 13.1. The expected construction wastes that will be generated throughout the course of the development are described in Table 13.2.

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.

Description of Proposed Development Site Activities

The range of development works to which this Waste Management Plan will be integrated into during the design phase, construction phase and operation phase of the site are summarised as follows:

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 Vegetation	e.g. Trees and vegetation
Bulk Excavation	Removal of excess soils off-site
Transport of material off site	Segregation of materials on site
Basement excavation	Piling, soil excavation
Substructure	Rebar, Formwork and Pour, Foundations
Superstructure	Rebar, Formwork and Pour, Blockwork
External Envelope	Place façade to superstructure
Internal Finishes	Mechanical & Electrical etc.
External Landscaping	Hard and soft landscaping

Table 13.1 Sequence of Construction Works

➢ Description of Waste	%
Mixed Construction & Demolition Waste	33
Wood	28
Plasterboard (Gypsum materials)	10
Ferrous Metals	8
Concrete	6
Mixed other wastes	15
Total	*100*

Table 13.2 Typical Construction Waste Composition

Waste Type	Predicted tonnage to be produced	Re-Use		Recyclable		Disposal	
		Tonnage	%	Tonnage	%	Tonnage	%
Mixed C&D	1250	125	10	1000	80	125	10
Timber	1000	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	4000	907.5		2685		407.5	
Top Soil	5793	5793	100	-	-	0	0
Sub Soils	42,533	25,477	60	-	-	17,056	40

Table 13.3 Predicted Waste Generation

➢ Description of Waste	Corresponding LoW Code
Concrete, Bricks, Tiles and Ceramics	17 01
Concrete	17 01 01
Bricks	17 01 02
Tiles and Ceramics	17 01 03
Mixture of concrete, bricks tiles & ceramics	17 01 07
Wood, Glass and Plastic	17 02
Wood	17 02 01
Glass	17 02 02
Plastic	17 02 03
Bituminous mixtures, coal tar and products	17 03
Bituminous mixtures containing other than those mentioned 17 03 01	17 03 02
Bituminous Mixtures including Coal Tar and Tarred products	17.03 02
Metals (including their alloys)	17 04
Copper, Bronze, Brass	17 04 01
Aluminium	17 04 02
Lead	17 04 03
Zinc	17 04 04
Iron and Steel	17 04 05
Tin	17 04 06
Mixed Metals	17 04 07
Insulation and Construction Materials	17 06 04
Gypsum based construction material	17 08 02
Mixed Construction and Demolition Waste other than thc mentioned in 17 09 01, 17 09 02, 17 09 03	17 09 04
Sewage Screenings	19 08 01
Paper and Cardboard	20 01 01
Wood other than that mentioned in 20 01 37	20.01 38
Soil and Stones	17 05 04
Mixed Municipal Waste	20 03 01
Hydraulic oils	13 01 01*
Fuel oils and diesel	13 07 01*

Table 13.4 Typical Construction Waste Types

Waste Soil

It is estimated that c. 35,232m^3 of soils will be excavated to facilitate the development of this c. 18,197m^3 shall be re- used as fill.

Soils at the site have been previously tested to determine their classification as hazardous or non-hazardous in accordance with EPA Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous. The results of the soil testing indicate that the soils are inert.

Inert and Non-Hazardous soils may be suitable for re-use in other construction sites and may be declared as a by-product in accordance with Article 27 of the European Communities (Waste Directive) Regulations 2011.

Where feasible non-hazardous excavation material may be re-used within the proposed scheme as engineering fill or in landscaping. This will be investigated by the contractor and is subject to appropriate testing to ensure material is suitable for its proposed end use. Where excavation material may not be re-used within the proposed scheme the Contractor will endeavour to send material for authorised recovery or recycling so far as is reasonably practicable. All wastes generated from the proposed development will be delivered to authorised waste facilities granted a Waste Licence, Waste Facility Permit or Certificate of Registration.

Operational Phase

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 residential development will be c. 1289Kg/day, 9023Kg/week or 53m3/week.as detailed below in Tables 13.5 and 13.6.

House / Unit Type	# Units	Occupants	Waste/Day	Waste/week
	No.	No.	Kg	Kg
Residential Units	421	1494	1289	9023
Office	1	75	70	490
Retail	3	na	412	2883
Total for development	na	na	1771	12,396

Table 13.5 Calculated daily domestic waste generation.

Waste Type	% Waste	Kg/week	Kg/day
Organic waste	30.6	2762	395
Paper	12.5	1128	161
Cardboard	3.6	325	46
Composites	1	90	13
Textiles	15.5	1399	200
Plastics	13.6	1227	175
Glass	3.4	307	44
Metals	3.1	280	40
Wood	1.2	108	15
Hazardous municipal waste	0.9	81	12
Unclassified combustables	1.4	126	18
Unclassified incombustables	1.2	108	15
Fines	11.7	1056	151
Bulky Waste & WEEE	0.3	27	4
Totals	***100***	***9025***	***1289***

Table 13.6 Calculated domestic waste composition Residential Development.

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 South Dublin 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.

13.6 POTENTIAL CUMULATIVE IMPACTS

With regard to other existing, under construction and proposed residential developments in the general Citywest area, together with the proposed development, there will be a greater demand on existing local waste management services and on waste acceptance facilities. It is necessary that the subject development in addition to others are operated in a sustainable manner that reduces the generation and disposal of un-segregated domestic mixed waste and that provide the infrastructure and management services to assist residents to segregate domestic waste at source.

13.7 MITIGATION MEASURES

The Construction and Operational Waste Management Plans 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 general principles and key aspects of the Construction and Operational Waste Management Plans are detailed as follows:

Construction Phase

The Construction & Demolition Waste and By-Product Management Plan specifically addresses the following points:

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
- 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

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.

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 Construction 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 licenced 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 Project Construction 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 Project Construction 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.

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

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.

Soils
The subject development site is currently greenfield and undeveloped with no evidence of historic dumping or industrial use.

Top and subsoils shall be re-used on-site for landscaping purposes to minimise the volume of soils to be exported off-site

Excess soils shall be exported to an appropriately waste permitted/licenced facility.

Excavated excess soils that are required to be exported off-site may be suitable for re-use in other construction sites and may be declared as a by-product in accordance with Article 27 of the European Communities (Waste Directive) Regulations 2011. Article 27 requires that the material classified not a waste but a by-product must meet specific criteria and that that a declaration of a material as a by-product is notified to the EPA.

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 and exported off-site to an appropriately licenced facility for treatment/disposal.

Operational Phase

An Operational Waste Management Plan (OWMP) has been prepared as a stand-alone report to accompany this planning 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.

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.

Key Aspects of the OWMP to achieve Waste Targets:

- 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.
- 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.

The Operational 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. 2018.*

The proposed residential development at Cooldown Commons Phase 3 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 Operational Waste Management Plan 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 apartments, duplex units and houses 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.

House residents shall engage private waste collection contractors who provide a 3-bin waste collection service.

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 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.

13.8 PREDICTED IMPACTS

Construction Phase

The management of wastes generated during the construction of the proposed development will be in accordance with a Construction & Demolition Waste and By-Product Management Plan (which is included with the SHD application). As long as the construction phase is completed in accordance with the plan it is envisaged that the impact of the construction (excavation and construction waste) phase will be temporary and slight.

Operational Phase

With regard to how it has been demonstrated how domestic 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 development on the receiving environment, existing material assets and local waste management services will be minor with the implementation of the proposed mitigation measures

There is likely to be significant available capacity within existing Irish waste management infrastructure to manage operational phase wastes from the proposed development.

The development shall be designed to provide adequate domestic waste storage areas for common residential areas apartments and duplex units. This will promote the appropriate segregation at source of domestic generated waste from all residential units at the development.

13.9 'DO NOTHING' SCENARIO

Should the lands not be developed, there will be no predicted impact on the receiving environment or on existing regional waste management infrastructure. However, a vacant site can lend itself to fly-tipping which would have a potentially negative impact on the local area.

13.10 WORST CASE SCENARIO

There is no worst-case scenario associated with waste management at the subject development site.

13.11 MONITORING & REINSTATEMENT

Construction Phase

Record Keeping

It will be the responsibility of the Project Construction Manager or his/her delegate that a written record of all quantities and natures of all wastes reused / recycled and exported off-site and Article 27 declarations during the project are maintained in a Waste File at the 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.

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 Phase Waste Management Plan.

Operational Phase

The Facility Management Company shall record and monitor wastes generated during the operational phase of the development and shall prepare an annual report for South Dublin County Council 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.

13.12 DIFFICULTIES IN COMPILING INFORMATION

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

13.13 REFERENCES

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.
South Dublin County Council Development Plan 2016 - 2022
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.
South Dublin County Development Plan 2016 – 2022

14 CULTURAL HERITAGE

14.1 INTRODUCTION

IAC Archaeology Ltd. has prepared this report on behalf of Cairn Homes to assess the impact, if any, on the archaeological, architectural, and cultural heritage resource of a proposed residential development at Cooldown Commons, Citywest, Dublin 24 (Figures 14.1). The assessment was carried out Jacqui Anderson of IAC Archaeology Ltd.

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 proposed development, 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 2014a). This leads to the following:

- Determining the presence of known archaeological, architectural and cultural heritage sites that may be affected by the proposed development;
- Assessment of the likelihood of finding previously unrecorded archaeological remains during the Construction Phase;
- Determining the impact upon the setting of known cultural heritage sites in the surrounding area; and
- Suggested mitigation measures based upon the results of the above research.

The study involved detailed interrogation of the archaeological, architectural and historical background of the proposed development area and its surrounding landscape. This included information from the Record of Monuments and Places of County Dublin, the County Development Plan, the topographical files of the National Museum of Ireland and cartographic and documentary records. A study area of 500m surrounding the proposed development area was used for the purposes of assessment. Inspection of the aerial photographic coverage held by the Ordnance Survey, Bing Maps and Google Earth has also been carried out. A field inspection has been carried out in an attempt to identify any known archaeological and cultural heritage sites and previously unrecorded features, structures and portable finds within the site.

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.

14.2 METHODOLOGY

The following legislation, standards and guidelines were consulted as part of this assessment.

- European Communities (EC) (Environmental Impact Assessment) (Amendment) Regulations 1999;
- National Monuments Acts 1930 (as amended);
- The Planning and Development Act 2000 (as amended);
- Heritage Act, 1995;
- Environmental Protection Agency (EPA) EPA Advice Notes on current practice in the preparation of Environmental Impact Statement (EIS) (EPA 2003) and draft revised notes (September 2015);
- EPA Guidelines on the Information to be contained in Environmental Impact Statement (EPA, 2002) and draft revised guidelines (August 2017);
- European Commission document 'Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report' (2017)
- Frameworks and Principles for the Protection of the Archaeological Heritage, 1999, (formerly) Department of Arts, Heritage, Gaeltacht and the Islands;
- Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 1999; and
- Local Government (Planning and Development) Act 2000.

Desk Based Assessment

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;
- Monuments in State Care Database;
- Preservation Orders;
- Register of Historic Monuments;
- Topographical files of the National Museum of Ireland;
- Cartographic and written sources relating to the study area;
- South Dublin County Development Plan 2017–2023;
- National Inventory of Architectural Heritage;
- Place name analysis;
- Aerial photographs; and
- Excavations Bulletin (1970-2019)

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

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

National Monuments in State Care Database is a list of all the National Monuments in State guardianship or ownership. Each is assigned a National Monument number whether in guardianship or ownership and has a brief description of the remains of each Monument. The Minister for the DoCHG may acquire national monuments by agreement or by compulsory order. The state or local authority may assume guardianship of any national monument (other than dwellings). The owners of national monuments (other than dwellings) may also appoint the Minister or the local authority as guardian of that monument if the state or local authority agrees. Once the site is in ownership or guardianship of the state, it may not be interfered with without the written consent of the Minister.

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

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

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

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

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

- Down Survey Map of the Barony of Newcastle, c. 1655
- John Rocque's Map of the County of Dublin, 1760
- John Taylor's Map of the Environs of Dublin, 1816
- Ordnance Survey maps of County Dublin, 1843, 1906–9

Documentary sources were consulted to gain background information on the archaeological 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 Geological Survey of Ireland, the Ordnance Survey and Google Earth.

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

Development Plans contain a catalogue of all the Protected Structures and archaeological sites within the county. The 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 route. The Record of Protected Structures lists structures of architectural, cultural, scientific, historical or archaeological interest can be protected under the Planning and Development Act, 2000, where the conditions relating to the protection of the architectural heritage are set out in Part IV of the Act. This Act superseded the Local Government (Planning and Development) Act, 1999, and came into force on 1st January 2000.

The National Inventory of Architectural Heritage (NIAH) is a government-based organisation tasked with making a nationwide record of significant local, regional, national and international structures, which in turn provides county councils with a guide as to what structures to list within the Record of Protected Structures. The NIAH have also carried out a nationwide desk-based survey of historic gardens, including demesnes that surround large houses. This has also been completed for County Dublin and was examined in relation to the surviving demesnes within the surrounding area of the proposed development.

Excavations Bulletin is a summary publication that has been produced every year since 1970. This summarises every archaeological excavation that has taken place in Ireland during that year up until 2010 and since 1987 has been edited by Isabel Bennett. This information is vital when examining the archaeological content of any area, which may not have been recorded under the SMR and RMP files. This information is also available online (www.excavations.ie) from 1970–2019.

Field Inspection

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

The archaeological and architectural field inspection was conducted from 20 February 2020 and entailed:

- Walking 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 recorded sites: and
- Visually investigating any suspect landscape anomalies to determine the possibility of their being anthropogenic in origin.

Impact Assessment

For the purpose of this Impact Assessment, the impacts significance is defined in accordance with the EPA Guidelines on the Information to be Contained in Environmental Impact Statements (EPA, 2017).

- Negative Impact: A change which reduces the quality of the environment. For example: a change that will detract from or permanently remove an archaeological / architectural monument / structure from the landscape.
- 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: a change that improves or enhances the setting of an archaeological / architectural monument/structure.
- Direct Impact: Where an archaeological / architectural feature or site is physically located within the footprint of the proposed development and entails the removal of part, or all of the monument or feature.
- Indirect Impact: Where a feature or site of archaeological / architectural heritage merit or its setting is located in close proximity to the footprint of a potential route alignment.

It should be noted that whilst impact levels and definitions are applied consistently to the cultural heritage resource, direct impacts on sites that are subject to statutory protection are considered to be more significant than sites/ structures not subject to statutory protection.

Effect	Description
Imperceptible Effects	An effect capable of measurement but without noticeable consequences.
Slight Effects	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate Effects	An effect that alters the character of the environment in a manner that is consistent with existing and emerging trends.
Significant Effects	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant Effects	An effect which, by its character, magnitude, duration or intensity significantly alters the majority of a sensitive aspect of the environment.
Profound Effects	An effect which obliterates sensitive characteristics.

Table 14.1 Impact definitions

14.3 RECEIVING ENVIRONMENT

The proposed development area is located in the townland of Fortunestown, Dublin 24. There are no recorded monuments within 500m of the proposed development area. One site is listed in the SMR, a habitation site (DU021-023) located c. 289m to the north. In addition, the zone of archaeological potential for the deserted medieval settlement (DU021-034) of Saggart is located c. 694m west of the proposed development area.

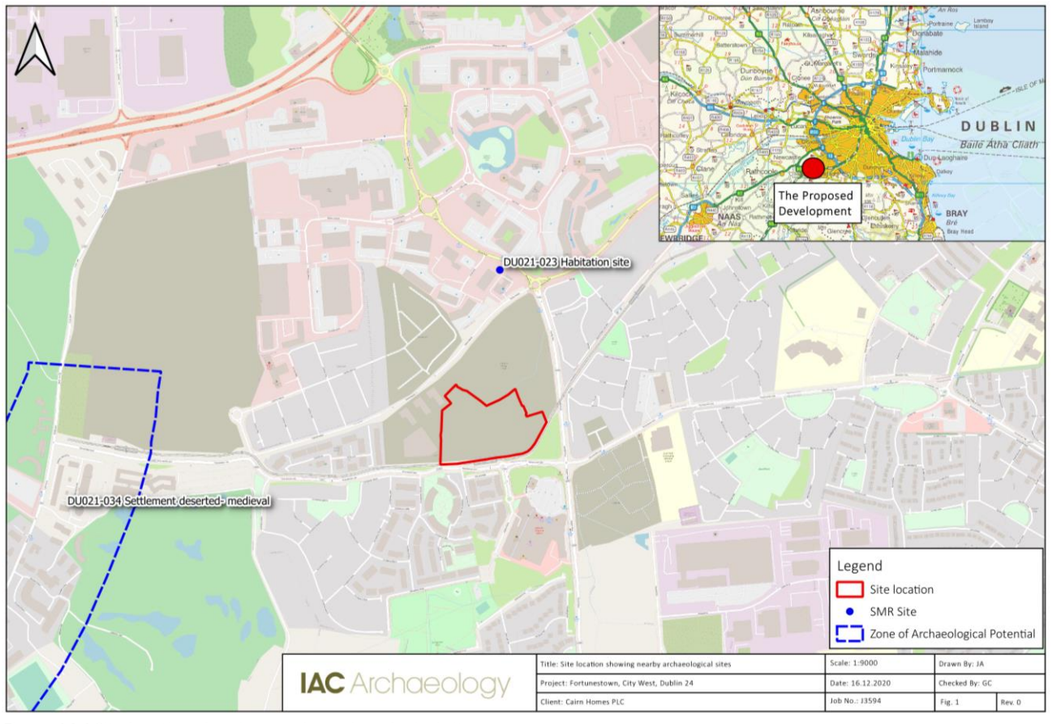

Figure 14.1 Site location showing nearby archaeological sites

Archaeological and Historical Background

Mesolithic Period (6000–4000 BC)

Although recent discoveries in the southwest of Ireland may push back the date of human activity by a number of millennia (Dowd and Carden 2016), the Mesolithic period is the earliest time for which there is clear evidence for prehistoric occupation of the island. During this period people hunted, foraged and gathered food and appear to have had led a primarily mobile lifestyle. The presence of Mesolithic communities is most commonly evidenced by scatters of worked flint material, a by-product from the production of flint implements.

The current archaeological evidence suggests that the environs around Dublin were first inhabited towards the later part of this period. At this time people made crude flint tools known as Larnian (or Bann) Flakes. Small numbers of these flakes have been found along coastal areas such as Dun Laoghaire, Dalkey Island, and Loughlinstown and may indicate small-scale transient settlement along the riverbanks and seashores of County Dublin (Corlett 1999). There are no known Mesolithic sites located within the immediate vicinity of the proposed development area.

Neolithic Period (4000–2500 BC)

The Neolithic period saw the introduction and adoption of agriculture in Ireland. The transition to the Neolithic was marked by major social change. Communities had expanded and moved further inland to more permanent settlements. This afforded the development of agriculture which demanded an altering of the physical landscape. Forests were rapidly cleared and field boundaries constructed. Pottery was also being produced, possibly for the first time. While recent years have seen a large increase in the number of identified Neolithic settlement and habitation sites, the period is most commonly characterised by its impressive megalithic tombs. There are a number of possible Neolithic burial monuments located within the wider landscape of the proposed development area. For example, there is a cluster of Neolithic passage tombs (DU024-005001/2, 034, 035) located on the high ground of Saggart Hill c. 4.5km southeast of the proposed development area in the townlands of Slievethoul and Crockaunadreenagh. However, there are no recorded Neolithic sites within 500m of the proposed development area.

Bronze Age (2500–800 BC)

The Bronze Age was marked by the widespread use of metal for the first time in Ireland. As with the transition from Mesolithic to Neolithic, the transition into the early Bronze Age was accompanied by changes in society. The construction of megalithic tombs went into decline by the end of the early Bronze Age and the burial of the individual became typical. Cremated or inhumed bodies were often placed in a cist, which is a stone-lined grave, usually built of slabs set upright to form a box-like construction and capped by a large slab or several smaller lintels (Buckley and Sweetman 1991). Barrows and pit burials are also funerary monuments associated with this period. As during the Neolithic period, the high ground of the Dublin Mountains to the south of the proposed development area may have been perceived as being sacred and a large number of burial monuments dating to this period are recorded within this landscape. However, there are no recorded Bronze Age sites within the environs of the proposed development area.

Iron Age (800 BC–AD 500)

Until recently, the dearth of evidence representing the Irish Iron Age lead to the it being among the most enigmatic and least understood period in Irish prehistory. However, large scale commercial excavations carried out over the past two decades have produced large quantities of new data relating to Iron Age settlement and industry across the country. There is as yet no firmly dated evidence for Iron Age activity within the immediate vicinity of the proposed development area.

Early Medieval Period (AD 500–1100)

The early medieval period is depicted in the surviving sources as largely rural characterised by the basic territorial unit known as túath. Byrne (1973) estimates that there were probably at least one hundred and fifty kings in

Ireland at any given time during this period, each ruling over his own túath. Each túath would have consisted of between 1,700 and 3,300 subjects based on estimates placing the population of early medieval Ireland at 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 are most commonly located at sites with commanding views of the surrounding environs, which provided an element of security. While raths, for the most part, avoid the extreme lowlands and uplands, they also show a preference for the most productive soils (Stout 1997). However, there are no recorded ringforts or enclosure sites within the vicinity of the proposed development area.

A habitation site (DU021-023) is listed in the SMR c. 289m north of the proposed development area. This record relates to the discovery of a number of archaeological features during works for the Cork to Dublin gas pipeline in 1981 which, based on associated finds, may date to the 9th or 10th century. In particular, a bone comb was recovered from one of the features. The exact location of the site is not recorded, and the SMR file indicates that the coordinates given are intended to be indicative only.

This period was also characterised by the introduction of Christianity to Ireland. An early medieval ecclesiastical enclosure is recorded c. 1.2km west-southwest of the proposed development area (DU021-034001). The remains of this feature, which borders the graveyard, may be associated with the religious foundation established here by St. Mosacra during the 7th century. This was known as Teach Sacra (House of Sacra) and for many years Saggart was known by the derivative of this 'Tassagard' or 'Tassagart'. As with many early medieval ecclesiastical enclosures, this one contains the remains of a medieval church (DU021-034002), along with a graveyard (DU021-034003), cross-slab (DU021-034004), architectural fragment (DU021-034005), two crosses (DU021-034006/7), a stone head (DU021-034008) and a bullaun stone (DU021-034009).

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 1169, when Richard de Clare and his followers landed in Wexford to support MacMurchada. In 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 fortifications.

The settlement of Saggart is recorded on the RMP as a deserted medieval settlement (DU021-034). The zone of archaeological potential for this record extends to 694m west of the proposed development area. After the Anglo-Norman invasion Saggart was retained as property of the Crown, becoming a royal manor. Nevertheless, it bordered the lands of the Gaelic Irish, and as such was exposed to regular attacks. In 1272, as a result of frequent incursions by Irish tribes, the King's sergeant Robert Owen recommended that lands at Saggart 'near the land of war' be exchanged for lands at Newcastle Lyons, 'near the land of peace' (southdublinhistory.ie). The Crown vigilantly guarded its property in Saggart, but in 1311 the O'Byrnes and O'Tooles invaded the area. Around 1323, the lands around Saggart became the property of St. Patrick's Cathedral and were assigned by the Dean and Chapter to the economy fund. At the time, Saggart may have been enclosed, as reference is made to a gate in an old deed. The settlement was also administered by a portreeve, which was a position that was held in 1432 by Richard Aylmer. Excavations carried out in the vicinity of the village of Saggart have produced a significant amount of evidence dating to this period, including burgage plot layout and evidence of domestic and industrial activity.

In 1472 ditches were dug around Saggart to deter invasion from the native Irish clans. Following this, in 1494, further strengthening of Saggart's defences took place, with an order to the inhabitants of the Pale to build a 'double ditch of six feet high above ground' for their protection (southdublinhistory.ie). The threat of attack from the Irish of the Dublin and Wicklow mountains was constant throughout the following centuries. The resultant political conditions precipitated the construction of a large amount of tower houses and fortified buildings within the South Dublin and Rathdown area. There are two later medieval tower houses recorded within Saggart (DU021-034010/11), but none within 500m of the proposed development area.

Post-Medieval Period (AD 1600–1800)

During the second half of the 17th century the village of Saggart to the southwest of the proposed development was affected by the Cromwellian Restoration and Williamite land settlements. Prior to 1641, the confiscation was aimed primarily against the Gaelic Irish. After that date all Catholic proprietors, comprising mainly Irish and Old English, found their lands subject to forfeiture unless they could prove 'constant good affection' to the English parliament (Goff 1987). The village of Saggart was burned a number of times during this turbulent period. In January 1642, the village was defended by 500 Irish soldiers to prevent further incident. Following their transfer to Drogheda the village burned again by Crown forces, under the command of Sir Thomas Armstrong (southdublinhistory.ie).

With the onset of the 18th century, the political climate settled and this saw a dramatic rise in the establishment of large residential houses around the country. This was largely due to the fact that after the turbulence of the preceding centuries, the success of the Protestant cause and effective removal of any political opposition, the country was at peace. The large country house was only a small part of the overall estate of a large landowner and provided a base to manage often large areas of land that could be dispersed nationally. During the latter part of the 18th century, the establishment of a parkland context (or demesnes) for large houses was the fashion. Although the creation of a parkland landscape involved working with nature, rather than against it, considerable construction effort went into their creation. Major topographical features like rivers and mountains were desirable features for inclusion into, and as a setting, for the large house and parkland. Multiple demesne landscapes and large houses were established throughout County Dublin during this period, due to the proximity of the city. The nearest demesne to the proposed development area was Saggart House c. 975m west of the site as shown on Taylor's map of 1816. Today the demesne contains a golf course. However, the main house and a number of outbuildings survive in good condition. The house is a protected structure (RPS 290) along with the outbuildings (RPS 292, 422). The outbuildings have also been included within the NIAH survey (Ref.: 11214008). The demesne wall survives along much of the eastern boundary of the landscape and forms a boundary between the demesne and Garter Lane.

Summary of Previous Archaeological Fieldwork

A review of the Excavations Bulletin (1970–2019) has revealed that no previous archaeological investigations have taken place within the proposed development area. A number of archaeological investigations have taken place within the wider vicinity of the site.

Archaeological monitoring undertaken directly to the north of the site in 2019 (IAC Archaeology forthcoming) did not reveal anything of archaeological significance. Test trenching in 2006 and 2008 (Bennett 2006:580, Licence Ref.: 06E0572 & Bennett 2008:374, Licence Ref.: 08E0792) for the extension of the Luas, which runs to the immediate south of the proposed development area, also did not discover anything of archaeological significance.

Archaeological testing of two potential archaeological sites identified through aerial photography, c. 201m north of the proposed development area failed to identify any features of archaeological significance (Licence Ref.: 92E0110, Bennett 1992:039).

Monitoring was conducted for a pipeline as part of the Saggart, Rathcoole and Newcastle Drainage Scheme, as well as works associated with a diversion of a 110kV line at the junction of Fortunestown Lane and Garter's Lane (Bennett 2005:524, Licence Ref.: 05E1244). No finds or features of archaeological interest were found during any of these works.

Cartographic Analysis

Down Survey Map of the Barony of Newcastle, c. 1655

This map does not provide great detail of the proposed development area and its immediate surroundings. The village of 'Sagard' is depicted with a number of structures including two castles and a 'stump of a castle'. The River Cammock is indicated.

John Rocque's Map of the County of Dublin, 1760 (Figure 14.2)

By the time of this map, it appears that the proposed development area is in use as agricultural land. Fortunestown Lane has been established immediately south of the proposed development area but is not labelled. A structure in the immediate vicinity of the proposed development area is labelled 'Fortunestown'.

John Taylor's Map of the Environs of Dublin, 1816 (Figure 14.2)

This map does not provide great detail, however, it illustrates Saggart Village to the southwest of the proposed development area. Saggart House features prominently to the west of the site. The proposed development area itself appears to continue to function as agricultural land. While a number of isolated structures are shown along the north side of Fortunestown Lane, it is unclear whether these are situated within the proposed development area.

First Edition Ordnance Survey Map, 1843, scale 1:10,560 (Figure 14.3)

This is the first accurate historic mapping coverage of the area containing the proposed development area. The site consists of a number of agricultural fields at this time. The townland boundary between Brownsbarn and Fortunestown forms the northern boundary of the proposed development area and an isolated structure is depicted in the northwest corner of the site.

Ordnance Survey Map, 1906–9, scale 1:2,500 (Figure 14.3)

There is little significant change to the proposed development area by the time of this map in 1906–9. A small farmhouse complex to the south of the site, fronting onto Fortunestown Lane, has expanded northwards into the south of the proposed development area. The structure shown in the earlier OS map of 1843 in the northwest of the proposed development area is no longer extant.

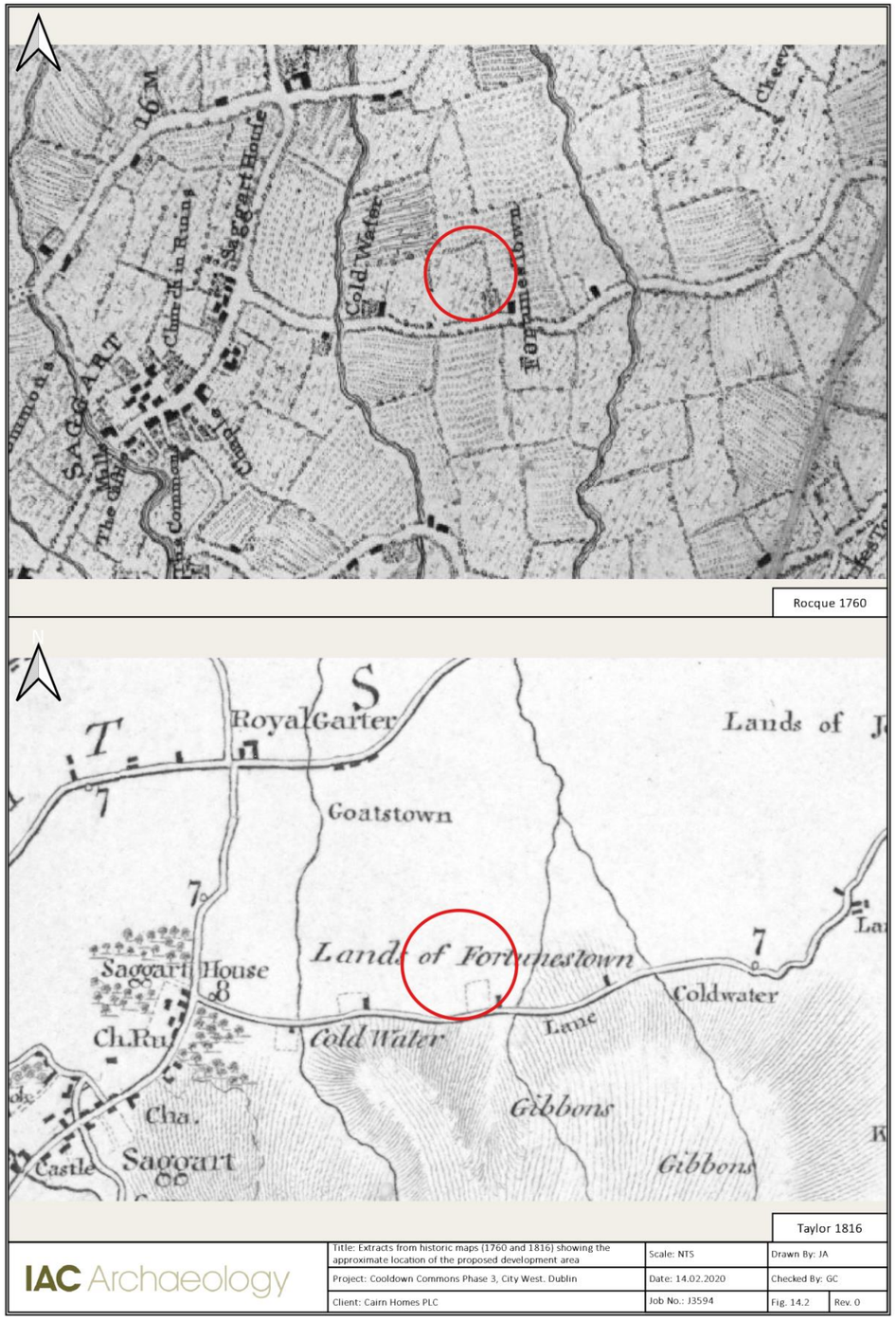

Figure 14.2 Extracts from historic maps (1760 and 1816) showing the approximate location of the proposed development area.

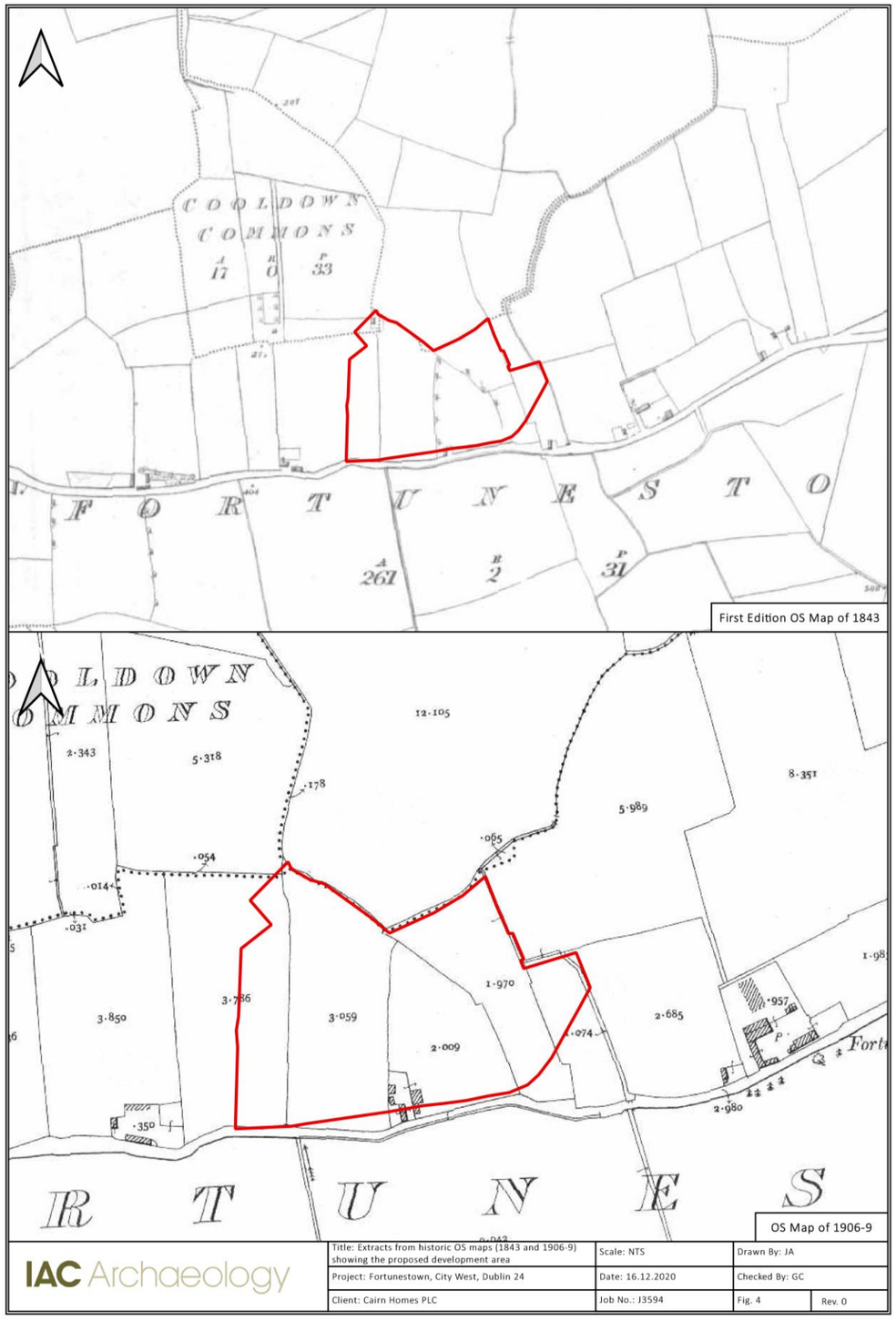

Figure 14.3 Extracts from historic OS maps (1843 and 1906-9) showing the approximate location of the proposed development area.

Aerial Photographic Analysis

Aerial photographic coverage of the proposed development area held by the Ordnance Survey (1995, 2000, and 2005), Google Earth (2008–2019), and Bing Maps were examined. The OSI imagery of 1995 shows the farmyard shown in the later historic OS mapping of 1906–9 has expanded into a large farmyard complex in the south of the proposed development area. The internal field boundaries within the proposed development area have been removed but the townland boundary bordering the site to the north is extant. By 2005, it appears the farmyard has fallen out of use, becoming overgrown (OSI). The former field boundaries depicted in the OS mapping are visible as cropmarks.

In the 2009 Google Earth imagery the extant of the disturbance which took place within the proposed development area during the construction of the Luas Line to the immediate south is clear. It appears a small compound was established within the site at this time. Further and much more significant disturbance is evident in the most recent Bing and Google Earth imagery (2019). It appears a compound and car park were established within the proposed development area during the construction of the adjacent developments to the west and northwest (Plate 14.1). It also appears that deposition of topsoil has taken place within the proposed development area.

Plate 14.1 Aerial photography of the proposed development area (Bing Maps)

Topographical Files

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 review of the topographical files for the study area revealed that no stray finds have been recorded for the proposed development area or the surrounding environs.

County Development Plan

The South Dublin County Development Plan (2016–2022) recognises the statutory protection afforded to all RMP sites under the National Monuments Legislation (1930–2014). The development plan lists a number of aims and objectives in relation to archaeological heritage (Appendix 14.3). It is the objective of the council to protect and preserve (in-situ, or at a minimum, preservation by record) all known sites and features of historical and archaeological interest and all sites and features of historical interest discovered subsequent to the publication of the Record of Monuments and Places.

There are no recorded monuments within 500m of the proposed development area. One site is listed in the SMR, a habitation site (DU021-023), which was excavated in 1981, c. 289m north of the proposed development area. This site is not subject to statutory protection.

Cultural Heritage Background

Toponomy of Townlands

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

PLACENAME	DERIVATION	POSSIBLE MEANING
Fortunestown	-	Anglicised name referring to the family name Fortune
Brownsbarn	-	Anglicised name referring to an agricultural feature
Cooldown Commons	*Cúil Dúin*	Corner fort
Saggart	*Teach Sagard*	The house of St. Sacra

Table 14.2 Placename analysis

Townland boundaries

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 tracks 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).

The townland boundary between Fortunestown to the south and Brownsbarn to the north borders the proposed development area to the north. The townland boundary was not located during the field inspection which suggests it has been removed during the preparation of the site as a compound and car park for the construction works at the adjacent site to the west.

Cultural Heritage Sites

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

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 report. During the course of the field investigation the proposed development site and its surrounding environs were inspected (Figure 14.1).

The field inspection confirmed that the site has been primarily in use as a compound (Plate 14.2) and car parking area (Plate 14.3).

Plate 14.2 Compound, facing south.

Plate 14.3 Car parking area, facing north

The southwest of the site has been used as a topsoil storage area (Plate 14.4). While the east of the proposed development area has also seen a level of disturbance (Plate 14.5). No evidence of the former townland boundary which bordered the site to the north was visible, suggesting it was been removed.

Plate 14.4 Southwest portion of the proposed development area, facing northwest

Plate 14.5 Eastern portion of the proposed development area, facing northeast

14.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development will consist of the construction of 421 no. residential units within 9 no. blocks ranging in height from 1 – 13 storeys, retail/commercial/office units, and open spaces along with all associated site development works and services provisions to facilitate the development including parking, bin storage, substations, landscaping and all services. A full description is provided in the statutory notices and in Chapter 3 of the EIAR.

14.5 POTENTIAL IMPACTS

Construction Phase
There are no predicted impacts to any known archaeological remains or recorded monuments during the construction phase of the proposed development.

Due to the level of disturbance across the site, there is not considered to be any potential for previously unrecorded archaeological features to be located at the site.

Operational Phase
There are no predicted impacts to any archaeological, architectural or cultural heritage assets during the operation of the proposed development.

14.6 POTENTIAL CUMULATIVE IMPACTS

A number of developments, both proposed and those granted permission, in the surrounding area have been considered in the assessment of cumulative impacts.

There are no predicted cumulative impacts to the archaeological or cultural heritage resource. Where proposed and granted developments in the surrounding area have the potential to impact on archaeological remains, it is highly likely that mitigation measures have been proposed to preserve by record any identified archaeological remains.

14.7 MITIGATION MEASURES

Construction Phase
Due to the level of disturbance across the site, no archaeological mitigation is deemed necessary.

Operational Phase
Not applicable.

14.8 PREDICTED IMPACTS

Construction Phase
There are no predicted residual impacts on the archaeological, architectural or cultural heritage resource.

Operational Phase
Not applicable.

14.9 'DO NOTHING' SCENARIO

If the proposed development were not to proceed there would be no negative impact on the archaeological, architectural or cultural heritage resource.

14.10 WORST CASE SCENARIO

In the event that the development proceeds without cultural heritage mitigation in place, it is possible that features of culture heritage value will be destroyed without proper record.

14.11 MONITORING & REINSTATEMENT

As there are no predicted impacts and no proposed mitigation, monitoring and reinstatement are not required.

14.12 DIFFICULTIES IN COMPILING INFORMATION

No difficulties were encountered during the course of this assessment.

14.13 REFERENCES

- Bennett, I. (ed.) 1987–2010 Excavations: Summary Accounts of Archaeological Excavations in Ireland. Bray. Wordwell.
- Buckley, V. and Sweetman, P.D. 1991. Archaeological Survey of County Louth. Dublin.
- Byrne, F. J.,1973. Irish kings and high kings. Four Courts Press.
- Chartered Institute for Archaeologists 2014a Standards & Guidance for Field Evaluation.
- Chartered Institute for Archaeologists 2014b Standards & Guidance for Archaeological Excavation.
- Chartered Institute for Archaeologists 2014c Standards & Guidance for an Archaeological Watching Brief (Monitoring).
- Corlett, C. 1999. Antiquities of Old Rathdown: The Archaeology of South County Dublin and North County Wicklow. Bray. Wordwell.
- Culleton E. (ed.) 1999 Treasures of The Landscape; Townland Names by An Tathair Seamas S. De Vaal Dublin: Trinity College.
- Department of Arts, Heritage, Gaeltacht and the Islands. 1999a Framework and Principles for the Protection of the Archaeological Heritage. Dublin. Government Publications Office.
- Department of Arts, Heritage, Gaeltacht and the Islands. 1999b Policy and Guidelines on Archaeological Excavation. Dublin. Government Publications Office.
- Dowd, M. and Carden R. 2016. "First evidence of a Late Upper Palaeolithic human presence in Ireland." Quaternary Science Reviews 139: 158-163.
- Environmental Protection Agency. 2015 Draft Advice Notes on Current Practice (in the preparation of Environmental Impact Statements). Dublin. Government Publications Office.
- Environmental Protection Agency. 2017 Draft Guidelines on the Information to be Contained in Environmental Impact Statements. Dublin. Government Publications Office.
- Fortunestown Local Area Plan 2012-2022
- Goff, H. 1987 'English Conquest of an Irish Barony: the changing patterns of land ownership in the Barony of Scarawalsh 1540-1640' in Whelan, K (ed.) Wexford: History and Society Geography Publications: Dublin.
- IAC Archaeology forthcoming, Archaeological Monitoring at Cooldown Commons and Fortunestown, Citywest, Dublin 24

- MacCotter, P. 2008 Medieval Ireland. Dublin: Four Courts Press.
- McErlean, T. 1983 "The Irish townland system of landscape organisation". In Reeves-Smyth, Terence; Hamond, Fred (eds) Landscape Archaeology in Ireland BAR British Series 116. pp. 315–39.
- National Monuments Service, Department of Culture, Heritage and the Gaeltacht. Sites and Monuments Record, County Dublin.
- National Museum of Ireland. Topographical Files, County Dublin.
- South Dublin County Development Plan 2016–2022
- Stout, M. 1997 The Irish Ringfort. Dublin. Four Courts.
- Stout, G. and Stout, M. 1997 Early Landscapes: from Prehistory to Plantation. In F.H.A. Aalen et al. (eds), Atlas of the Irish Rural Landscape. Cork. Cork University Press.
- Stout, M. 2017 Early Medieval Ireland 431-1169. Bray. Wordwell.

CARTOGRAPHIC SOURCES

- Down Survey Map of the Barony of Newcastle, c. 1655
- John Rocque's Map of the County of Dublin, 1760
- John Taylor's Map of the Environs of Dublin, 1816
- Ordnance Survey maps of County Dublin, 1843, 1906–9

ELECTRONIC SOURCES

- www.excavations.ie – Summary of archaeological excavation from 1970–2019.
- www.southdublinhistory.ie – History of Saggart and South County Dublin.
- www.archaeology.ie – DoCHG website listing all SMR sites.
- www.osiemaps.ie – Ordnance Survey aerial photographs dating to 1995, 2000, and 2005 and 6-inch/25-inch OS maps.
- www.heritagemaps.ie – The Heritage Council web-based spatial data viewer which focuses on the built, cultural and natural heritage.
- www.googleearth.com – Satellite imagery of the proposed development area.
- www.booksulster.com/library/plnm/placenamesC.php - Contains the text from Irish Local Names Explained by P.W Joyce (1870).
- www.logainm.ie –Placenames Database of Ireland launched by Fiontar agus Scoil na Gaelige and the DoCHG.

15 INTERACTIONS

15.1 INTRODUCTION

As a requirement of the Planning and Development Regulations 2001, as amended, and the draft EPA guidelines (2017), not only are the individual significant impacts required to be considered when assessing the impact of a development on the environment, but so must the interrelationships between these factors be identified and assessed.

Under the Regulations interactions between the various environmental factors, are to be assessed as well as the vulnerability of the proposed development to the risk of natural disaster.

15.2 ASSESSMENT

Where an interaction is both likely and significant, it is given a reference number in the matrix and detail of the interaction is recorded below. The interactions are listed in numerical sequence, purely for referencing purposes.

	Population	Biodiversit	Soil	Hydrology	Noise	Air and Climate	Landscape	Traffic	Waste	Cultural Heritage	Material Assets
Population											
Biodiversity											
Soil	1	7									
Hydrology	2	8	11								
Noise	3	9									
Air and Climate	4		12								
Landscape	5	10	13								
Traffic											
Waste											
Cultural Heritage							14				
Material Assets	6										

Table 15.1 Interaction Matrix

1. Population & Human Health / Soils
There is potential for dust generation during construction works, which under dry and windy conditions could lead to localised dust impacts for the small number of properties proximate to the development site. However, the implementation of 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. Therefore, there will be minimal impacts on local residents.

2. Population & Human Health / Water
Failure or mismanagement of the potable water supply could lead to its contamination during the construction phase. A range of mitigation measures will be put in place during the construction phase of the development to ensure this does not occur.

3. Population & Human Health / Noise
Increased noise levels during the construction phase will be temporary and are not expected to have a long-term significant adverse effect upon the local population. Construction noise will be audible at a low level in the ambient noise. However, the impact is predicted to be minor and temporary. The impact due to the increased traffic associated with the operational development is expected to be minor.

4. Population & Human Health / Air
The completed development will generate additional emissions to the atmosphere due to traffic associated with the development. However, air quality in the vicinity of the site is expected to remain within air quality standards.

During construction, there may be potential for slight dust nuisance in the immediate vicinity of the site. However, dust control measures, such as wheel washes, covering of fine material etc. will minimise the impacts on air quality.

5. Population & Human Health / Landscape
Existing residents and visitors to the Citywest area interact with the landscape, such that they will be aware of a significant change at this site from a vacant site to a new residential development with a mix of unit types, building heights, open spaces etc. Such a transformation, whilst significant, is designated for this site in the South Dublin County Development Plan 2016-22 and Fortunestown LAP 2012. It is expected that the design of the proposed scheme will over time integrate with the surrounding area.

6. Population & Human Health / Materials Assets
It is expected that the proposed development will benefit the materials assets with the additional population helping to sustain and generate improvements to the physical infrastructure of the area.

7. Biodiversity / Soils
Potential construction stage effects arising from the general loss and fragmentation of some habitats and reduction of associated opportunities for biodiversity are considered neutral to slight negative during the construction phase, while potential operational stage effects are considered imperceptible neutral as new planting/landscaping matures.

8. Biodiversity / Water
As concluded in the Appropriate Assessment Screening Report submitted with the application there are no elements of the proposed development that are likely to give rise to significant effects on Natura 2000 sites in the wider area.

The implementation of construction and operational phase soils and water management proposals, together with the site drainage design will adequately reduce such potential impacts arising from the development site on these aquatic habitats in the wider area. Potential construction and operational phase effects on biodiversity associated with aquatic habitats in the wider area are considered imperceptible/neutral with the implementation of soils and water management proposals.

9. Biodiversity / Noise
Increased noise levels during the construction phase will only be temporary and are not expected to have a long-term significant adverse effect upon remaining fauna within the wider landscape.

Operational noise will be audible at a low level in the ambient noise and the impact is predicted to be minor.

10. Biodiversity / Landscape
The changes to the landscape of the subject site has the potential to negatively impact the biodiversity in the immediate area, as outlined in Chapter 5.

The proposed landscape masterplan including the retention of existing vegetation where feasible will help to mitigate this loss of habitats and biodiversity in the area. New planting will provide new habitats for local species.

11. Soils / Water
When soil is exposed after vegetative clearance there will also be increased run-off and evaporation. Mitigation measures will be implemented during construction to prevent this run-off water from discharging directly to watercourses.

12. Soils / Air
Exposed soil during the construction phase of the proposed scheme may give rise to increased dust emissions. However, the implementation of 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.

13. Soils/Landscape
Residual soils arising as a result of excavation at the development site will be used in landscaping works in the proposed public open spaces as much as possible rather than transporting off-site.

14. Landscape/Cultural Heritage
Careful consideration has been given to minimizing the visual impact of the proposed scheme on architectural heritage in the wider area.

16 SCHEDULE OF MITIGATION MEASURES

16.1 INTRODUCTION

Given the complexity of the proposed development and this EIAR, this chapter seeks to provide a complete summary of mitigation measures proposed in Chapters 4 to 16. The appointed contractor will be required to adhere to the mitigation contained in the EIAR. Monitoring of the effectiveness of mitigation measures put forward in the EIAR document by the competent authorities is also integral to the process.

16.2 CONSTRUCTION PHASE

Population and Human Health	A preliminary Construction Management Plan (CMP) has been prepared by DBFL and will be implemented during the construction phase to reduce the detrimental effects of the construction phase on the environment and local population. The CMP will be formally agreed in writing with the planning authority in writing prior to the commencement of the development (the preliminary CMP is included with this application for reference). Other items to be mitigated during the construction phase are discussed further under various environmental topics discussed in the chapters following. These measures are put forward to avoid any significant negative environmental impacts on the population and human health.

Biodiversity	Pollution during construction – mitigation by reduction A Construction Management Plan has been prepared by DBFL Construction Engineers. and which should include pollution prevention measured in accordance with best practice guidelines from Inland Fisheries Ireland (2016). This identifies the potential pollution impacts and states that the following measures will be taken: Contamination of Groundwater – There is a risk that ground water could become contaminated with lime from cement which could subsequently finds its way into the local adjacent watercourses. The measures proposed to be put in place to mitigate any potential damage from the effluent of contaminated ground water would be to create an exclusion zone, as far as reasonably practicable.
Biodiversity continued	Sediment & Erosion – Similar to the above, groundwater needs to be protected from sedimentation and erosion due to direct surface water runoff generated onsite during the construction phase. To prevent this from occurring, surface water discharge from the site will be managed and controlled for the duration of the construction works until the permanently attenuated surface water drainage system of the proposed site is complete. A temporary positive drainage system shall be installed prior to the commencement of the construction works to collect surface water runoff by the site during construction. A series of geotextile lined cascading, high level outfall, settling basins will be installed upstream of the agreed discharge point. This temporary surface water management facility will throttle runoff and allow suspended solids to be settled out and removed before being discharged in a controlled manner to the agreed outfall. All inlets to the cascading settling basins will be riprapped to prevent scour and erosion near the inlet. Discharge Licences – It will not be permitted to discharge into any newly constructed storm water systems or watercourse without adhering to the conditions of the discharge licence and agreeing the same with the Site Manager and Local Authority Area Engineer. Over Ground Oil / Diesel Storage – Only approved storage system for oil / diesel within the site will be permitted, (i.e. all oil / diesel storage to be located within a designated area placed furthest away from adjacent watercourses and contained within constructed bunded areas e.g. placed on 150mm concrete slab with the perimeter constructed with 225mm solid blockwork rendered internally). The bunded area will accommodate the relevant oil / diesel storage capacity in case of accidental spillage. Any accidental spillages will be dealt with immediately on site by containment /removal from site. Concrete Washout – The washing out of concrete trucks on site will not be permitted as they are a potential source of high alkaline discharges to watercourses. Consequently, it is a requirement that all concrete truck washout takes place back in the ready-mix depot. Disposal of Wastewater off Site – The Site Management Team will maintain a record of all receipts for the removal of toilet or interceptor waste off site to insure its disposal in a traceable manner. These will be available for inspection at all times by the Environmental Section of South Dublin County Council. Road Sweepers / Cleaning – The cleaning of public roads in and around the subject site will be undertaken to reduce environmental impacts and care will be taken to prevent any pollution of watercourses from this activity.

Land, Soil and Geology	• 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 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 be located on site. • Top and subsoils shall be re-used on-site for landscaping purposes to minimise the volume of soils to be exported off-site • The design of road levels and finished floor levels has been carried out to minimize cut and fill type earthworks operations. • Disturbed subsoil layers will be stabilized as soon as practicable. Therefore, backfilling of service trenches, construction of road capping layers, construction of building foundations and completion of landscaping), will all be carried out promptly to minimise the duration that subsoil layers are exposed to the effects of weather. • Stockpiles of excavated subsoil material will be protected for the duration of the works. Stockpiles of subsoil material will be located separately from topsoil stockpiles. • 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 open drainage ditches). • Where feasible, excavated material will be reused as part of the site development works (e.g. for landscaping works and for backfill in trenches). • Earthworks plant and vehicles 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 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. • 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 hardstanding area, remote from surface water inlets (when it is not possible to carry out such activities off-site). • Site Investigations indicate that bedrock is deeper than below circa 17m on site. Therefore, it is unlikely that bedrock will be exposed during construction works. Should bedrock be encountered, the extent of exposed bedrock will be limited to the immediate vicinity of active work areas. Where bedrock is encountered it will be crushed, screened and tested for use within the designed works to reduce the volume of material required to leave site. This will also reduce the volume of material to be imported to the site.

Hydrology	To minimise the impact of the construction phase on the water environment, mitigation measures should be implemented. • Implement best practice construction methods and practices complying with relevant legislation to avoid or reduce the risk of contamination of watercourses or groundwater. • A Site-Specific Construction Management Plan will be developed and implemented during the construction phase. Site inductions will include reference to the procedures and best practice as outlined in the Construction Management Plan. • 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. • Weather conditions and seasonal weather variations will also be taken account of when planning stripping of topsoil and excavations, with an objective of minimizing soil erosion. • The extent of sub-soil and topsoil stripping to be minimised to reduce the rate and volume of the run-off during construction until the topsoil and vegetation are replaced. • Concrete batching will take place off site or in a designated area with an impermeable surface. • Concrete wash down and wash out of concrete trucks will take place off site or in an appropriate facility. • Discharge from any vehicle wheel wash areas is to be directed to on-site settlement ponds. • Oil and fuel stored on site for construction should be stored in designated areas. These areas shall be bunded and should be located away from surface water drainage and features. • Refuelling of construction machinery shall be undertaken in designated areas away from surface water drainage in order to minimise potential contamination of the water environment. Spill kits shall be kept in these areas in the event of spillages. • Hazardous construction materials shall be stored appropriately to prevent contamination of watercourses or groundwater. • Spill kits should be kept in designated areas for re-fuelling of construction machinery. • Dewatering measures should only be employed where necessary. • Basement excavations to be kept to a minimum to reduce impacts on groundwater. • Hydrobrake flow controls and petrol interceptors should be constructed on each surface water outfall before the outfalls are made operational.

Noise and Vibration	**General Construction Site Management** 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 Mitigation Measures** An independent acoustic consultant shall be engaged by the contractor prior to the commencement of site activities to ensure that all noise mitigation measures as specified in this Section of the EIAR are implemented and to prepare a site-specific *Construction Management Plan.* The Plan shall include all relevant noise and vibration control measures as specified in this report. The Plan shall be submitted to South Dublin County Council for approval as required. The nominated contractor shall appoint a designated person to manage all environmental complaints including noise and vibration. A noise complaint procedure shall be implemented in which the details of any noise related complaint are logged, investigated and where required, measures are taken to ameliorate the source of the noise complaint. Appropriate signage shall be erected on all access roads in the vicinity of the site to inform HGV drivers that engines shall not be left idling for prolonged periods and that the use of horns shall be banned at all times. HGV's queuing on any local or public road shall not be permitted and it shall be the responsibility of site management to ensure this policy is enforced. Typical construction hours are: 07:00hrs – 19:00hrs Monday to Friday 08:00hrs – 14:00hrs Saturday Closed on Sundays and Bank/Public Holidays All onsite generator units (if required) used to supply electricity to the site shall be silenced models or enclosed and located away from any receptor. The site compound shall be located at a point on site furthest away from any residential development. Mains power shall be used to supply electricity to all site offices and site lighting at the earliest instance. The use of generators during the night-time shall be avoided.

Noise and Vibration continued	**Construction Phase Noise Control & Mitigation** The following shall be implemented to mitigate construction noise impacts in order to ensure that the construction phase of the development does not have an unacceptable impact on sensitive receptors. **Construction Works Noise Mitigation Measures** A strictly enforced noise management programme shall be implemented at the site from the outset of construction activities. The Construction Project Manager shall appoint an acoustic consultant to conduct continuous noise surveys which shall be conducted at the baseline noise monitoring locations throughout the construction phase of the development to assess compliance with the construction noise limit criteria detailed in Table 8.1 and to assess the effectiveness and implementation of the specific Construction Phase noise mitigation measures detailed in this document. The principal of controlling noise at source shall be implemented at the site. Best practice mitigation techniques as specified in *BS 5228:2009+A1 2014 – Noise and Vibration Control on Construction and Open Sites* shall be implemented during the construction phase and are detailed in this Section. Noisy stationary equipment shall be sited away from sensitive site boundaries as far as practicable. Where reasonably practicable, noisy plant or activities shall be replaced by less noisy alternatives if noise breaches and/or complaints occur. Proper use of plant with respect to minimising noise emissions and regular maintenance will be required. All vehicles and mechanical plant will be fitted with effective exhaust silencers and will be maintained in good efficient order. Where noisy plant is required to operate in works areas next to residential houses low noise plant options will be used wherever practicable. Dumpers and any plant used for moving materials around the site will have high performance exhaust silencers. Selected use of rubber-tyred equipment over steel track equipment where practicable. The use of inherently quiet plant is required where appropriate – all compressors and generators will be "sound reduced" or "super silent" models fitted with properly lined and sealed acoustic covers, which will be kept closed whenever the machines are in use, and all ancillary pneumatic percussive tools will be fitted with mufflers or silencers of the type recommended by the manufacturers.

Noise and Vibration continued	All compressors, generators and pumps shall be silenced models fitted with properly lined and sealed acoustic covers or enclosures, which will be kept closed whenever the machines are in use. All pneumatic percussive tools such as pneumatic hammers shall be fitted with dampers, mufflers or silencers of the type recommended by the manufacturer. Fixed items of plant shall be electrically powered in preference to being diesel or petrol driven. Vehicles and mechanical plant utilised on site for any activity associated with the works shall be fitted with effective exhaust silencers and shall be maintained in good working order and operated in a manner such that noise emissions are controlled and limited as far as reasonably practicable. Any plant, equipment or items fitted with noise control equipment found to be defective in shall not be operated until repaired / replaced. Machines in intermittent use shall be shut down in the intervening periods between works or throttled down to a minimum during periods when not in use. Static noise emitting equipment operating continuously shall be housed within suitable acoustic enclosure, where appropriate. All excavator mounted pneumatic breakers used for demolition and ground-breaking activities shall be fitted with effective dampeners and /or enclosed within a noise adsorbing blanket structure to minimise noise emissions. Site activities shall be staggered when working in proximity to any receptor, that is concrete cutting and rock breaking should where possible. This proposed method of working will provide effective noise management of site activities to ensure that any receptor is not exposed to unacceptably high levels of noise over extended periods. Excessive reviving of all vehicles shall be avoided. Unnecessary dropping of heavy items onto ground surfaces shall be banned. The use of an excavator bucket to break up slabs of concrete or tarmacadam shall not be permitted. The dragging of materials such as steel covers, plant or excavated materials along ground surfaces shall not be permitted. The use of acoustic screens to attenuate noise at source shall be implemented as deemed necessary. Plant Reversing Alarms: Where reasonably practicable and deemed safe by risk assessment, taking into account onsite hazards and working environment, the tonal reversing alarms of mobile plant shall be replaced with broadband alarms.

Noise and Vibration continued	A nominated person from the Project Management team will be appointed to liaise with local residents and businesses regarding noise nuisance events. In the event of the requirement for out of hours work to occur which will involve the generation of noise levels that are predicted to exceed out of hours noise limit criteria, South Dublin County Council shall be immediately notified prior to the works commencing. A nominated person from the Project Management team will be appointed to liaise with and inform local residents and South Dublin County Council regarding out of hours works. An independent acoustic consultant shall review the implementation of the recommended mitigation measures on a monthly basis. It is recommended that high performing acoustic barriers are utilised such as *Echo Barrier* products or *Ventac* products. **Construction Phase Vibration Control & Mitigation** The following specific vibration mitigation and control measures shall be considered during the construction phase: **Vibration Mitigation Measures** Breaking out concrete elements using low vibration tools Choosing alternative, lower-impact equipment or methods wherever possible Scheduling the use of vibration-causing equipment, such as jackhammers, at the least sensitive time of day Routing, operating or locating high vibration sources as far away from sensitive areas as 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. Confining vibration-generating operations to the least vibration-sensitive part of the day which could be when the background disturbance is highest. A nominated person from the Project Management team will be appointed to liaise with local residents and businesses regarding vibrational nuisance events.

Noise and Vibration continued	An independent acoustic consultant shall review the implementation of the recommended mitigation measures on a monthly basis. In order to ensure that site construction activities are conducted to minimise the vibration impacts on the receiving environment, structural vibration monitoring shall be conducted during the course of the project works if required. It is proposed that vibration monitoring will be conducted at properties adjacent to or within 20m of the site as required using calibrated vibration monitors and geophones capable of transmitting live text and email alerts to ensure that if vibration levels approach or exceed specified warning and limit values, site personnel will be alerted to cease at the earliest instance and appropriate mitigation measures may then be implemented to minimise the vibrational impacts of protected structures. Live vibration monitoring systems shall be installed for the duration of the construction phase in cooperation with TII in proximity to the inbound Citywest LUAS track which runs adjacent to the southern and south-eastern site boundaries. The transient vibration guide values for cosmetic damage as specified in *British Standard BS 7385:, Evaluation and measurement for vibration in buildings, Part 2 1993 Guide to damage levels arising from ground borne vibration* is 15 mm/sec Peak Component Particle Velocity at 4 Hz increasing to 20 mm/sec at 15 Hz. This limit value rises to 50 mm/sec at frequencies of 40 Hz and greater. The applied conservative limit of 12.5 mm/sec PPV (peak particle velocity) applied for this assessment is significantly lower than these levels. In order to protect the amenities enjoyed by nearby residents and commercial premises, a full Construction Management Plan (including traffic management) shall be put in place prior to the commencement of development. This will have regard to the mitigation measures set out in Section 8.7 of this document.

Air and Climate	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: **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.

Air and Climate continued	Material stockpiles containing fine or dusty elements including topsoils 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 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
Landscape and Visual Impact	No mitigation measures are proposed other than standard best practice construction site management.
Traffic and Transportation	The Construction 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. In order to ensure satisfactory operation of the construction stage the following is proposed: • Provision of sufficient on-site parking and compounding to ensure no potential overflow onto the local network. • It is likely that some numbers of the construction team will be brought to/from the site in vans/minibuses, which will serve to reduce the trip generation potential. • Site offices and compound will be located within the site boundary. The site will be able to accommodate employee and visitor parking throughout the construction period through the construction of temporary hardstanding areas. • Finally, truck wheel washes will be installed at construction entrances and any specific recommendations with regard to construction traffic management made by the Local Authority will be adhered to.

Material Assets	Mitigation measures proposed in relation to the drainage and water infrastructure include the following: • A detailed "Construction Management Plan" will be prepared by the Contractor and implemented during the construction phase. Site inductions will include reference to the procedures and best practice as outlined in the "Construction Management Plan". • 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. • In the event of groundwater being encountered during the construction phase, mitigation measures will include dewatering by pumping to an appropriate treatment facility prior to discharge. Other measures would include excluding contaminating materials such as fuels and hydrocarbons from sensitive parts of the site i.e. highly vulnerable groundwater areas. • In order to reduce the risk of defective or leaking sewers, all new sewers should be laid in accordance with the relevant standards, pressure tested, and CCTV surveyed to ascertain any possible defects. • 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 removed 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. • Where possible backup network supply to any services will be provided should the need for relocation or diversion or existing services be required otherwise relocation or diversion works will be planned to incur minimal impact, with users notified in advance of any works. • Connections to the existing gas and telecommunications networks will be coordinated with the relevant utility provider and carried out by approved contractors.

Waste	The Construction & Demolition Waste and By-Product Management Plan specifically addresses the following points: 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 **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. **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.

Waste continued	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 Construction 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 licenced 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 Project Construction 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 Project Construction 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. **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

Waste continued	**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. **Soils** The subject development site is currently greenfield and undeveloped with no evidence of historic dumping or industrial use. Top and subsoils shall be re-used on-site for landscaping purposes to minimise the volume of soils to be exported off-site Excess soils shall be exported to an appropriately waste permitted/licenced facility. Excavated excess soils that are required to be exported off-site may be suitable for re-use in other construction sites and may be declared as a by-product in accordance with Article 27 of the European Communities (Waste Directive) Regulations 2011. Article 27 requires that the material classified not a waste but a by-product must meet specific criteria and that that a declaration of a material as a by-product is notified to the EPA. **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 and exported off-site to an appropriately licenced facility for treatment/disposal.

Cultural and Archaeological Heritage	Due to the level of disturbance across the site, no archaeological mitigation is deemed necessary.

16.3 OPERATIONAL PHASE

Population and Human Health	The proposed development has been designed to avoid negative impacts on population and human health through the provision of various physical and social infrastructure as part of the development as are outlined in Chapter 3 of this EIAR. No addition mitigations measures are considered necessary.
Biodiversity	The following measures are taken from the bat report but will also benefit invertebrates and common birds: *Lighting* It is important that any proposed lighting for the proposed residential development is wildlife friendly. Nocturnal mammals are impacted by lighting. Therefore, it is important that lighting installed within the proposed development site is completed with sensitivity for local wildlife while still providing the necessary lighting for human usage. It is also important that developments reduce their impact on the night sky and reduce sky glow. The "Dark Sky" principal should be followed – i.e. no upward lighting to reduce light pollution. The following principles should be followed: - 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). o All luminaires used will lack UV/IR elements to reduce impact. o LED luminaires will be used due to the fact that they are highly directional, lower intensity, good colour rendition and dimming capability. o A warm white spectrum (<2700 Kelvins will be used to reduce the blue light component of the LED spectrum). o Luminaires will feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats. o Column heights should be carefully considered to minimise light spill. The shortest column height allowed should be used where possible. Ballard lighting should be considered for pedestrian and greenway areas, if deemed necessary. o Only luminaires with an upward light ratio of 0% and with good optical control will be used. o Luminaires will be mounted on the horizontal, i.e. no upward tilt. o Any external security lighting will be set on motion-sensors and short (1min) timers. The intensity of external lighting should be limited to ensure that skyglow does not occur in order to reduce light pollution. o As a last resort, accessories such as baffles, hoods or louvres will be used to reduce light spill and direct it only to where it is needed.

Biodiversity continued	*Landscape Plan* The landscape plan includes the following proposals: - Development of links to a Neighbourhood Park. - Development of a Local Park. - Planting of native tree and shrub plant species. - New treelines and hedgerows along the eastern boundary of the proposed development site, particularly linking in with the Neighbourhood Park. *Biodiversity Enhancement Measures* It is recommended to erect two Habitat Rocket Bat Boxes within the buffer zone along the stream. This will provide roosting sites for local bat populations. These should be located in dark zones adjacent to tall vegetation proposed to be planted as part of the landscaping. The bat report should be consulted for full details.
Land, Soil and Geology	The only mitigating measures envisaged during the operational phase are to ensure regular maintenance of SuDS features and landscaped open space. Ensuring appropriately designed, constructed and maintained site services will protect the soils and geology from future contamination arising from operation of the developments.
Hydrology	• The design of proposed site levels (roads, FFL etc.) has been carried out to replicate existing surface contours, break lines etc. and 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 recommended in the Greater Dublin Strategic Drainage Study (GDSDS). Surface water discharge rates will be controlled by a Hydrobrake flow control device, with attenuation tank and detention basin provided to store runoff from a 1% AEP storm event. SUDs features are implemented in the surface water drainage network to reduce the rate of runoff form hard standing area sand to improve the quality of surface water runoff. For detailed information refer the "Infrastructure Design Report" prepared by DBFL and submitted with the planning application. • Surface water runoff from the development to be collected by an appropriately designed system with contaminants removed prior to discharge i.e. petrol interceptor. • A regular maintenance and inspection programme of the flow control devices, attenuation storage facilities, gullies and petrol interceptor will be required during the Operational Phase to ensure the proper working of the development's networks and discharges. • Waste generated by the everyday operation of the development should be securely stored within designated collection areas with positive drainage collection systems to collect potential runoff. Operational waste should be removed from site using licenced waste management contractors. • Water conservation methods to be implemented such as the use of low flush toilets.

Noise and Vibration	The operational phase of the development is predicted not to have an adverse 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. Operational Phase noise mitigation measures relate to the inward impact of existing external noise sources on the operational development. Operational mitigation measures are classified as mitigation by design. External noise can enter rooms within dwellings through windows, ventilators, walls, roof and doors. In most cases, however, windows provide the main path. **Acoustic Design requirements for residential buildings** ***Windows*** In order to ensure a sufficient level of sound insulation is provided for all dwellings within the development, the sound insulation performance of windows and window frame sets in terms of the in-situ weighted sound reduction index (Rw) for all unit windows with a line of sight onto the LUAS Citywest Line, Fortunestown Lane and Citywest Road shall be up to 37dB Rw to ensure that the internal noise level criteria are achieved. All window sets shall be double/triple glazed and acoustically rated in accordance with EN ISO Part3 1995, EN ISO 717 1997.  *Figure 16.1 Facades requiring acoustically rated windows* ***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. This design feature of the residential units will ensure that the building structure is acoustically insulated from the external environment. ***Wall Constructions*** The wall construction typically provides the highest level of sound insulation performance to a residential building. The residential dwellings will be built using either masonry or a timber framed construction. The minimum sound insulation performance of the chosen wall construction will be 55dB Rw.

Noise and Vibration continued	***Acoustic Performance Verification*** At the earliest stage during the construction phase, residential test units 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 8.12 above provides detail on the recommended sound insulation values that shall be achieved to ensure acoustic privacy between adjoining residential units and to assess compliance with external noise intrusion criteria as defined in *BS 8233: 2014: Guidance on Sound Insulation and Noise Reduction for Buildings.*
Air and Climate	The Operational Phase of the Cooldown Commons Phase 3 residential 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 operational phase includes mitigation measures relating to the design of the development to minimise the impact of the operational phase of the development on air quality and climate are as follows: **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

Air and Climate continued	**Air Quality Mitigation Measures** Natural Gas heating Inclusion of electric car charging points to encourage electric vehicle ownership Proximity of Dublin Bus and LUAS to the development site to provide public transport to residents. Provision of open landscaped areas and playgrounds within the development to encourage residents to avail of active lifestyle options.

Landscape and Visual Impact	The proposed development is the culmination of a considered design process, weighing the development opportunity of the strategic land resource and certain characteristics of the receiving environment (refer to 'Townscape Sensitivity', Section 10.6.2) against the sensitivities. Much of the guidance relevant to townscape and visual amenity in the Fortunestown LAP and County Development Plan has been incorporated in the proposal, adapted to comply with the more recently published national policy (NPF and Building Height Guidelines). No significant negative townscape or visual effects have been identified. Therefore, no mitigation measures are recommended.

Traffic and Transportation	With the objective of mitigating the potential impact of the proposed development as predicted in Section 11.5 and 11.6 during its operational stage, the following initiatives and associated timescale for their implementation have been identified and subsequently form an integral part of the subject development proposals. • Management – A Mobility Management (MMP) is to be compiled with the aim of guiding the delivery and management 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. • Car Share – The proposed apartment car parking provision, is lower than the development plans maximum standards. This reduction is due to developments' close proximity to the Fortunestown Luas Stop; the proposed high cycle parking provision and the DHPLG's guidelines for apartment developments which states; "*planning authorities must consider a reduced overall car parking standard and apply an appropriate maximum car parking standard*". Due to these factors, should the demand arise at a future time, 1 no. proposed duplex visitor space could be reassigned in order to accommodate a car share facility. • Cycle parking provision – A total of 650 no. bicycle parking spaces are proposed as part of the development scheme comprising 330 no. long stay spaces at basement level, 200 no. long stay at surface level and 120 no. short stay spaces at surface level. The proposals is 502 spaces higher than the SDCC' development plan minimum requirement of 148 cycle parking spaces and represents a compromise between the development plan requirements and the DHPLG requirements (974 spaces). Accordingly, the generous provision of cycle parking will help promote cycling as a viable mode of travel to / from the subject development site.

Material Assets	Please refer to Chapter 7 Hydrology for mitigation measures associated with the surface water treatment. • All new drainage lines (foul and surface water) will be pressure tested and will be subject to a CCTV survey to identify any possible defects prior to being made operational. • Chapter 7 includes the mitigation measures associated with the surface water system for the development. • It is envisaged that the development would take place and be occupied over a reasonable time period, and therefore the downstream foul sewerage system (foul sewer network and wastewater treatment facility) would be gradually loaded. • Water conservation methods such as the use of low flush toilets and low flow taps should be incorporated into dwellings to reduce water volumes and related treatment and abstraction costs of the development. • Similarly, water conservation methods would reduce the loading on the foul sewer network and the treatment works at Ringsend. • On completion of the construction phase no further mitigation measures are proposed in relation to the electrical, gas and telecommunications infrastructure.

Waste	An Operational Phase Waste Management Plan (OWMP) has been prepared as a stand-alone report to accompany this planning 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. 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.* Key Aspects of the OWMP to achieve Waste Targets: • 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. • 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.

Waste continued	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. 2018.* The proposed residential development at Cooldown Commons Phase 3 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 this Waste Management Plan 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 apartments, duplex units and houses 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. House residents shall engage private waste collection contractors who provide a 3-bin waste collection service.

Waste continued	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 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.

Cultural and Archaeological Heritage	Not applicable.