McGill Planning

Chartered Town Planners

ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR)

PARKSIDE 4 RESIDENTIAL DEVELOPMENT

APPLICANT: CAIRN Homes Properties ltd.

PREPARED BY: McGILL PLANNING, 45 HERBERT LANE, DUBLIN 2 PH: +353 1 2846464

IN ASSOCIATION WITH: MCORM Architects, DBFL Consulting Engineers, Openfield Ecological Services, Traynor Environmental Consultants, Modelworks, AIT landscape and IAC Archaeologists

OCTOBER 2019

ENVIRONMENTAL IMPACT ASSESSMENT REPORT
VOL I – MAIN STATEMENT

PREPARED BY

McGill Planning
Chartered Town Planners

IN ASSOCIATION WITH:

MCORM Architects,
DBFL Consulting Engineers,
Openfield Ecological Services,
Traynor Environmental Consultants,
Modelworks,
AIT landscape and
IAC Archaeologists

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER 11 TRAFFIC AND TRANSPORTATION

CHAPTER 13 WASTE MANAGEMENT

CHAPTER 14 ARCHAEOLOGICAL AND CULTURAL HERITAGE

CHAPTER 15 INTERACTIONS

LIST OF FIGURES

LIST OF PLATES

CHAPTER 14 ARCHAEOLOGICAL AND CULTURAL HERITAGE

1 INTRODUCTION AND METHODOLGY

1.1 INTRODUCTION

This Environmental Impact Assessment Report (EIAR) has been prepared on behalf of Cairn Homes Properties Limited to accompany a Strategic Housing Development application to An Bord Pleanala for a new residential development on lands located at Parkside 4 (former Balgriffin Park Lands), Parkside, Dublin 13.

The subject site is located within the North Fringe, identified in the Government's 'Rebuilding Ireland' strategy as one of four key locations in the Dublin City Council area to deliver significant residential development. The site is located proximate to existing and proposed public transport, local services and significant public open spaces. Re-development of this site for significant residential development is envisaged in the Belmayne – Clongriffin LAP 2018-2018 (extended until 2022) and the Dublin City Development Plan (2016-2022).

The gross site area is c.3.17 ha and is located to the north of Parkside Boulevard and east of Balgriffin Park, Dublin 13. The site lies to the south of Mayne River and west of Parkside Playground.

The development will comprise 282 apartment units within 4 blocks ranging in height from 3 to 7 storeys. The development will also include residential amenity facilities, car and cycle parking, private, communal and public open spaces including completion of Mayne River Linear Park through the lands, all associated site development, landscape and boundary works, and services provision. A detailed description of the proposed development is provided in Chapter 3.

Please note that whilst the majority of this site is in Dublin City Council jurisdiction there is a small area owned by the applicant which is located within Fingal County Council administrative area and is included in order to complete the linear park proposed.

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 2001-18.

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 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 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 in respect of an application for consent for proposed development where either of the following are relevant:

- the proposed development would be of a class specified in Part 1 of Schedule 5 of the Planning and Development Regulations.
- the proposed development would be of a class specified in Part 2 of Schedule 5 of the Planning and Development Regulations.
- **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 equal or exceed the relevant quantity, area or other limit specified in that Part, but is concluded, determined or decided that proposed development is likely to have a significant effect on the environment.**

The subject development 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 dwellings***
- ***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 residential proposal in this instance is for 282 apartment units which is under the 500 unit threshold. The application site is 3.17 ha which is less than 10ha.

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 proposed number of residential units are below the thresholds in Development Class 10 of Part 2 of Schedule 5, having regard to Development Class 15, Schedule 7 and Section 172 of the Act, and with regard to the size and scale of the proposed development, the proposed use of natural resources, the relative environmental sensitivity of the location, and the types of potential cumulative impacts from the previously permitted phases of the Parkside development (as also constructed by the applicant), it was deemed prudent to prepare an EIAR for the proposed development to accompany the planning application in this instance. Furthermore, it is noted that cumulatively the number of units in the Parkside Development as a whole (existing, permitted and now proposed) would, at over 800 units, exceed the 500 unit threshold outlined in Development Class 10(b)(i).

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.

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

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 & CONTENT

This EIAR is sub divided as follows:

- Environmental Impact Assessment Report
- Appendices to Environmental Impact Assessment Report
- Non-Technical Summary.

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
1.0	Introduction & Methodology	McGill Planning Ltd.
2.0	Alternatives	McGill Planning Ltd.
3.0	Project Description	McGill Planning Ltd.
4.0	Population & Human Health	McGill Planning Ltd.
5.0	Biodiversity	Openfield Ecological Services
6.0	Lands, Soils & Geology	DBFL
7.0	Hydrology & Water Services	DBFL
8.0	Noise & Vibration	Traynor Environmental
9.0	Air & Climate	Traynor Environmental
10.0	Landscape & Visual	Modelworks
11.0	Traffic & Transportation	DBFL
12.0	Material Assets	McGill Planning Ltd.
13.0	Waste Management	Traynor Environmental
14.0	Cultural Heritage	IAC Archaeologists
15.0	Interactions	McGill Planning Ltd.
16.0	Summary of Mitigations Measure	McGill Planning Ltd.

Table 1.1List of EIAR Chapters

1.8 METHODOLOGY

The preparation of this EIS 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	Consultant	Lead Consultant	Qualifications
Introduction & Methodology	McGill Planning Ltd.	Trevor Sadler	Master of Regional & Urban Planning
Alternatives			
Project Description			
Populations & Human Health			
Landscape & Visual (Written)			
Material Assets			
Interactions			
Summary of Mitigations Measure			
Biodiversity	Openfield Ecological Services	Pádraic Fogarty	BSc in Zoology PhD in Ecology
Lands, Soils & Geology	DBFL	Noel Gorman	BEng, MIEI
Hydrology & Water Services			
Traffic & Transportation			
Noise & Vibration	Traynor Environmental	Nevin Traynor	BSc. Env, H.Dip I.T, Cert SHWW
Air & Climate			
Waste Management			
Cultural Heritage	IAC Archaeologists	Grace Corbett	MA, BA (Hons), MIAI, MCIfA

Table 1.2 Qualifications of EIAR Authors

1.10 DIFFICULTIES IN COMPILING THE SPECIFIED INFORMATION

There were no significant difficulties in completing the Environmental Impact Statement. (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.

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 Dublin City Council and Fingal 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. A copy of confirmation of receipt is submitted with the application.

2 ALTERNATIVES

2.1 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 Designs
- 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.

2.2 ALTERNATIVE LOCATIONS

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

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 2017 Guidelines further:

> *Note also that plan-level/higher-level assessments may have set out project-level objectives or other mitigation that the project and its EIAR should be cognisant of.*

In this regard we note that the proposed development is located in the Dublin City Council North Fringe Area which includes Clongriffin and Belmayne. The subject lands are zoned Z14 in the Dublin City Development Plan 2016-22.

(The small portion of the site north of the Mayne river and located within the Fingal County Council area is zoned Open Space under the Fingal County Development Plan, 2017-23. That portion of the site is proposed to be landscaped as part of the public park).

The Z14 zoning objective states as follows: *"To seek the social, economic and physical development and/or rejuvenation of an area with mixed use, of which residential and "Z6" would be the predominant uses."* Residential is a permitted in principle use.

In addition, the subject lands are designated as part of the Clongriffin Belmayne Strategic Development & Regeneration Area (SDRA) 1 and are subject to a Local Area Plan, which was adopted in 2012 and has been extended until 2022.

Within the LAP the subject lands are designated for Belmayne Phase 3 residential development.

To date the applicant has already secured planning permission within Belmayne Phases 1 and 2 – these comprise the existing Parkside development to the south of the site, with the majority of that area completed.

Whilst the applicant also owns land located south of the existing Parkside development, those lands are located in LAP Belmayne Phase 4 and are not being considered for development at this particular time. In any event the delivery of additional residential development at the current site in the current application is in accordance with the recommended phasing strategy outlined in the LAP.

In summary, the location of new residential development at the subject site has been pre-empted in the adopted Local Area Plan and the City Development Plan, each of which was the subject of Strategic Environment Assessment (SEA) prior to being adopted.

In the drafting of the City Development Plan and the LAP it is noted that the planning authority would've considered alternative locations for residential development.

Given the above, the consideration of alternative site locations for the proposed residential development were not considered necessary or justified in this instance.

Figure 2.1 Parkside Development phasing superimposed on LAP phasing

2.3 ALTERNATIVE USES

As noted above the site is zoned Z14 with "residential" a permitted in principle use. The LAP specifically designates the subject lands for residential development within the Belmayne area. Alternative Z14 uses, such as employment, are not designated for this location under the LAP, although uses complementary to the main residential use are feasible (e.g. public open spaces, gym, and associated residential amenities).

It is also noted that prior to consideration of the site for residential development, the development area was occupied by two temporary schools. The potential for development as a permanent school campus was mooted, however, once the Department of Education secured an alternative site within Belmayne to the south-west this option was no longer pursued.

As a result, the consideration of alternative uses for the proposed residential development were not considered necessary or justified given the specific statutory planning objectives for the site.

2.4 ALTERNATIVE DESIGNS

The layout, scale, quantum, density and design of the proposed development has had due regard to its setting in a suburban residential area east of the city. The proposed layout and design have also been influenced by the site's specific topography and accessibility.

A number of alternative residential layouts and designs have been considered on the subject site. Prior to analysis of the individual alternative designs, it is important to point out that the reason why the development footprint was relatively uniform in all options considered was due to the following:

- The LAP requirement to complete the Mayne River Linear Park running east-west through the landholding.
- The existing completed park area (with attenuation area) located to the immediate west.
- The need to retain a large undeveloped area in the northeast and east of the site to accommodate the predicted floodzone of the Mayne (see Chapter 7 for details).
- The existing Parkside Boulevard public road to the south.
- The orientation of the site, in order to maximise solar gain.

These obvious constraints limited the range of design options available.

2.4.1 Alternative A - Parkside 4 - Feasibility Study

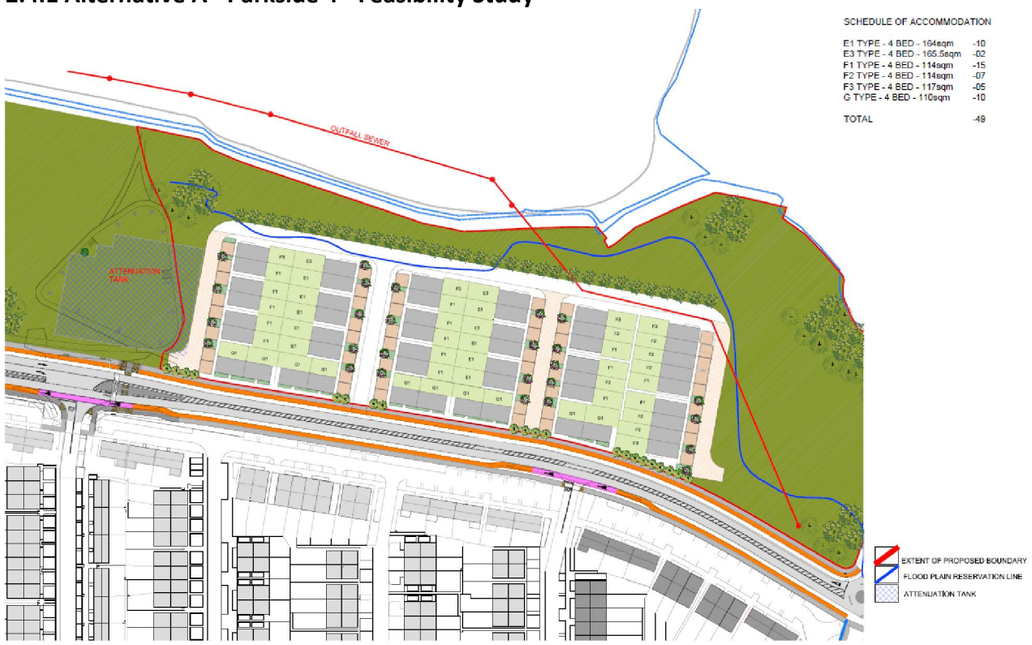

Figure 2.2 Alternative Design A

Alternative A relates to a feasibility study that was conducted as a proposal for c. 49 unit housing development with houses ranging in size from 110 sqm - 165.5 sqm. One site entrance was proposed from Parkside Boulevard. The majority of the houses were laid out in a north south linear pattern enabling good levels of daylight and sun light into the houses and garden areas.

Alternative Design A – Comparison of Environmental Effects

The scheme proposed a low density housing development, c. 15 units per hectare gross, in a neighbourhood that currently dominated by 2-3 storey housing. This development therefore would not achieve a *"highly sustainable, mixed-use urban district, based around high quality public transport nodes, with a strong sense of place"* as outlined within the Clongriffin-Belmayne Local Area Plan. Furthermore, the density of development would not be in accordance with National, Regional or Local Planning Policies. The relationship to the public park to the west, north and east would be poor. Ultimately this option would be an inefficient use of a scare resource, zoned vacant lands. However, the orientation of the buildings, with its east/west facing buildings enabled positive solar gain and passive building principles.

2.4.2 Alternative Design B – Parkside 4 - Extract from DCC Preplanning Booklet

Figure 2.3 Alternative Design B

Figure 2.4 Alternative Design B

Figures 2.3 and 2.4 show an extract from a pre-planning booklet demonstrating a draft proposal for an alternative design on the current application site. This design ranged in height of 1-4 storey blocks comprising of 202 residential units (apartments), a gym and media suite. The unit mix type provided one and two beds only with a total of 144 car parking spaces. This proposed two vehicular accesses off Parkside Boulevard and surface parking.

Alternative Design B – Comparison of Environmental Effects

The proposed density of Alternative Design B improves upon Alternative Design A in terms of higher density and unit types. However, this scheme's density equates to 63.7 units per hectare (gross). It was considered that the surface parking on the site detracted from the character and appearance of the development and also the linear park. Furthermore, the height, which was four storeys in total, would not reflect the permitted development currently under construction on the opposite side of Balgriffin Park which is 6 storeys in height and could lead to a disjointed streetscape along the linear park. The orientation of the buildings enabled passive solar gain for the apartments and provide good quality light into the communal areas.

2.4.3 Alternative C - Parkside 4 - Feasibility Study

Figure 2.5 Alternative Design C

Figure 2.5 shows a design proposal for a feasibility study on the subject site. The proposal's layout also shows four linear blocks of apartment buildings; however, it was redesigned to incorporate 205 no residential units, 216 parking spaces, a concierge facility, business centre, media centre and a gym. Alternative design C unit mix type caters for one, two and three bed units. This proposed two vehicular accesses off Parkside Boulevard and surface parking.

Alternative Design C – Comparison of Environmental Effects
Alternative design C provides for a higher density. Furthermore, the scheme provides a wider mix of residential accommodation to cater for a range resident's needs. However, the surface level parking was still considered detrimental to the overall character and appearance of the scheme and the wider area.

2.4.4 Alternative D – May 2019 – Parkside 4 – Pre-Application Consultation.

Figure 2.6 Pre-application SHD proposal layout

Figure 2.5 shows the pre-application scheme submitted to An Bord Pleanála. The scheme proposed consists of four no. 6 and 7 storey apartment blocks over basement. The total number of apartments permission was sought for was 278 residential units with 90 no. 1 beds, 172 no. 2 beds, and 16 no. 3 beds.

This scheme revised the number of units and site layout. In previous schemes proposed, the apartment blocks were uniform in nature. However, in this pre-application proposal, block D (the block to the east of the site) is designed to be a focal point at the eastern end of Parkside Boulevard to respond to the pocket park directly to the east. Furthermore, a slot within block D of 3 storeys allows daylight penetration into the communal area. It was also considered that the width of the blocks provided better surveillance to Mayne River Linear Park and Parkside Boulevard. The proposal also provides a concierge, media centre and gymnasium. In total, 286 car parking spaces are proposed and 423 bicycle parking spaces are proposed, the majority of which are in the basement, creating a car free environment. Only one vehicular access off Parkside Boulevard is proposed.

Alternative Design D – Comparison of Environmental Effects

The environmental impacts of the previous design alternatives were taken into account when producing the current scheme. It is considered that the proposed density is appropriate for the land and surrounding areas. The mix of units is proposed with a range of 1 bed, 2 bed (3 and 4 persons) and 3 bed apartments provides for a wider range of choice. The provision of underground parking resulted in a more pleasant environment which is more visually attractive when viewed from the park and surrounding public areas.

2.4.5 Submitted application

Figure 2.7 Current SHD proposal layout

The revised layout and design of the proposed development has improved the mix of unit types and density of the development in line with the Board's comments. It is evident from the above that there has been a progressive evolution of design alternatives to arrive at the current proposal. There is a better defined hierarchy of streets, variety of residential character areas and public open spaces throughout. The orientation of the buildings, along with the varying heights enabled communal areas to have good quality daylight and sunlight. The provision of basement car parking result in a pleasant car free development. The linear park has been enhanced with routes and connections indicated across the entire site and into the wider area.

2.5 ALTERNATIVE PROCESSES

This is a residential development located on lands specifically designated for residential development. The site is a vacant brownfield site which was formally occupied by two temporary school. Alternative processes were not considered.

2.6 SUMMARY TABLE OF ALTERNATIVE SITES AND ENVIRONMENTAL IMPACTS

	Alternative A	Alternative B	Alternative C	Chosen Option
Population and Human Health	Neutral	Neutral	Positive	Positive
Biodiversity	Negative	Neutral	Neutral	Positive
Land, Soil and Geology	Negative	Neutral	Neutral	Neutral
Hydrology	Negative	Neutral	Neutral	Neutral
Noise and Vibration	Neutral	Neutral	Neutral	Neutral
Air and Climate	Neutral	Neutral	Neutral	Neutral
Landscape and Visual	Negative	Negative	Positive	Positive
Traffic and Transportation	Negative	Neutral	Neutral	Neutral
Material Assets	Neutral	Neutral	Positive	Positive
Waste Management	Neutral	Neutral	Neutral	Neutral
Cultural Heritage	Neutral	Neutral	Neutral	Neutral

Table 2.1 Assessment of Design Alternatives

3 DESCRIPTION OF DEVELOPMENT

3.1 INTRODUCTION

This section of the EIAR has been prepared by McGill Planning Ltd. with input from the 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 CHARECTERISTICS OF THE SITE

The development site is located within the Belmayne-Clongriffin area approximately c.9km north of Dublin city centre. The majority of the site is within the administrative area of Dublin City Council, with a small area within the north of the site, immediately beside the River Mayne within Fingal County Council area.

The subject lands within Dublin City Council area is zoned Z14 with the following objective - *"To seek the social, economic and physical development and/or rejuvenation of an area with mixed use, of which residential and "Z6" would be the predominant uses."* Residential is a permitted in principle use. These lands are also subject to the Belmayne Clongriffin Local Area Plan 2012-18 (as extended) which specifically designates it for residential development.

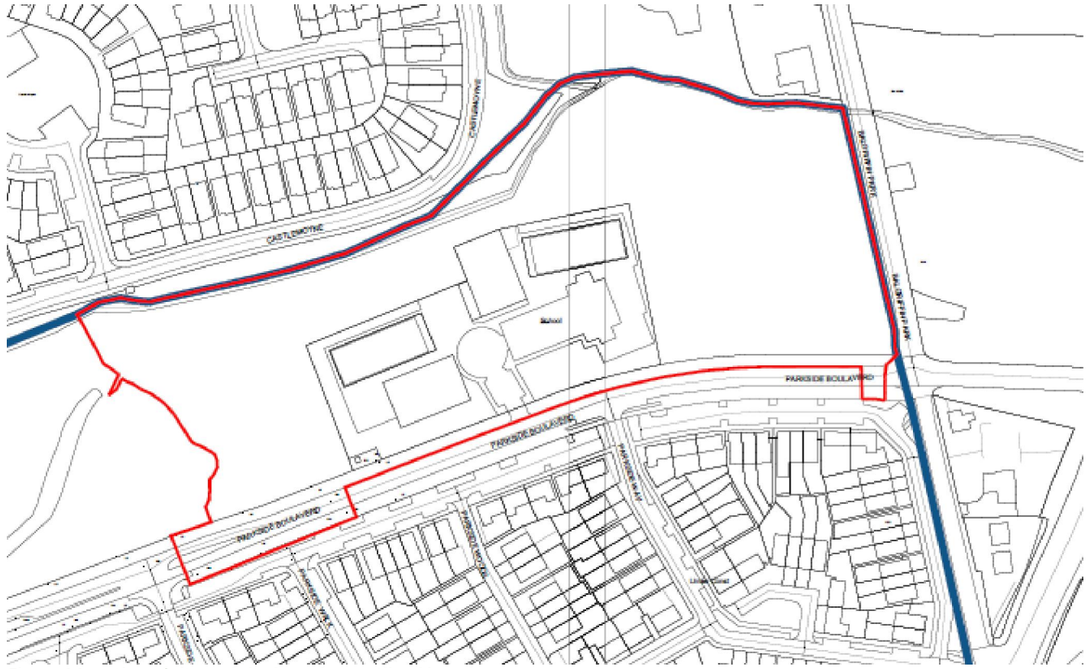

Figure 1 Location of site and site boundary outlined in red

The small portion of the site north of the Mayne river and located within the Fingal County Council area is zoned Open Space under the Fingal County Development Plan, 2017-23. That portion of the site is proposed to be landscaped as part of the public park.

The gross site area is c.3.17Ha and is irregular in shape. The site is defined by Parkside Boulevard, a main road to the south, and the Mayne River to the north. To the east is Balgriffin Park road and west is the existing park and Parkside Playground. The application site is a vacant site that was previously occupied, on a temporary basis, by two schools (Belmayne Educate Together National School and St Francis of Assisi Primary School). These schools have now relocated to a new purpose built school campus off Belmayne Avenue.

The wider area around the site is predominantly residential with Castlemoyne residential estate to the north, and Parkside development to the south. Much of the Parkside development has been completed or is under construction.

The site is located proximate to existing and proposed public transport, local services and significant public open spaces.

3.3 PROPOSED DEVELOPMENT

The proposed development is set out in the statutory notices and will comprise the following:

A residential scheme of 282 residential units in 4 apartment blocks ranging in height from 3 to 7 storeys. The development will include 94 no. 1-bed apartments, 8 no. 2-bed (3 person) apartments, 167 no. 2-bed (4 person) apartments and 13 no. 3-bed apartments. Apartments will have north/south/east/west facing balconies/terraces. The proposed development also includes residential amenity facilities (530 sq.m) incorporating concierge, media centre, and gymnasium. 277 no. car parking and 289 no. cycle parking spaces will be provided in the basement along with basement stores, plant, waste management areas, motor bike spaces and EV charging points. There will be an additional 134 no. surface cycle parking spaces for visitors along with 9 no. surface car parking spaces.

The proposed development provides for the continuation and completion of the Mayne River Linear Park as well as public open space and communal open spaces between the buildings.

Vehicular access is from Parkside Boulevard. Pedestrian and cycle access are from Mayne River linear Park, Balgriffin Road and Parkside Boulevard.

All associated site development works (including site re-profiling), landscaping, boundary treatments and services provision including ESB substations.

3.4 CONSTRUCTION STAGE

This section of the EIAR summarises the construction of the proposed development. An Outline Construction & Environmental Management Plan is submitted with the planning application and should be consulted for further details.

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 Dublin City Council prior to the development of the site. 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 Contractor will be responsible for the security of the site. The Contractor will be required to:

- Operate a Site Induction Process for all site staff;
- Ensure all site staff shall have current 'Safe Pass' cards and appropriate PPE;
- Install adequate site hoarding to the site boundary;
- Maintain site security at all times;
- Install access security in the form of turn-styles and gates for staff;
- Separate public pedestrian access from construction vehicular traffic;

The Main Contractor will be required to submit a site layout plan that will detail the proposed location of the site compound. The site compound will be used as the primary location for the storage of materials, plant and equipment, site offices and worker welfare facilities. As Project Supervisor Construction Stage (PSCS), the Contractor will be responsible for site security and they are to ensure that the site and site compound are adequately secured at all times.

As with the other construction activities that are being carried out within the 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.

The site layout plan will also include the site perimeter and the proposed detail with regards the hoarding and gate system.

Site Clearance and Demolition
This application does not involve the demolition of a structure.

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 08:00 hrs to 19:00 hrs Monday to Saturday 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. It is predicted that there may be up to 150 personnel on site during peak construction activity.

Lighting
There are no proposals to alter the existing lighting arrangements in the area. It is not envisaged that any existing public lighting will need to be disconnected as a result of the proposed works. 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 Traffic Management Plan (TMP) 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 facilities will include canteen, toilet block and drying room for all staff/workers. 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 pumped to a holding tank on site. From here the water will be pumped to a series of settlement tanks. These tanks will act as primary and secondary settlement. The settlement tanks will be of sufficient number and size to allow the necessary retention time for solids to settle. The discharge water from the final tank will be routed to the existing combined water system with approval from the local authority. 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. Roads shall be regularly cleaned and maintained as appropriate. 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 practise and procedures.

3.5 OPERATIONAL STAGE

The proposed development is a residential development on lands within an area of Dublin city that has been identified in national, regional and local planning policy for significant residential development.

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 to 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 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 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.

No significant secondary enabling development, other than as described in this EIAR, is deemed necessary to facilitate the proposed development.

In relation to cumulative impacts these are individually assessed in the individual chapters of the EIAR.

3.7 REFERENCES

Not applicable to this chapter.

4 POPULATION AND HUMAN HEALTH

4.1 INTRODUCTION

This chapter, prepared by McGill Planning Ltd., addresses the impacts of the proposed residential scheme at Parkside 4, Parkside Boulevard, Dublin 13 on population and human health.

4.2 METHODOLOGY

The 2014 EIA directive requires this chapter to assess the likely significant impacts of the proposed development in the following aspects:

- Land Use and Settlement Patterns
- Population
- Age Profile
- Employment
- Socio-Economic and
- Human Health

The subject development is for 282 apartment units distributed in four blocks varying in height from 3-7 storeys in height.

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 human sources in the area. Desk based study of Central Statistics Office Census data, the ESRI Quarterly Economic Commentary, and national, regional and local planning documents was also carried out.

4.3 RECEIVING ENVIRONMENT

LAND USE AND SETTLEMENT PATTERNS

The subject site has a gross site area of c. 3.17Ha and is located in the 'North Fringe' area of Dublin City, c.9km north of the city centre.

The surrounding context comprises residential estates and associated communal facilities. The application site is located to the north of Parkside Boulevard, on a site that is currently vacant was previously occupied, on a temporary basis, by two schools (Belmayne Educate Together National School and St Francis of Assisi Primary School), south of the Mayne River and Castlemoyne Housing Estate, east of Balgriffin Park road and west of Parkside Playground. The proposed development will comprise a residential scheme of 282 residential units in 4 apartment blocks ranging in height from 6 to 7 storeys in height. The development will include 94 no. 1 bed apartments, 175 no. 2 bed apartments and 13 no. 3 bed apartments.

Within the wider area, to the north, south and east is predominantly residential land uses. The neighbourhood is served by the retail outlets in Clare Hall which has supermarkets, local shops, and other facilities and services. Clongriffin neighbourhood will also serve the future population of the development as they provide for a range of services including a medical centre, pharmacy, local shops, and restaurants. Other local services such as post office, hair salons and playgrounds are available at both neighbourhood centres.

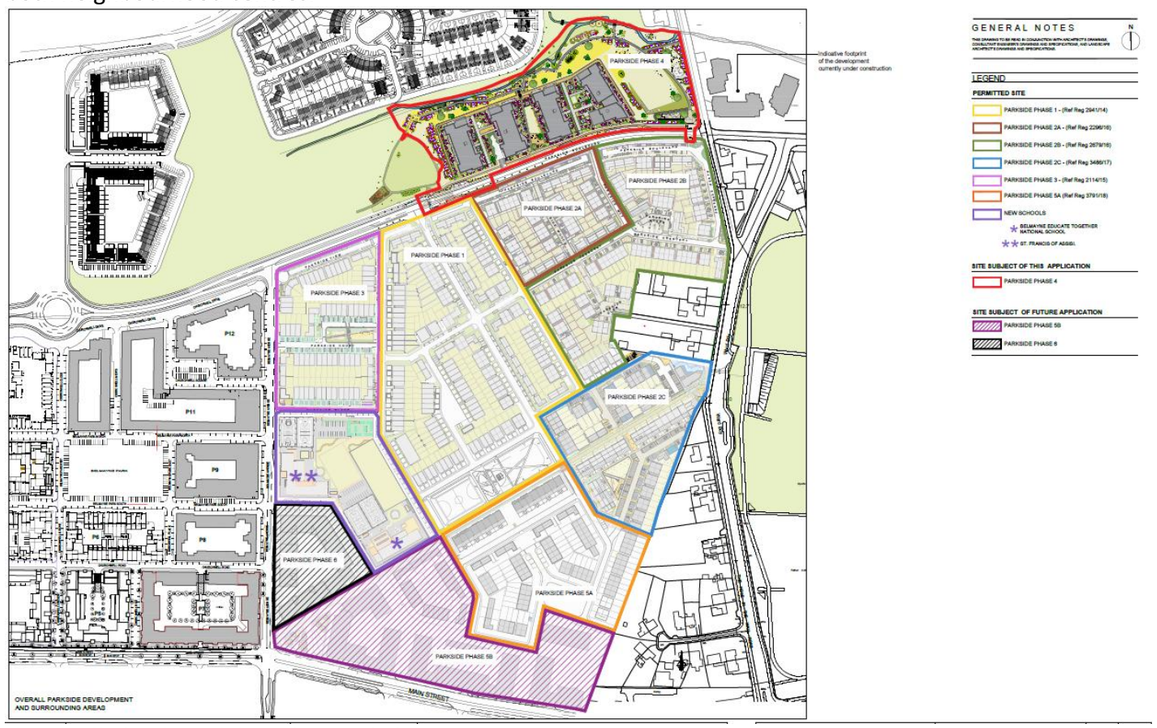

Figure 4.1 Site location - existing and proposed schemes

The previous schemes in the Parkside area have been predominantly family housing comprising 3-4 bedroom houses located in the central area with some smaller 2-3 bedroom apartment/ duplex units along the greenway, which will accommodate a wide variety of future occupants including single occupants, couples and elderly residents.

The site, the subject of this application, is located on the opposite, northern side of the Parkside Boulevard. It is on a site which is currently vacant, having previously been used as temporary accommodation for two schools. This proposed development will provide a strong urban edge completing the frontage along Parkside Boulevard, providing a highly legible street. It will be a continuation of the apartment development to the east (Marrsfield Avenue) providing a 6 storey building which is currently under construction.

This proposed 3 – 7 storey development will provide a strong urban edge to Parkside Boulevard, and high levels of visual surveillance to public open spaces within the scheme. It will also deliver the central section of the Mayne River Linear Park. Without this strong edge of development this road will be a long, lonely un-surveyed area beside a wide-open park resulting in an uninviting, intimidating and unfriendly area to

be, particularly on a winters evening. This increase in density and height ensures that this route has a more urban feel and provide a connection between Malahide Road, Fr Collins Park and Clongriffin New Town which is a key strategic east-west connection in this area.

This development will also provide for a setting for the linear park that follows the Mayne River and enables the formation of further green infrastructure linkages between Baldoyle, Clongriffin, Belmayne and Northern Cross, as advocated in the Clongriffin-Belmayne LAP.

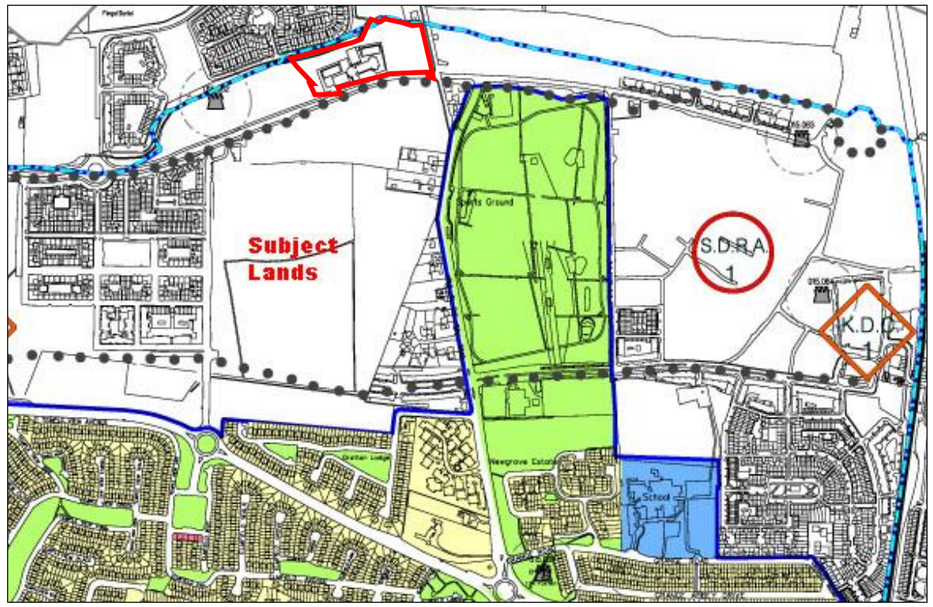

Figure 4.2 Dublin City Development Plan 2016 excerpt showing location of proposed scheme

POPULATION

The Census of Ireland shows that population of Ireland increased between 2002 and 2016 by 12.3% bringing the total population of Ireland 4,761,865. Regional Authority of Dublin and Dublin City Council populations for the same period grew by 13% and 9.5% respectively. Physical constraints and socio-economic factors of Dublin City have restrained population growth within the actual city boundary.

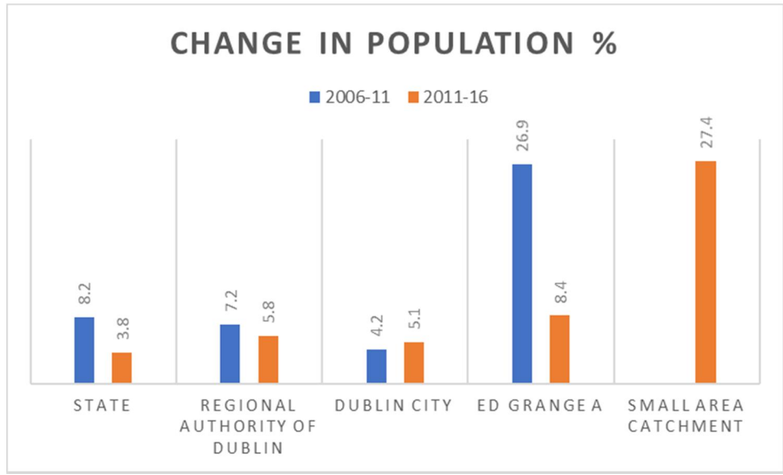

Figure 4.3 Change in population percentage (Source: CSO)

For the purpose of this assessment a catchment area of 1-kilometre radius has been chosen which comprises of 32 Small Area divisions identified within the 2016 census.

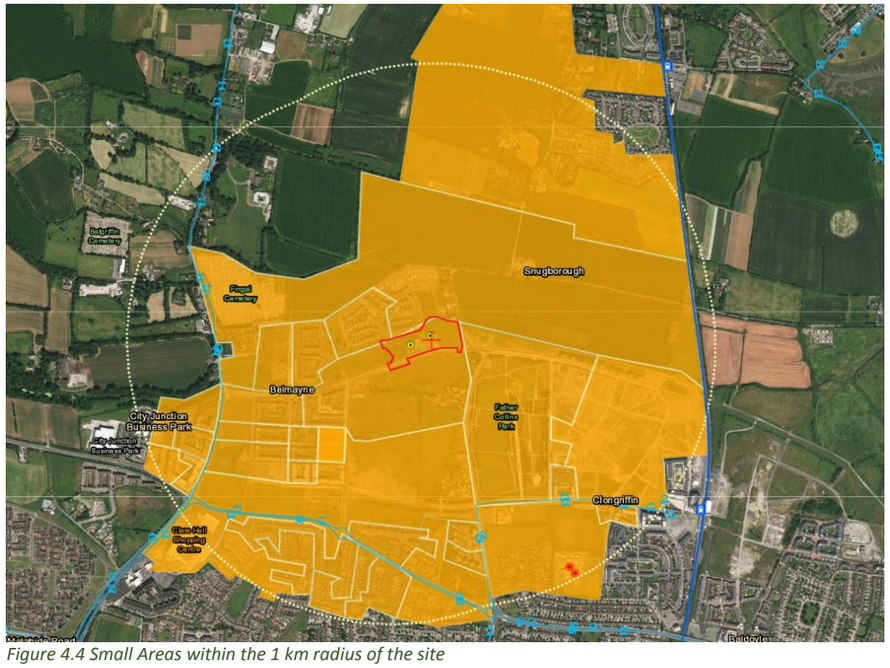

Figure 4.4 Small Areas within the 1 km radius of the site

	2006	2011	2016
State			
Total	4,239,848	4,588,252	4,761,865
Male	2,121,171	2,272,699	2,354,428
Female	2,118,677	2,315,553	2,407,437
Regional Authority of Dublin			

Total	1,187,176	1,273,069	1,347,359
Male	582,557	619,902	658,371
Female	604,619	653,167	688,988
Dublin city			
Total	506,211	527,612	554,554
Male	248,087	257,303	272,270
Female	258,124	270,309	282,284
ED Grange A			
Total	7050	8948	9,696
Male	3536	4352	4,751
Female	3514	4596	4,945
Small Area Catchment			
Total	-	8100	10316
Male	-	3845	5001
Female	-	4255	5315

Table 4.1Population statistics (Source: CSO)

The area directly north of the site comprises of residential developments. The Small Area Catchment identified for the site has shown large growth of 27.8% within 2011-2016. The Electoral Division (Grange A) has shown large growth of 26.9% between 2006-2011 and a slower rate of growth of 8.4% between 2011-2016.

AGE PROFILE

The local Electoral Division Grange A has a strong representation of working age group with 61% of the population belonging to the 19-64 age group in 2016. The analysis of CSO data has another notable trend that is shown by the locality is the robust representation of 0-18 age group with consistent 31% share of the population.

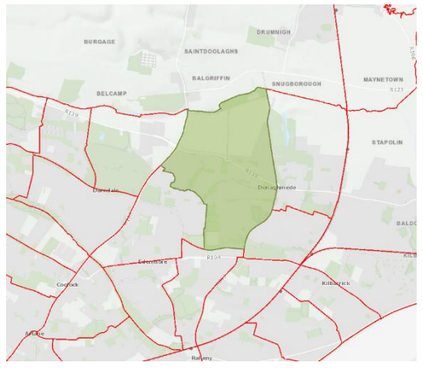

Figure 4.5 Local ED Grange A

The age sex ratio for Dublin city is 1036 females to a 1000 male births in 2016. For the same period the Electoral Division containing the site and the Small Area Catchment had a sex ratio of 1040 and 1062 females respectively for 1000 males.

Age sex pyramid prepared for Dublin city (given in Appendix 4.1) shows that the population trend is dominated by the 20-30 age group and there is a visible decline in numbers of 10-14-year olds for the city. The same analysis when conducted for the Grange A Electoral Division of the site shows that the population for the locality is dominated by the settling down age group 30-45 years. The 0 to 14 age group also has a very robust representation.

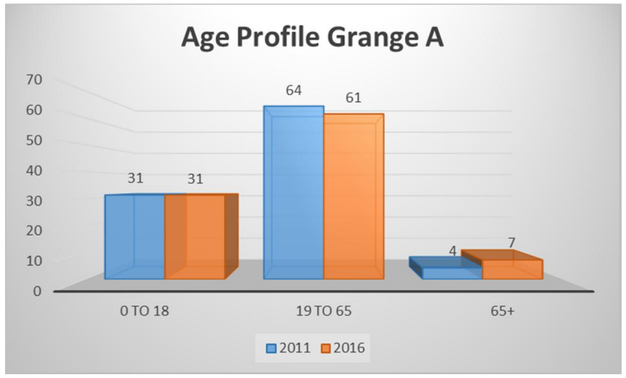

Figure 4.6 Age profile percentages Source CSO

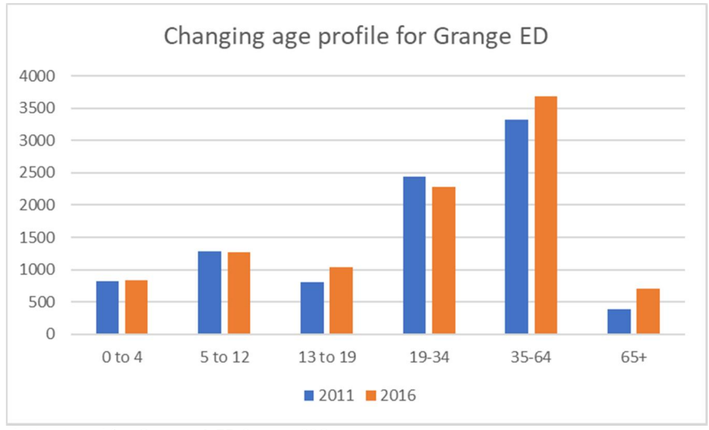

Figure 4.7 Changing population trend for Grange A ED Source CSO

2011 Population	2016 Population	Population Change 2011-2016	Percentage Change 2011-2016
8,948	9,696	748	8.3%

Table 4.2 CSO Data of the Grange A Electoral Division

Age	2011	2016	Change	Percentage Change
0-4 Pre-school	817	837	+20	+2.38
5-18 School Children	1,987	2,198	+211	+9.6
19-34 Adults	2,436	2,286	-150	-6.5
35-64 Adults	3,327	3,676	+349	+9.5
65+ Adults	381	699	+318	+45.5

Table 4.3 Age Groups CSO Data of the Grange A Electoral Division

Approximately 9,696 no. people were living within the Grange A Electoral Division at the time of the 2016 Census. The area saw an 8.3% increase in population between the 2011 and 2016 Census. The analysis of CSO data showed that the population was aging with a 45.5% increase in population over the age of 65, an increase of 9.5% in population of older adults (35-64 years old) and a decrease of 6.5% for young adults (19-34 years old). It is worth noting that 9.6%, of the population are of school going age. From the

population data for Grange A it can be found what percentage share of the existing population attends pre-school, primary and post primary schools. This calculation is shown in the table 4.3. It can be seen that a major share of the 0-18 age population are primary school goers.

EMPLOYMENT

	Q2 2017	Q1 2018	Q2 2018	Q3 2018	Q4 2018	Q1 2019	Q2 2019	Annual change
								2018-19
Employed	2,063,000	2,220,500	2,255,000	2,273,200	2,281,300	2,301,900	2,300,000	+45,000
Unemployed	141,500	132,900	144,300	143,800	128,800	114,400	130,800	-13,600
In labour force	2,204,500	2,353,400	2,399,300	2,417,000	2,410,100	2,416,300	2,430,800	+31,400
Not in labour force	1,477,400	1,470,500	1,448,900	1,443,200	1,467,000	1,480,200	1,481,800	+32,900

Table 4.4 ILO Economic Statistics Source CSO

CSOs Quarterly Labour Force Survey provide information in relation to national employment levels, unemployment level and current labour force participation rated. Data for Quarter 2 shows that the number of employed people increase by 45,000 (1.9%) for the state during the 2018-19 period bringing the total employment to 2,300,000. This compares with an annual increase of 192,000 for the 2017-18 period. Unemployment decreased by 13,600 for the 2018-19 period.

Labour Force Survey Employment Series for Quarter 1 2019 gives details regarding the employment status and sectoral groups. Although all sectors had a notable increase in the number of employees within the 2013-19 period. The most notable increases were observed in the Construction sector with +102.1% and Accommodation and food service activities with +42.1% increase within the same period. Between Q1 2013 and Q1 2019, the number of employees increased by 400,900 or 25.6% while those classified as self-employed increased by 14,900 (+4.8%). The Professional and Skilled trades occupational groups, rising by 85,100 and 60,900 respectively, showed the largest increase in the number of employees over the period. The largest increases in self-employment were in the Skilled Trades and the Caring, leisure and other services groups at 11,600 and 5,000 respectively.

Employment data for the Electoral Division indicate that there has been significant increase in the number of employed during the 10-year period from 2006-16(+28%). Although there is a corresponding decrease in the number of unemployed persons from 2011-16 (-19%) there is a significant increase in the number of unemployed persons by 841 persons. This can be attributed to the economic downturn during in 2008.

ED Grange A	2006	2011	2016
Employed	3512	4,025	4,497
Unemployed/ Looking for Job	191	1277	1031
Total	3703	5,302	5,528

Table 4.5 Employment data for Local ED Grange A

SOCIO ECONOMIC

The site is served by an extensive high-quality public transport network with Clongriffin Train Station at 1.5km of the site and a number of Dublin bus routes serves the site at accessible distance. Drogheda/Dundalk train, DART services and Europort Rosslare lines connects the site from Clongriffin station to the North up to Dundalk, to the city centre and to the South to Bray/Greystones. Numbers 42 and 43 Dublin Buses run along the Malahide Road, and the numbers 15, 27 and 27x travel along the R139 to the south of the site. While the number 29 runs along the Grange Road. Within the wider area, to the north, south and east is predominantly residential land uses.

Retail
Regarding retail services for the area Clare Hall shopping centre is less than 2 km from the site and a range of local shops and services are available along- Belmayne Avenue, Malahide road and along main street. Local shops and other services along main street are only c.850m from the site. Within the masterplan scheme it is envisaged that the plots along main street is going to consist of commercial and retail elements.

Community and Social infrastructure
A number of churches and community facilities also service the site. The site location also benefits from the proximity of the site to extensive recreational facilities. Fr Collins Park lies adjacent to the site and provides the residents of the area with a wide variety of recreational spaces. The park has dedicated skateboard parks, two playgrounds and 5 football pitches. Parkside and Belmayne playgrounds also serve the site. Proposed Mayne River Park will provide a green and attractive setting for the buildings while, in turn, the buildings will provide 24-hour informal surveillance of the park. The site is also surrounded by a range of golf courses. The master plan for the site and surrounding also includes proposals for a community centre and other services which will benefit the existing and future population of the site.

Schools
The site is accessible to a range of schools in the wider area. There are 6 primary schools located within a 20 minutes walktime of the site and over 20 10-minute drive time catchment of the site. The St. Francis of Assisi primary school and Educate Together primary school, previously located on the subject lands, are now located 5 mins walk to the south at Belmayne Avenue. There are 10 secondary schools located in the 10-minute drive time catchment of the site. Of this Grange community college and Gealcholáiste Reachrann are located within walkable distance of the site (less than 20 mins). The school enrolment data shows that the proposed development and the population generated can be accommodated comfortably within the existing school network for the locality.

Childcare services
Of the 23 existing crèche facilities in the wider area, 11 are located within c. 1 km of the subject site. This data was collected in conjunction with Dublin City Council, Pobal, Google Maps, the applicable crèche website as well as phoning the various childcare/crèche facilities. The information gathered on childcare services is shown in table 4.9. The Parkside development to the south includes for a permitted creche which will accommodate 117 children and is planned for construction shortly. This facility is intended to serve all of the Parkside developments include the current proposal, which is predominantly 1 and 2 be apartments and not expected to generate significant private childcare demand.

HUMAN 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 or processes (including SEVESO II Directive sites) which would be likely to result in a risk to human health and safety.

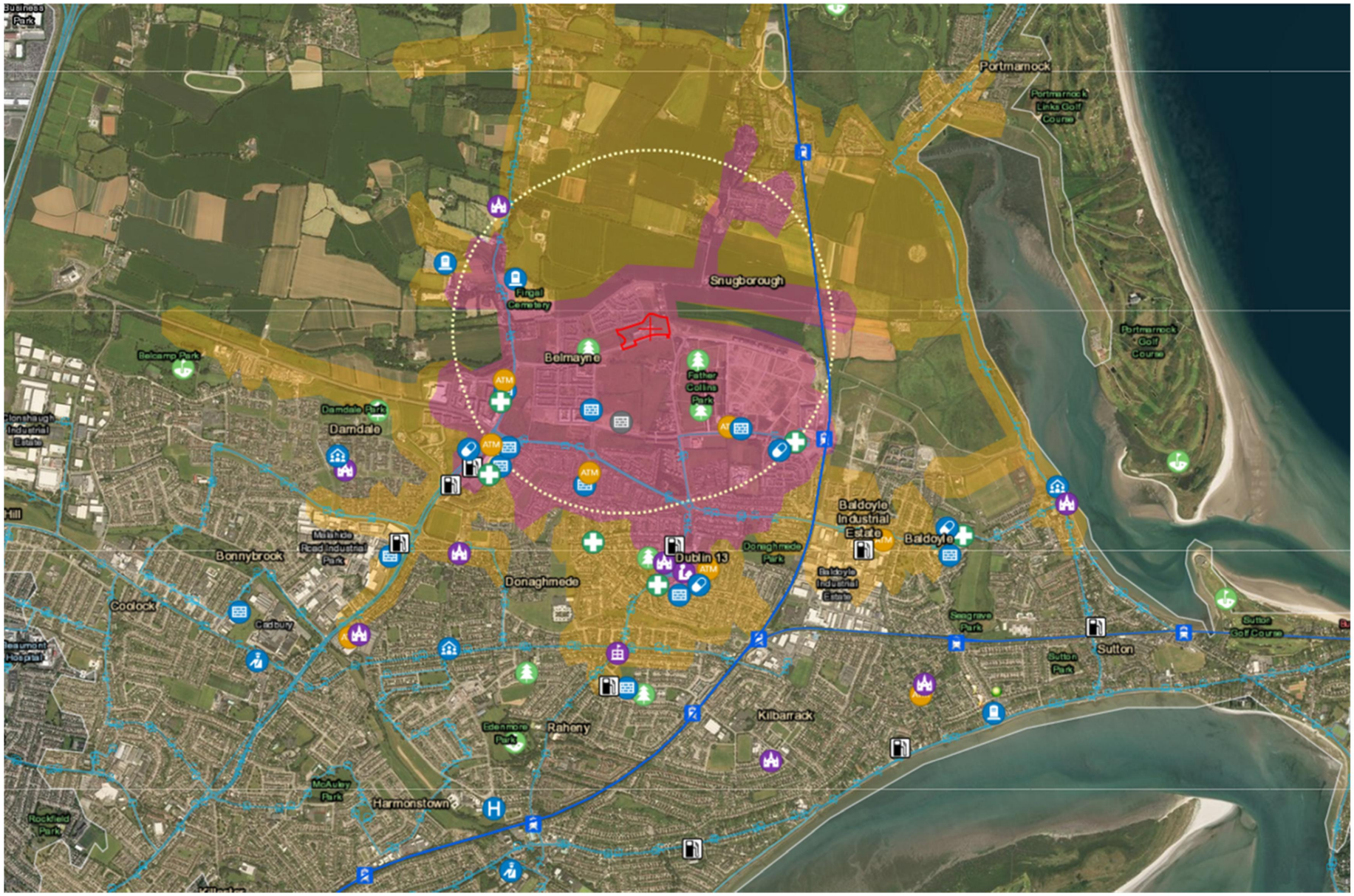

Figure 4.8Map locating existing services and community infrastructure for the site

Figure 4.9 Primary and Post Primary Schools in relation to the site

PRIMARY SCHOOLS

	County	Roll Number	Official School Name	Address 1	Address 2	Address 3	Ethos/Religion	FEMALE	MALE	TOTAL
1	Dublin City Council	20308Q	Belmayne Educate Together National School	Balgriffin Park	Belmayne	Dublin 13	MULTI DENOMINATIONAL	224	218	442
2	Dublin City Council	20304I	St. Francis of Assisi National School	Belmayne	Balgriffin	Dublin 13	CATHOLIC	237	218	455
3	Dublin City Council	19538D	ST KEVINS JUNIOR N S	NEWBROOK AVE	DONAGHMEDE	DUBLIN 13	CATHOLIC	86	112	198
4	Dublin City Council	19611K	SCOIL NAOMH COLMCILLE	NEWBROOK RD	DONAGHMEDE	DUBLIN 13	CATHOLIC	91	94	185
5	Dublin City Council	19406J	HOLY TRINITY SEN N S	GRANGE ROAD	DONAGHMEDE	DUBLIN 13	CATHOLIC	168	188	356
6	Dublin City Council	19473B	SCOIL BHRIDE	GRANGE ROAD	DONAGHMEDE	DUBLIN 13	CATHOLIC	204	219	423
7	Dublin City Council	19471U	ST PAULS JUNIOR NATIONAL SCHOOL	AYRFIELD	MALAHIDE RD	DUBLIN 13	CATHOLIC	116	110	226
8	Dublin City Council	19618B	ST PAULS SEN NS	AYRFIELD	MALAHIDE RD	DUBLIN 13	CATHOLIC	100	129	229
9	Dublin City Council	19524P	OUR LADY IMMAC SEN N S		DARNDALE	DUBLIN 17	CATHOLIC	93	87	180
10	Dublin City Council	19454U	DARNDALE NS JUNIOR		DARNDALE	MALAHIDE ROAD, DUBLIN 17	CATHOLIC	118	110	228
11	Dublin City Council	19668Q	ST FRANCIS SENIOR N S	PRIORSWOOD	DUBLIN 17		CATHOLIC	97	90	187
12	Dublin City Council	17104G	ST FRANCIS JUNIOR NATIONAL SCHOOL	Clonshaugh Drive	Priorswood	Dublin 17	CATHOLIC	95	110	205
13	Dublin City Council	19913D	ST JOSEPHS NS	MACROOM ROAD	BONNYBROOK	DUBLIN 17	CATHOLIC	156	196	352
14	Dublin City Council	19920A	ST JOHN OF GOD N S	KILMORE ROAD	ARTANE	DUBLIN 5	CATHOLIC	176		176
15	Dublin City Council	18362K	S N CAITRIONA NAIONAIN	COOLOCK	DUBLIN 5		CATHOLIC	126	110	236
16	Dublin City Council	18361I	S N CAITRIONA C	COOLOCK	DUBLIN 5		CATHOLIC	202		202
17	Dublin City Council	19777V	GAELSCOIL MIDE	Bóthar an Ghleanntain Ghlais	Cill Bharróg	Baile Átha Cliath 5	CATHOLIC	112	126	238
18	Dublin City Council	19954R	NORTH BAY EDUCATE TOGETHER NS	GREENDALE AVENUE	KILBARRACK	DUBLIN 5	MULTI DENOMINATIONAL	101	115	216
19	Fingal County Council	19393D	MHUIRE IOSEF JUNIOR	Verbena Avenue,	Sutton	Dublin 13	CATHOLIC	204	207	411
20	Fingal County Council	19533Q	S N MUIRE AGUS IOSEF	Verbena Ave	Bayside	Sutton	CATHOLIC	211	226	437
21	Fingal County Council	09642P	BURROWS N S	Howth Road	Sutton	Dublin 13	CHURCH OF IRELAND	114	112	226
22	Dublin City Council	20437E	ST LAURENCE'S NATIONAL SCHOOL	BROOKSTONE ROAD,	BALDOYLE,	DUBLIN 13	CATHOLIC	213	233	446
23	Fingal County Council	20445D	MALAHIDE PORTMANOCK EDUCATE TOGETHER NATIONAL SCHOOL	MALAHIDE ROAD,		DUBLIN 17	MULTI DENOMINATIONAL	196	218	414

	Schools within walk time catchment highlighted
	Schools within 5-minute drive time catchment highlighted

Table 4.6 List of Primary schools and their enrolment for 2018-19 year (Source Major Projects, Dept. of Education and Skills)

POST PRIMARY SCHOOLS

	Roll Number	Official School Name	Address 1	Address 2	Address 3	Eircode	Ethos/Religion	FEMALE	MALE	TOTAL
1	91325R	Malahide Community School	Broomfield	Malahide	Co. Dublin	K36 PR28	INTER DENOMINATIONAL	604	611	1,215
2	91324P	Portmarnock Community School	Carrickhill Road	Portmarnock	Co Dublin	D13 F766	INTER DENOMINATIONAL	415	516	931
3	60021U	St Marys Secondary School	Baldoyle	Dublin 13		D13 W208	CATHOLIC	300		300
4	91342R	Pobalscoil Neasáin	Baldoyle	Dublin 13		D13 F9K2	INTER DENOMINATIONAL	288	483	771
5	70020B	Grange Community College	Grange Road	Donaghmede	Dublin 13	D13 NX25	INTER DENOMINATIONAL	77	153	230
6	91318U	The Donahies Community School	Streamville Road	Dublin 13		D13 YN77	INTER DENOMINATIONAL	232	249	481
7	60550B	Chanel College	Coolock Village	Malahide Road	Dublin 5	D05 EY86	CATHOLIC		598	598
8	60291D	Árdscoil La Salle	Raheny Road	Raheny	Dublin 5	D05 Y132	CATHOLIC	79	110	189
9	60370W	ST. FINTAN'S HIGH SCHOOL	DUBLIN ROAD,	SUTTON,	DUBLIN 13	D13HN59	CATHOLIC		706	706
10	76085N	GAELCHOLÁISTE REACHRANN	BÓTHAR MHAINISTIR NA GRÁINSÍ,	DOMHNACH MÍDE,	BAILE ATHA CLIATH 13	D13NP52	INTER DENOMINATIONAL	216	192	
11	TBC	Donaghmede Howth	Baldoyle Stapolin		D13					

	Schools within walk time catchment highlighted
	Schools within 5-minute drive time catchment highlighted

Table 4.7 List of Post Primary Schools and their enrolment for 2018-19 year (Source Major Projects, Dept. of Education and Skills)

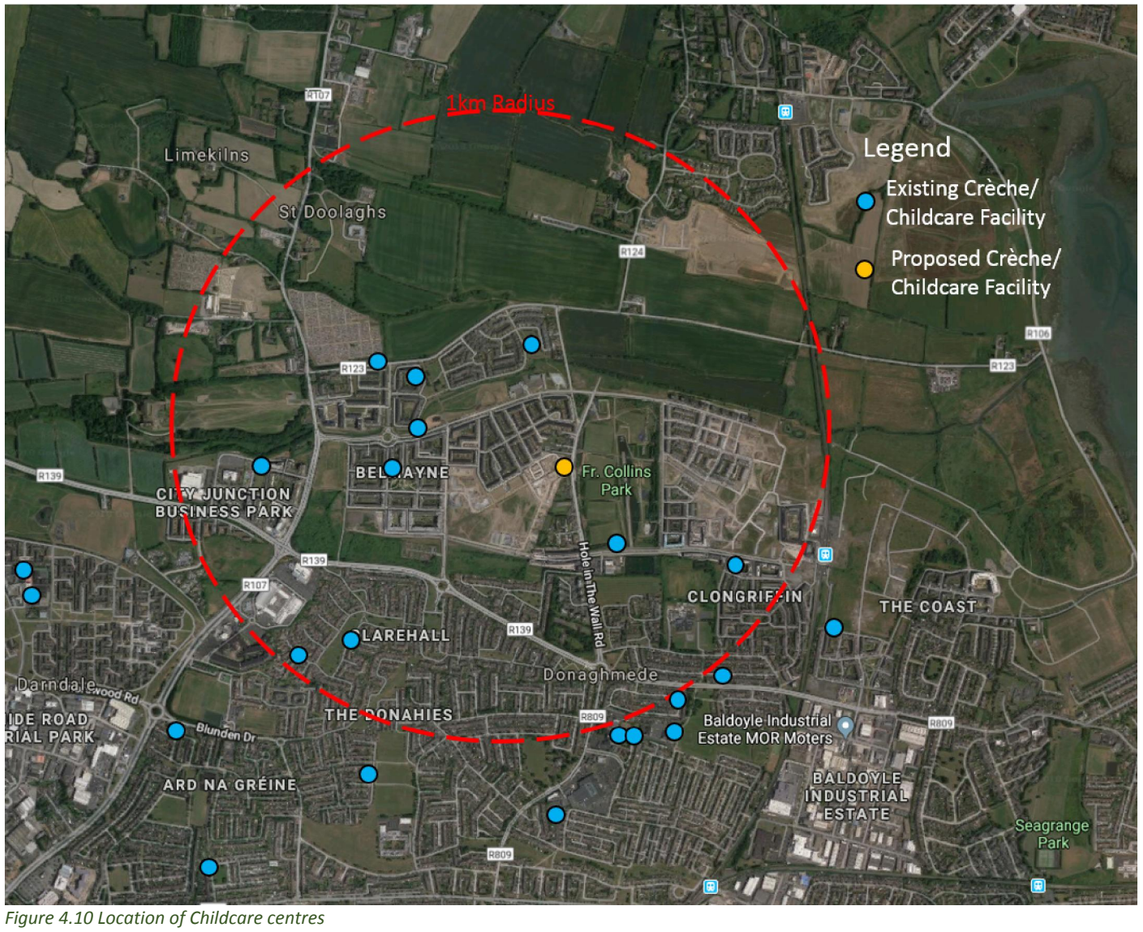

Figure 4.10 Location of Childcare centres

Crèche/Childcare Facilities	Total no. Children	Vacancy	Services Offered
Giraffe Childcare Northern Cross	No Response	No Response	Full Day Care
Little Rainbows	96	Not provided	Full Day Care
Little Blossoms Crèche	33	Not provided	Full Day Care
Bumblebees	55	0	Full Day Care
Learning Circle Childcare	32	Not provided	Full Day Care
The Learning Circle	60	0	Full Day Care
Tigers Childcare Balgriffin	85	0	Full Day Care
Ciara's Playschool	22	0	Sessional
Lovable Me Montessori	44	0	Sessional
Pipalong Childcare	44	0	Sessional/After school
Madeline's Preschool	20	0	Not provided
Children's Choice	34	0	Full Day Care
Coraline's Playschool	16	0	Sessional/After school
Fizzy Fingers	22	0	Sessional
Mead Day Care Centre	55	0	Part Time
Stepping Stones	14	8	Sessional
Little Jesters Playschool	16	0	Sessional
Ayrfield Community Playgroup	16	4	Sessional
The Kids Den Preschool	40	0	Full Day Care
Learn and Play Preschool and Afterschool CLG	22	11	Part Time
Darndale Belcamp New Life Centre LTD	36	0	Afterschool
Darndale/Belcamp Integrated Childcare Service	234	7	Full Day Care
Drumnigh Montessori Primary School	44	2	Sessional
Total	**1,040**	**32**	
Proposed 507 sq.m. 2 storey Crèche (Permission Granted Reg. Ref. 3486/17)		**117**	
Total Vacancy rate for Crèche (including proposed crèche Reg. Ref. 3486/17)		**149**	

Table 4.8 List of Childcare centres

4.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development will comprise a residential scheme of 282 residential units in 4 apartment blocks ranging in height from 3 to 7 storeys. The development will include 94 no. 1-bed apartments, 8 no. 2-bed (3 person) apartments, 167 no. 2-bed (4 person) apartments and 13 no. 3-bed apartments. Apartments will have north/south/east/west facing balconies/terraces. The proposed development also includes residential amenity facilities (530 sq.m) incorporating concierge, media centre, and gymnasium. 277 no. car parking and 289 no. cycle parking spaces will be provided in the basement along with basement stores, plant, waste management areas, motor bike spaces and EV charging points. There will be an additional 134 no. surface cycle parking spaces for visitors along with 9 no. surface car parking spaces. The proposed development provides for the continuation and completion of the Mayne River Linear Park as well as public open space and communal open spaces between the buildings. Vehicular access is from Parkside Boulevard. Pedestrian and cycle access are from Mayne River linear Park, Balgriffin Road and Parkside Boulevard. All associated site development works (including site re-profiling), landscaping, boundary treatments and services provision including ESB substations.

4.5 IMPACT ASSESSMENT

IMPACT ON LOCAL BUSINESSES AND RESIDENCES

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. The scheme 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.

The increase in residents to the area will also result in improving the vibrancy and vitality of the area and in the growth of the community. The previous schemes have been predominantly family housing comprising 3-4 bedroom houses located in the central area with some smaller 2-3 bedroom apartment/ duplex units along the greenway, which will accommodate a wide variety of future occupants including single occupants, couples and elderly residents. This development also provides for a setting for the linear park that follows the Mayne River and enables the formation of further green infrastructure linkages between Baldoyle, Clongriffin, Belmayne and Northern Cross, as advocated in the Clongriffin-Belmayne LAP.

IMPACT ON HUMAN HEALTH

Construction Phase
The construction phase of the proposed development may give rise to short term (maximum 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 from 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.

IMPACT ON AIR QUALITY AND CLIMATE

Construction Phase
As a former brownfield site, the construction associated with the development is unlikely to cause major disturbances to the site and the locality. The likely impacts during the construction phase include dust emissions from moving heavy machinery and construction traffic. If not properly mitigated this is likely to affect the surrounding existing residential estates such as Castlemoyne estate to the North and operational phases of Parkside scheme to the South.

Due to the extent of the proposed works on the site there will be an increase in exhaust emissions, but these will be a short-term effect and will not have any significant detrimental impacts to the air quality. The increase in exhaust emissions and dust released 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 kitchens 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 are not anticipated to be of significant impact to the existing or expected population of the locality.

CHILDCARE

The 2016 census indicates the share of population in the Primary school (5-12 years of age) and Post Primary school (13-19 years of age). This percentage share was used to estimate the number of preschools, primary and post primary school children that will be generated by the proposed scheme.

Parkside Phase	Total No. of Units	No. without 1-beds	No. without 1 and 2 beds
Phase 1 – Reg Ref. 2941/14	166	166	166
Phase 2A - Reg. Ref. 2296/16	48	48	48
Phase 2B - Reg. Ref. 2679/16	94	94	94
Phase 2C - Reg. Ref. 3486/17	89	89	66
Phase 3 - Reg. Ref. 2114/15	71	71	71
Phase 5A – Reg. Ref. 3791/18	96	96	80
Proposed Phase 4 Development	*282*	*188*	*13*
Total No. of Units	**846**	**752**	**538**

Table 4.9 Unit Total and Breakdown for Overall Parkside Development

Based on an average household size of 2.7 then the estimated population of the overall Parkside development would be c.2,284 persons.

Parkside (Overall Development)	No. of Residential Units	Estimated population	No. of children in primary school age 15.6%	No. of children in post primary school age 9.8%
Parkside Phase 1 (complete)	166	448	70	44
Parkside Phase 3 (complete)	71	192	30	19
Parkside Phase 2A(complete)	48	130	20	13
Parkside Phase 2B (nearly completed)	94	251	39	25
Parkside Phase 2C (nearing completion)	89	240	37	24
Parkside Phase 5A	96	259	40	25
Parkside Phase 4	282	761	119	75
TOTAL	846	2284	356	223

Table 4.9 Percentage share of Preschool, Primary school and Post Primary school children for the local ED Grange A

The estimated maximum school going population that will be generated by the entire scheme is 356 primary school children and 223 post primary school children. However, the proposed development will not generate this level of demand instantly given that the development will be constructed in phases and will initially be occupied by those predominantly in the early family cycle (e.g. young, singles, newlyweds). The proposed scheme for Parkside Phase 4 includes 94 no. 1 bed apartment units that are unlikely to be occupied by families with children.

In assessing the Childcare spaces that will be generated by the proposed scheme requirements set by Childcare Facilities Guidelines for Planning Authorities, 2001, and Sustainable Urban Housing: Design Standards for New Apartments, 2018 where used. The Quarterly National Household Survey (QNHS) carried out by the Central Statistics Office includes a Special Module on Childcare. The most recent report on this module was published for Quarter 4 2016. What the figures indicate is that crèche/Montessori use for pre-school age children Nationally is 19%, however the highest rate of use can be found in Dublin (25%) (Source: CSO.ie). The table below provides an outline of the demand generated for childcare numbers by the entire scheme and assesses if the currently existing /proposed services can meet this demand generated.

Parkside (All Phases)	Population	No. without 1-beds	No. without 1 and 2 beds
Total Pop Estimate (@2.7 Household Size)	2284	2030	1453
Total Pop of 0 - 4 years (8.6% Census)	196	175	125
Total 0-4 Years Requiring Private Childcare (QNHS 25%)	49	44	31
Total 0-4 Years Requiring Private Childcare (Worst Case 50%)	98	87	62

Table 4.10 Private Childcare Demand for Overall Parkside Development

Parkside (Phase 4)	Population	No. without 1-beds	No. without 1 and 2 beds
Total Pop Estimate (@2.7 Household Size)	761	508	35
Total Pop of 0 - 4 years (8.6% Census)	65	44	3
Total 0-4 Years Requiring Private Childcare (QNHS 25%)	16	11	1
Total 0-4 Years Requiring Private Childcare (Worst Case 50%)	33	22	2

Table 4.11 Private Childcare Demand for Parkside Phase 4

In summary, the above tables indicate that the likely childcare demand arising out of the Parkside 4 development will be very low and when assessed in conjunction with the adjoining Parkside phases then the total demand will be at worst 98 places, and likely much lower than that when 1 and 2 bed units are excluded.

The existing and proposed Parkside developments will be served by a centrally located creche as permitted in Phase 2C under Ref. 3486/17. This permitted creche (c. 507 sq.m) is designed to accommodate 117 childcare places and is intended to serve the entire Parkside developments as well as having surplus spaces to serve adjoining developments if required.

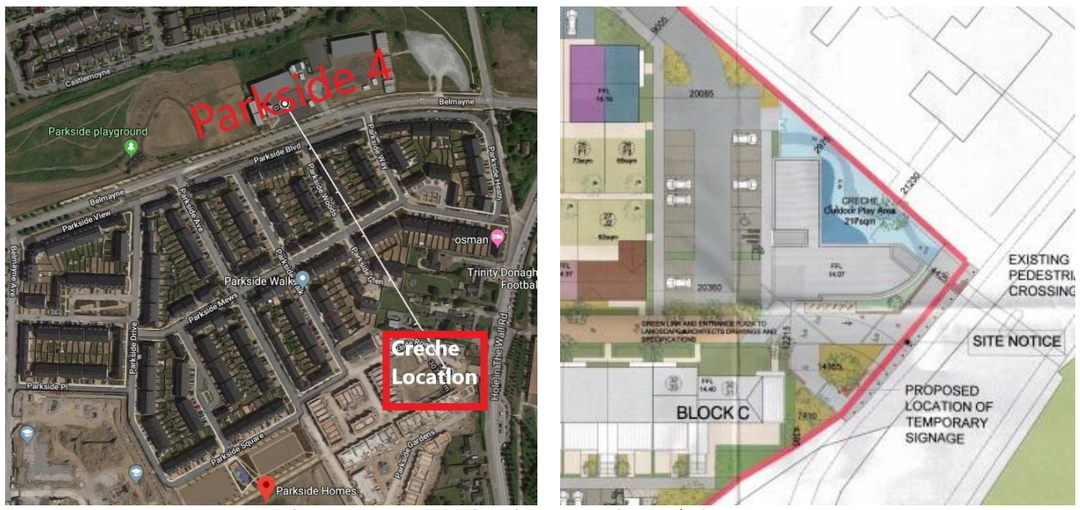

Figure 4.11 Location and Site Plan of Permitted Parkside Crèche (DCC Reg. Ref.: 3486/17)

It is understood that that documentation in relation to the completion of the creche has been submitted to Dublin City Council in compliance with conditions under Ref. 3486/17. It is also noted, according to the creche audit carried out by McGill Planning, that within the existing creches in the wider area there is existing supply of c. 32 spaces in the surrounding area**.**

Taken together with the Cairn Homes creche to be delivered presently, it is considered that there will be more than sufficient childcare provision in the local area to facilitate the (predominantly 1 and 2 bed) Parkside 4 scheme, without the need for an additional on-site creche. Please refer to the Creche Audit prepared by McGill Planning Limited for full details in relation to private childcare demand which accompanies this application.

SCHOOLS

Based on Table 4.3 above the estimated percentage of children of school going age (5-18 years) in the local area (Grange A ED) is c.22.6%. However, it is noted that the ED includes significant areas of 3+ bed family housing. This contrasts with the current proposal which is predominantly 1 and 2 bed apartments and will not have a similar proportion of school going children when fully occupied. Applying the census figures for the ED to the scheme would suggest a potential school going population of c.172. However, the number is expected to be much lower than this.

Furthermore, we note that the demand initially will be for childcare. Over the course of approximately 10 years primary school demand will increase and then secondary school demand incrementally.

Given the level of existing and planned additional school facilities in the local area and within accessible distance of the city centre it is considered likely that the capacity will be sufficient to cater for the school place demand arising out of the proposed development over time. Given the existing and planned provision in the locality and within bus/cycling distance, then it is considered that there is/will be sufficient capacity.

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, mix of units, 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, public transport, and shops etc. will benefit from the increase in population.

4.7 MITIGATION MEASURES

Construction Phase
A Construction and Environmental Management Plan (CEMP) has been prepared by the contractor and will be implemented during the construction phase to reduce the detrimental effects of the construction phase on the environment and local population. The CEMP will be agreed in writing with the planning authority in writing prior to the commencement of the development (An outline CEMP 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 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 zoned lands remaining undeveloped and underutilised.

'Worst Case' Scenario
The worst-case scenario for the development will be a situation where only a portion of the residential element is built and the associated amenities such as 'open space' and services are not completed.

4.10 MONITORING & 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

There were no difficulties experienced whilst compiling the Population and Human Health Chapter of the EIA

5 BIODIVERSITY

5.1 INTRODUCTION

This biodiversity chapter has been prepared by Pádraic Fogarty of OPENFIELD Ecological Services. Pádraic Fogarty has worked for nearly 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).

This report provides for an assessment of the potential impacts to biodiversity of the proposed development.

Article 3 of the EIA Directive requires that "The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:… (b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;"

And

Annex IV point 4 of the EIA Directive requires "A description of the factors specified in Article 3(1) likely to be significantly affected by the project: … biodiversity (for example fauna and flora).

5.2 METHODOLOGY

The assessment was carried out in accordance with the following best practice methodology: draft 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports (Environmental Protection Agency, 2017) and 'Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland' by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018).

A site visit was carried out on the 29th of January 2019 and May 28th 2019. The site was surveyed in accordance with the Heritage Council's Best Practice Guidance for Habitat Survey and Mapping (Smith et al., 2010). Habitats were identified in accordance with Fossitt's Guide to Habitats in Ireland (Fossitt, 2000).

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

May lies within the optimal survey period for general habitat surveys (Smith et al., 2010) and so it was possible to classify all habitats on the site to Fossitt level 3. January is within the optimal season for surveying large mammals while May is optimal for surveying breeding birds.

5.3 RECEIVING ENVIRONMENT

5.3.1 Zone of Impact

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.

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

Within 2km of the site there is one area, the Baldoyle Bay, which is designated as a SPA, SAC and a pNHA. Baldoyle Bay is also internationally recognised as a Ramsar wetland site. The development is also connected to protected areas in Dublin Bay via the discharge of treated effluent from the Ringsend Wastewater Treatment Plant.

The SAC and SPA in Baldoyle are connected to the project via the Mayne River. Wastewater from the development will pass to the municipal sewer for Dublin City at Ringsend, and the point of discharge from this facility is also within a number of SACs and SPAs in Dublin Bay.

Baldoyle Bay SAC (site code: 0199)
This SAC is the estuary of the Sluice and the Mayne Rivers that is largely enclosed by a sand spit that stretches from Portmarnock to Howth. At low tide it has large areas of exposed mud and sediment that support rich invertebrate communities. There are a number of habitats here that are listed in the EU's Habitats Directive Annex I while there are two plants recorded from the Bay that are protected under the Flora Protection Order: Borrer's Saltmarsh-grass *Puccinellia fasciculata* and Meadow Barley *Hordeum secalinum.*

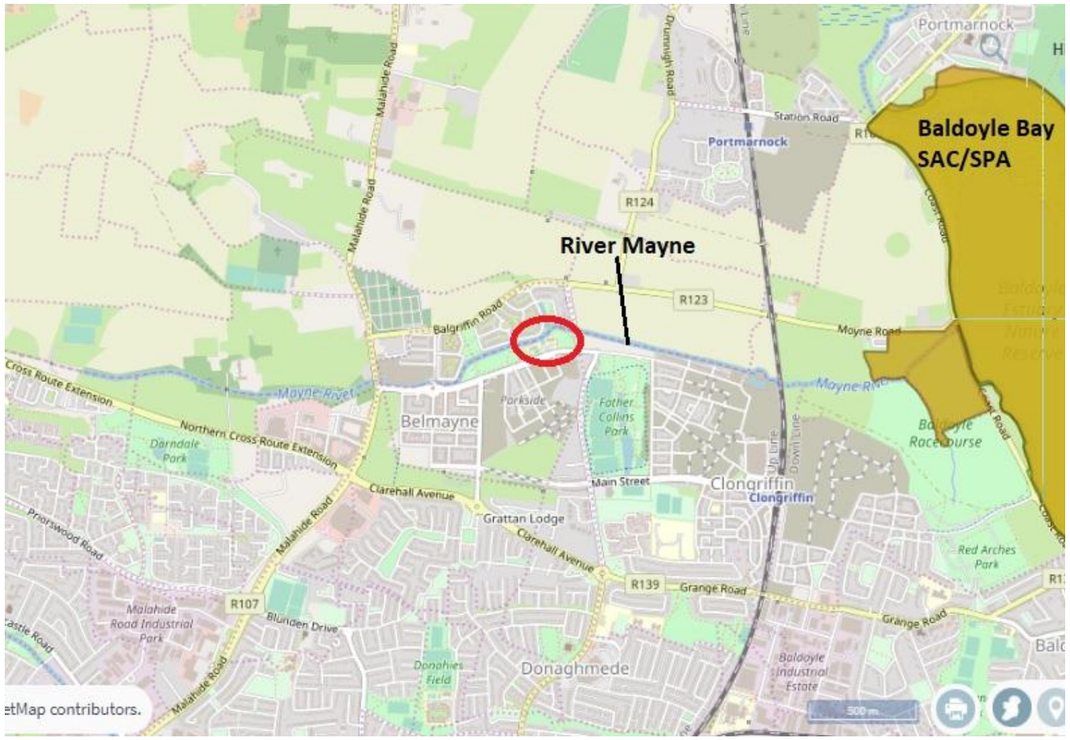

Figure 5.1 Proposed site (red circle) showing local water courses and areas designated for nature conservation (from www.npws.ie)

The reasons why the bay falls under the SAC designation are set out in the qualifying interests. They are either habitat types listed in Annex I or species listed in Annex II of the Habitats Directive. This information is provided by the National Parks and Wildlife Service (NPWS) and is shown in table 5.1 below. In this case the SAC is designated only for protected habitat types.

Code	Habitats
1140	Mudflats and sandflats not covered by seawater at low tide
1310	Salicornia and other annuals colonizing mud and sand
1330	Atlantic salt meadows
1410	Mediterranean salt meadows

Table 5.1 Qualifying interests for the Baldoyle Bay SAC (from NPWS)

- **Tidal mudflats (1140)**. This is an intertidal habitat characterised by fine silt and sediment. Most of the area in Ireland is of favourable status however water quality and fishing activity, including aquaculture, are negatively affecting some areas.
- **Salicornia mudflats (1310)**: This is a pioneer saltmarsh community and so is associated with intertidal areas. It is dependant upon a supply of fresh, bare mud and can be promoted by damage to other salt marsh habitats. It is chiefly threatened by the advance of the alien invasive Cordgrass *Spartina anglica.* Erosion can be destructive but in many cases this is a natural process.
- **Atlantic and Mediterranean salt meadows (1330 & 1410)**: these are intertidal habitats that differ somewhat in their vegetation composition. They are dynamic habitats that depend upon processes of erosion, sedimentation and colonisation by a typical suite of salt-tolerant organisms. The main pressures are invasion by the non-native *Spartina anglica* and overgrazing by cattle and sheep.

Baldoyle Bay SPA (site codes: 4016)

Estuarine habitats are some of the most productive in the world and the nutrients that are deposited here fuel primary and secondary production (levels in the food chain) that in turn provide food for internationally significant numbers of wintering birds (Little, 2000). It had a mean of 5,780 birds between the winters of 2006/07 and 2010/11 (Crowe et al., 2012). Specifically it has a number of species which are 'features of interest' of the SPA, along with 'wetlands and waterbirds'. Table 5.2 details these.

Species		Status[1]
Branta bernicula hrota	Light-bellied brent goose	Amber
Charadrius hiaticula	Ringed plover	Green
Limosa lapponica	Bar-tailed godwit	Amber
Pluvialis apricaria	Golden plover	Red
Pluvialis squatarola	Grey plover	Amber
Tadorna tadorna	Shelduck	Amber
Wetlands & Waterbirds		

Table 5.2 Features of Interest for the Baldoyle Bay SPA (from NPWS)

- **Light-bellied Brent Goose.** There has been a 67% increase in the distribution of this goose which winters throughout the Irish coast. The light-bellied subspecies found in Ireland breeds predominantly in the Canadian Arctic.
- **Ringed Plover.** This bird is a common sight around the Irish coast where it is resident. They breed on stony beaches but also, more recently, on cut-away bog in the midlands.
- **Bar-tailed Godwit.** These wetland wading birds do not breed in Ireland but are found throughout the littoral zone during winter months. They prefer estuaries where there are areas of soft mud and sediments on which to feed.
- **Golden Plover.** In winter these birds are recorded across the midlands and coastal regions. They breed only in suitable upland habitat in the north-west. Wintering abundance in Ireland has changed little in recent years although it is estimated that half of its breeding range has been lost in the last 40 years.
- **Grey Plover.** These birds do not breed in Ireland but winter throughout coastal estuaries and wetlands. Its population and distribution is considered to be stable.

[1] Birds of Conservation Concern in Ireland. Colhoun & Cummins, 2013

- **Shelduck.** The largest of our ducks, Shelduck both breed and winter around the coasts with some isolate stations inland. Its population and range is considered stable.

South Dublin Bay SAC (side code: 0210).
It has one qualifying interest (i.e. feature which qualifies the area as being of international importance) which is mudflats and sandflats not covered by seawater at low tide.

South Dublin Bay and Tolka Estuary SPA (side code: 4024)
This site is concentrated on the intertidal area of Sandymount Strand, to the south of the city, as well as the Tolka Estuary. The North Bull Island SPA (site code: 0206) is largely coincident with the North Dublin Bay SAC with the exception of the terrestrial portion of Bull Island. Table 5.4 lists the features of interest for these SPAs.

Bird counts form BirdWatch Ireland are taken from Dublin Bay as a whole and are not separated between the two SPAs in this area.

Dublin Bay is recognised as an internationally important site for water birds as it supports over 20,000 individuals. Table 5.3 shows the most recent count data available (Crowe et al., 2011).

Year	2010/11	2011/12	2012/13	2013/14	2014/15	Mean
Count	27,931	30,725	30,021	35,878	33,486	31,608

Table 5.3 Annual count data for Dublin Bay from the Irish Wetland Birds Survey (IWeBS)

There were also internationally important populations of particular birds recorded in Dublin Bay (i.e. over 1% of the world population): Light-bellied brent geese *Branta bernicula hrota*; Black-tailed godwit *Limosa limosa*; Knot *Calidris canutus* and Bar-tailed godwit *L. lapponica*.

Light-bellied Brent Goose (*Branta bernicla hrota*) [A046]
Oystercatcher (*Haematopus ostralegus*) [A130]
Ringed Plover (*Charadrius hiaticula*) [A137]
Grey Plover (*Pluvialis squatarola*) [A140]
Knot (*Calidris canutus*) [A143]
Sanderling (*Calidris alba*) [A144]
Dunlin (*Calidris alpina*) [A149]
Bar-tailed Godwit (*Limosa lapponica*) [A157]
Redshank (*Tringa totanus*) [A162]
Black-headed Gull (*Croicocephalus ridibundus*) [A179]
Roseate Tern (*Sterna dougallii*) [A192]
Common Tern (*Sterna hirundo*) [A193]
Arctic Tern (*Sterna paradisaea*) [A194]
Wetlands & Waterbirds [A999]

Table 5.4 Features of interest for the South Dublin Bay and Tolka Estuary SPAs in Dublin Bay (EU code in square parenthesis)

The NPWS web site (www.npws.ie) contains a mapping tool that indicates historic records of legally protected species within a selected Ordnance Survey (OS) 10km grid square. The Parkside site is located within the square O24 and a number protected plant species are recorded. These are detailed in table 5.5. It must be noted that this list cannot be seen as exhaustive as suitable habitat may be available for other important and protected species.

Species	Habitat2 3	Current status4
Centaurium pulchellum Lesser Centaury	Sandhills, dune-slacks and margins of brackish lakes	Current
Clinopodium acinos Basil Thyme	Field margins and sandy or gravelly places	Non-native; Record pre-1970
Galeopsis angustifolia Red Hemp-nettle	Calcareous gravels	Records pre-1986
Hordeum secalinum Meadow Barley	Upper parts of brackish marshes, chiefly near the sea	Current (O24)
Mertensia maritima Oysterplant	Shingle shores	Record pre-1970
Papaver hybridum Rough Poppy	Sandy fields	Non-native; Record pre-1986
Puccinellia fasciculata Borrer's Salt-marsh grass	Muddy inlets on the coast	Current
Saxifraga granulate Meadow saxifrage	Sandhills and pastures near the east coast	Record pre-1970
Scleranthus annus Annual Knawel	Waste places and roadsides on dry, sandy soils	Record pre-1970
Viola hirta Hairy Violet	Sand dunes, grasslands, limestone rocks	Current, records from Feltrim Hill

Table 5.5 Known records of protected species from the O24 square (from www.npws.ie)

[2] Parnell et al., 2012
[3] Hayden & Harrington, 2001
[4] Preston et al., 2002

As can be seen there are two current records of protected plants from this 10km square. The record of Hairy St. John's-wort is noted as the "east side of Santry woods" in the Flora of County Dublin while this reference gives the location of the Hairy Violet as coastal locations near Donabate and Portrane (Doogue et al., 1998).

The site is within the Clongriffin-Belmayne Local Area Plan 20102 area and as part of the production of this plan the lands were subjected to a Strategic Environmental Assessment (SEA) and an Appropriate Assessment (AA). These assessments confirmed that there were no areas designated for nature conservation within, or directly adjacent to the subject lands. It concluded: "The Natura Impact Report has determined that, assuming the successful implementation of the Policies and Objectives contained within the Local Area Plan, there will be no adverse effects on the integrity of Natura 2000 sites arising from the plan in isolation or in combination with other plans and projects acting in the same area."

The River Mayne is a relatively short water course that rises to the east of Dublin airport and enters the Irish Sea at Baldoyle. The Environmental Protection Agency maintains one monitoring station, at the Wellfield Bridge, and here ecological conditions were most recently (2016) assessed as 'poor'. Under the Water Framework Directive the overall status of the Mayne catchment has been assessed as of 'poor' status. This indicates point or diffuse pollution sources, or other ecological problems such as obstructions. The ecological quality of the transitional water body at Baldoyle Bay has been assessed as 'eutrophic', indicting 'bad' status. Dublin Bay is currently assessed as 'good status'.

3.2 Stakeholder Consultation

Inland Fisheries Ireland was contacted for nature conservation observations as reprofiling works are to be undertaken to the floodplain of the River Mayne. A response to this was received on April 30th 2019 stating:

The Mayne River is a non-salmonid system however IFI is currently working with Fingal to try salmonid reintroduction. The study carried out by Fingal will also look at the inlet of brackish water to restore the brackish meadows and to allow for otters moving between the estuary and the river. There are flap valves at the end of the system which are now open in the hope that salmonids can move back upstream. The planned development is located on what we would consider to be the most natural and suitable habitat for Brown trout. We have carried out electrofishing surveys on the system and I have attached an internal report for you.

3.3 Site Survey

Aerial photography from the OSI and historic mapping shows that this area has seen significant land use change in recent decades, from farmland to urban housing and transport links.

3.3.1 Flora

The subject site is composed of an open area of **buildings and artificial surfaces – BL3** and **dry meadow–GS1,** which is composed of grasses such as Cock's-foot *Dactylis glomerata* and False Oat *Arrhenatherum elatius* as well as Thistles *Cirsium sp.,* Willowherbs *Epilobium sp,* Ragwort *Senecio jacobaea* and Creeping Buttercup *Ranunculus repens.* This continues along the river to the rear of the school building and there are occasional clusters of Alder *Alnus glutinosa* with Brambles *Rubus fruticosus agg*. To the west of the school the land opens into an amenity area with **amenity grassland – GA2**.

The Mayne River is a **lowland river – FW2** in this location and is straight and relatively deep-sided. Although it is not a part of any routine drainage programme, its morphology suggests that it may have been modified in the past. The riparian zone is mostly open and grassy although some stretches have occasional Alder and Grey Willow *Salix cinerea* along with Reed Canary-grass *Phalaris arundinacea,* Hogweed *Heracleum sphondylium,* Nettle *Urticia dioica* etc.

There are two stretches of **hedgerow – WL1.** One along the eastern site boundary which is composed of Hawthorn *Crataegus monogyna,* Ivy *Hedera helix* and Brambles. Another is found to the centre of the site along the riparian zone of the river and this includes Grey Willow, Brambles, and Bindweed *Calystegia sepium*. Following methodology from the Heritage Council the eastern hedgerow is of 'lower significance' due to poor connectivity and low species diversity, while the hedgerow along the river is of 'higher significance' due to its likely age and its association with the River Mayne. A small patch of **wet grassland – GS4** is found near here, with Soft Rush *Juncus effusus* and Reed Canary-grass.

There are no habitats which are examples of those listed in Annex I of the Habitats Directive. Japanese Knotweed *Fallopia japonica* is found in one location close to the Mayne River. This plant species is listed as alien invasive on Schedule 3 of SI No. 477 of 2011. A specialist contractor has been appointed to treat the plant in situ and this commenced in 2019.

3.3.2 Fauna

The site survey included incidental sightings or proxy signs (prints, scats etc.) of faunal activity, while the presence of certain species can be concluded where there is suitable habitat within the known range of that species. Table 5.6 details those mammals that are protected under national or international legislation in Ireland. Cells are greyed out where suitable habitat is not present or species are outside the range of the study area.

Species	Level of Protection	Habitat[5]
Otter *Lutra lutra*	Annex II & IV Habitats Directive; Wildlife (Amendment) Act, 2000	Rivers and wetlands
Lesser horseshoe bat *Rhinolophus hipposideros*		Disused, undisturbed old buildings, caves and mines
Grey seal		Coastal habitats

[5] Harris & Yalden, 2008

Halichoerus grypus	Annex II & V Habitats Directive; Wildlife (Amendment) Act, 2000	
Common seal *Phocaena phocaena*		
Whiskered bat *Myotis mystacinus*	Annex IV Habitats Directive; Wildlife (Amendment) Act, 2000	Gardens, parks and riparian habitats
Natterer's bat *Myotis nattereri*		Woodland
Leisler's bat *Nyctalus leisleri*		Open areas roosting in attics
Brown long-eared bat *Plecotus auritus*		Woodland
Common pipistrelle *Pipistrellus pipistrellus*		Farmland, woodland and urban areas
Soprano pipistrelle *Pipistrellus pygmaeus*		Rivers, lakes & riparian woodland
Daubenton's bat *Myotis daubentoniid*		Woodlands and bridges associated with open water
Nathusius' pipistrelle *Pipistrellus nathusii*		Parkland, mixed and pine forests, riparian habitats
Irish hare *Lepus timidus hibernicus*	Annex V Habitats Directive; Wildlife (Amendment) Act, 2000	Wide range of habitats
Pine Marten *Martes martes*		Broad-leaved and coniferous forest
Hedgehog *Erinaceus europaeus*	Wildlife (Amendment) Act, 2000	Woodlands and hedgerows
Pygmy shrew *Sorex minutus*		Woodlands, heathland, and wetlands
Red squirrel *Sciurus vulgaris*		Woodlands
Irish stoat *Mustela erminea hibernica*		Wide range of habitats
Badger *Meles meles*		Farmland, woodland and urban areas
Red deer *Cervus elaphus*		Woodland and open moorland
Fallow deer *Dama dama*		Mixed woodland but feeding in open habitat
Sika deer *Cervus nippon*		Coniferous woodland and adjacent heaths

Table 5.6 Protected mammals in Ireland and their known status within the O02 10km grid square . Those that are greyed out indicate either that there are no records of the species from the National Biodiversity Data Centre.

Although a number of mammals are known to be present in this 10km, there are no habitats on the site which are suitable for the majority of these species. There was no evidence of Badger activity and there are no records for this species from the NBDC for this vicinity. There was no evidence that Irish Hare is present while habitat is not available for deer, Pine Marten or Red Squirrel. Small mammals such as the Irish Stoat, Hedgehog and Pygmy Shrew are considered more or less ubiquitous in the Irish countryside, including on disused land in urban areas (Lysaght & Marnell, 2016). No direct evidence of any mammal was recorded although Fox Vulpes vulpes and Rabbit Oryctolagus cuniculus are common in Dublin along with Brown Rat Rattus norvegicus, House Mouse Mus domesticus and Field Mouse Apodemus sylvaticus. These species are not protected.

The River Mayne is suitable for Otters although no evidence of their presence was recorded and there are no recorded from the NBDC from this vicinity (although this is not evidence of absence and there are records from the Mayne Estuary (Baldoyle Bay)). Otters can be tolerant of human presence but require uninterrupted passage along the riparian zone and so long culverts, e.g. under roads, present a significant barrier to their use of available habitats, something which may be an issue in this location given that there are culverts under road and railway lines between here and the coast. Nevertheless, their presence cannot be ruled out.

Features on the site are of low suitability for roosting bats as there are no old buildings or veteran trees (Hundt, 2012). A dedicated bat survey was carried out by Dr Tina Aughney on September 18/19 2019. This is within the optimal survey season. No bat roosts were recorded. Three species were noted to be foraging/feeding (Common Pipistrelle, Soprano Pipistrelle and Leisler's Bat) and the overall bat activity was assessed as 'low'.

The following list of birds from the site is taken from the January 2019 survey, when birds are not breeding: Blue Tit Parus caerulaeus, Starling Sturnus vulgaris, Dunnock Prunella modularis and House Sparrow Passer domesticus.

During the May 2019 survey the following species were noted to be nesting: House Sparrow, Goldfinch Carduelis carduelis and Starling.

These species are of low conservation concern/green list (Colhoun & Cummins, 2013). Suitable nesting habitat is available for common garden birds in trees and hedgerows.

Figure 5.2Habitat map of the subject lands superimposed on an aerial photograph (photo from www.bing.com)

There is no suitable habitat for breeding Common Frog *Rana temporania.* There is no suitable pond for Smooth Newt *Lissotriton vulgaris,* while Common Lizard *Zootoca vivipara* is considered widespread. Monitoring by Inland Fisheries Ireland, from 2011, indicated that the River Mayne holds populations of European Eel *Anguilla anguilla* and Three-spined Stickleback *Gasterosteus aculaetus*. The river is not believed to be of salmonid status (i.e. holding a population of Brown Trout Salmo trutta or Atlantic Salmon S. salar). European Eel is a critically endangered species (King et al., 2011).

An electrofishing survey of the Mayne was carried out by IFI in 2016.This found evidence of European Eel, Flounder and Three-spined Stickleback. No salmonids (e.g. Trout) were recorded.

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 in this area. Other protected invertebrates are confined to freshwater and wetland habitats which are not present on this site.

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

In summary, it has been seen that the application site is open grassland and artificial surfaces within a built-up area albeit adjacent to the River Mayne. There are no examples of habitats listed on Annex I of the Habitats Directive or records of rare or protected plants. Japanese Knotweed is growing on the lands and this species is listed as alien invasive as per SI 477 of 2011.

Hedgerows provide habitat for common breeding birds and foraging areas for bats while the River Mayne has salmonid potential along with possible populations of Otter and the endangered European Eel.

Significance criteria are available from guidance published by the National Roads Authority (NRA, 2009). These are reproduced in table 7. From this an evaluation of the various habitats and ecological features on the site has been made and this is shown in table 5.8.

Site Rating	***Qualifying criteria***
A - International importance	SAC, SPA or site qualifying as such. Sites containing 'best examples' of Annex I priority habitats (Habitats Directive). Resident or regularly occurring populations of species listed under Annex II (Habitats Directive); Annex I (Birds Directive); the Bonn or Berne Conventions. RAMSAR site; UNESCO biosphere reserve; Designated Salmonid water
B - National importance	NHA. Statutory Nature Reserves. Refuge for Flora and Fauna. National Park. Resident or regularly occurring populations of species listed in the Wildlife Act or Red Data List. 'Viable' examples of habitats listed in Annex I of the Habitats Directive.
C - County importance	Area of Special Amenity, Tree Protection Orders, high amenity (designated under a County Development Plan) Resident or regularly occurring populations (important at a county level, defined as >1% of the county population) of European, Wildlife Act or Red Data Book species

	Sites containing semi-natural habitat types with high biodiversity in a county context, and a high degree of naturalness, or populations of species that are uncommon in the county
D - Local importance, higher value	Sites containing semi-natural habitat types with high biodiversity in a county context, and a high degree of naturalness, or populations of species that are uncommon in the locality Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.
E - Local importance, lower value	Sites containing small areas of semi-natural habitat that are of some local importance for wildlife; Sites or features containing non-native species that are of some importance in maintaining habitat links.

Table 5.7 Site evaluation scheme taken from NRA guidance 2009

Buildings and artificial surfaces – BL3	Negligible ecological value
Dry meadow – GS2 including individual trees within this area Wet grassland – GS4 Eastern Hedgerow – WL1	Local importance, lower value
River Mayne and associated hedgerow – FW2/WL1	Local importance, higher value

Table 5.8 Evaluation of the importance of habitats and species on the Parkside 4 site

5.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

A full development description is in the statutory notices. The proposed development will see site clearance and a construction phase to include access roads, new homes, and all associated infrastructure as shown in figure 5.3. Post construction the land will be landscaped. This will include reprofiling of a portion of the river's floodplain although no works are proposed to the river itself. This reprofiling work is shown in figure 5.4.

Figure 5.3 Development overview

5.5 POTENTIAL IMPACTS

This section provides a description of the potential impacts that the proposed development may have on flora & fauna in the absence of mitigation. Methodology for determining the significance of an impact has been published by the NRA. This is based on the valuation of the ecological feature in question (table 5.8) and the scale of the predicted impact. In this way, it is possible to assign an impact significance in a transparent and objective way. Table 5.9 summaries the nature of the predicted impacts.

Construction Phase

1. The removal of habitats including, grassland, occasional trees and artificial surfaces. These are predominantly of negligible or low local value. The loss of these habitats is considered to be minor negative. No works are to be done at the river and a minimum riparian buffer zone of 10m is to be maintained while the two stretches of hedgerow are to be retained. There will be no effect arising to the river habitat or its suitability for Otters, Eels or other aquatic life.

Reprofiling of the floodplain will involve the temporary loss of grassland and this impact is considered to be minor negative. This will require earth works in this zone, as shown in figure 5.4. These works are expected to maintain the total floodplain capacity in this area and so no impacts to the functioning of the river system more broadly is will occur.

2. The direct mortality of species during demolition and site clearance. This impact is most acute during the bird breeding season which can be assumed to last from March to July inclusive. This may affect a number of locally common countryside birds and mitigation will be required to avoid this impact.

No impacts to bats can occur during this phase as no potential bat roosts are present.

3. Pollution of water courses through the ingress of silt, oils and other toxic substances. The ingress of sediment and other construction pollutants can have serious negative effects to aquatic habitats and fish spawning in particular. Although the River Mayne is not of high fisheries significance this impact is nevertheless potentially moderate native. Standard mitigation is available to ensure pollution does not occur.

4. Japanese Knotweed.

   There is a legal onus on the developer to ensure that Japanese Knotweed does not spread. Cairn Homes Properties Limited have prepared a note on the issue which states:

   There is a small stand of Japanese Knotweed on the north western boundary of the site adjoining the stream bank. The Knotweed stand was first identified in January 2019, by consulting Ecologists Openfield whilst undertaking a site walkover survey. The Japanese Knotweed is located in a peripheral location a considerable distance from any proposed excavation works. In consideration of same it will be possible to treat the Japanese Knotweed in -situ by means of stem injection. Cairn have appointed invasive species experts; Knotweed Control Ireland to undertake the in-situ treatment. The treatment process involves injecting the stems of each single plant with approved herbicides. The above ground vegetation is cut and disposed of to a suitably licensed facility. The cutting process exposes each stem for injection. In-situ treatment of a Japanese Knotweed stand of this scale is likely to take 2 years, with 2-3 treatments per growing season. The Japanese Knotweed stand will be protected with fencing and appropriate signage will be erected to inform the construction workers and later the public of the presence of the Japanese Knotweed. The environs of the Knotweed Stand will require monitoring for a further 2 years before the areas can be certified as Knotweed free.

Operational Phase

5. Pollution of water from foul wastewater arising from the development. Wastewater will be sent to the municipal treatment plant at Ringsend. Upgrade works are needed as the plant is not currently meeting its requirements under the Urban Wastewater Treatment Directive. Pollution effects are most acute in freshwater systems where the capacity for dilution is low and the consequent risk of eutrophication is high. The Ringsend WWTP discharges into Dublin Bay which is currently classified as 'unpolluted' by the EPA despite long-running compliance issues at the plant. A separate screening report for Appropriate Assessment specifically examines the impacts of this project on Natura 2000 areas in Dublin Bay however there is currently no evidence that non-compliance issues at the WWTP are having negative effects to features of high ecological value (e.g. wading birds or intertidal habitats). It is understood that Irish Water is to undertake upgrading works on a phased basis and that compliance issues will comprehensively addressed by 2020.

6. 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. A new surface water drainage system is to be installed in accordance with the GDSDS. This will comprise of an underground attenuation storage tank which will discharge to the River Mayne via an oil/grit interceptor, flow control device and existing outfall pipe. No negative effect arising to the quantity or quality of surface run-off will occur.

7. Landscaping. New boundary planting is planned and the riverside zone is to become an amenity space. This will include a walking track and play area for children. There will be some planting of native trees but no significant intervention along the riparian zone, which is to be maintained in a naturalised manner.

8. Artificial lighting. Proposed lighting of the proposed development will potentially impact on bat species in relation to commuting and foraging potential. The main impact on bats that may arise is the potential lighting impact on the northern boundary of the proposed development area which is used by pipistrelles. Common pipistrelles and soprano pipistrelles will tolerate low levels of lighting.

Therefore the lighting of the proposed development is likely to have a Minor Negative impact.

Impacts to Natura 2000 areas (SACs or SPAs) in Dublin and Baldoyle Bay are not predicted to occur, principally due to the separation distance between the site and these areas. A full assessment of potential effects to these areas is contained within a separate Screening Report for Appropriate Assessment.

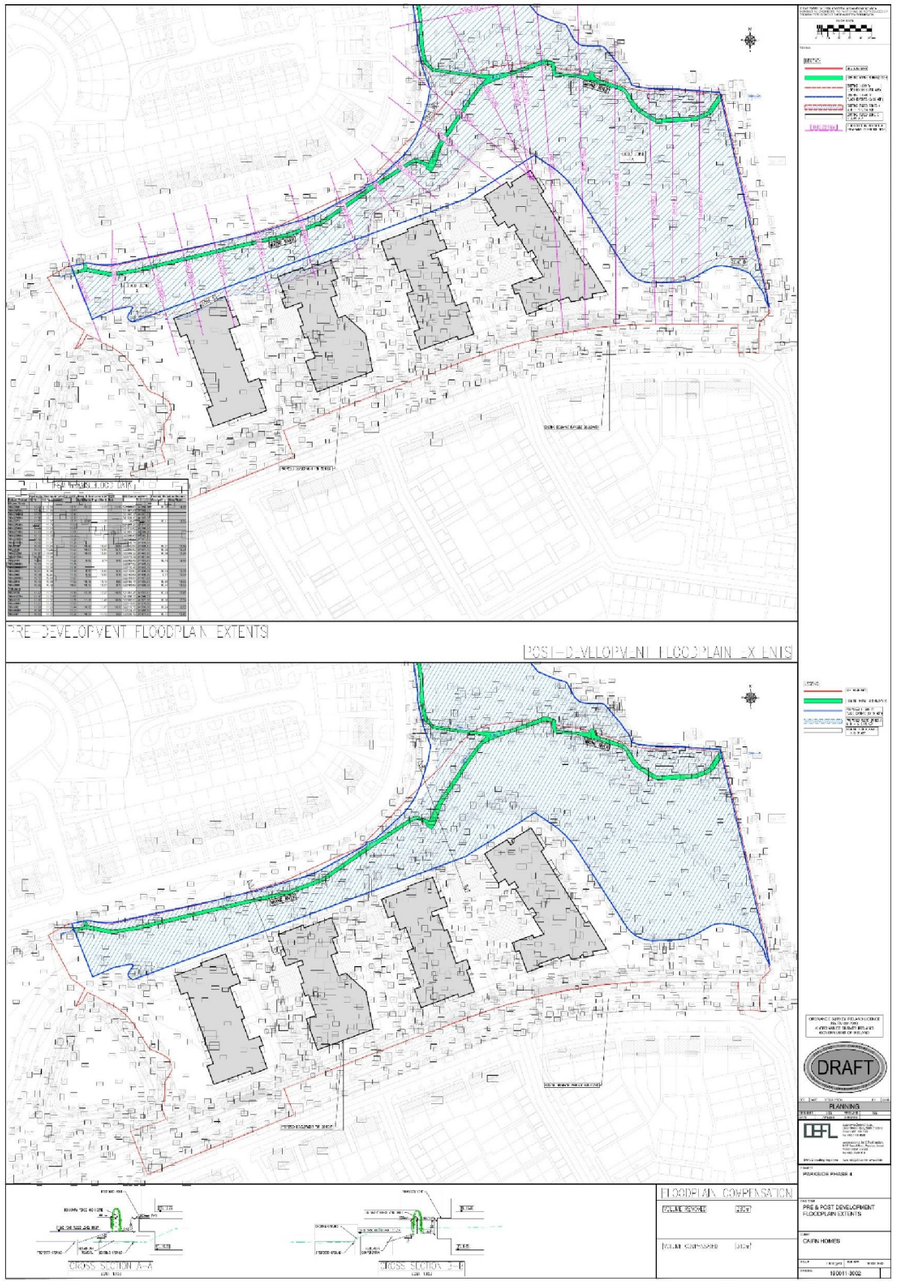

Figure 5.4 Extract from the Food Risk Assessment prepared by DBFL Consultant Engineers showing the existing situation (top) and the proposed reprofiling of the floodplain (bottom).

Impact		Significance
Construction phase		
1	Loss of habitat • Buildings and artificial surfaces • Dry meadow and occasional trees	Neutral – no effect Not significant
2	Mortality to animals during construction (nesting birds)	Significant effect
3	Pollution of water during construction phase	Significant effect
4	Japanese Knotweed	Significant effect
5	Wastewater pollution	Neutral – no effect
6	Surface water pollution	Neutral – no effect
7	Landscaping	Positive effect
8	Artificial lighting	Slight effect

Table 5.9 Significance level of likely impacts in the absence of mitigation

Overall it can be seen that four potentially significant effects are predicted to occur as a result of this project in the absence of mitigation.

5.6 POTENTIAL CUMULATIVE IMPACTS

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

In this instance, the incorporation of SUDS attenuation measures will result in not negative effect to surface water quality.

Increasing urbanisation of Dublin, and in particular land use change from agricultural to urban uses, is resulting in the loss of habitat for common species of plants and animals. In this case, higher value habitats are to be retained while post-construction landscaping will provide additional resources for wildlife.

5.7 MITIGATION MEASURES

Construction Phase

1: Disturbance of birds' nests

Deliberate disturbance of a bird's nest is prohibited unless under licence from the National Parks and Wildlife Service. If possible, site clearance works should proceed outside the nesting season, i.e. from September to February inclusive. If this is not possible, vegetation must first be inspected by a suitably qualified ecologist. If a nest is encountered then works must stop, until such time as nesting has ceased. Otherwise, a derogation licence must be sought from the NPWS to allow the destruction of the nest.

2. Construction Pollution

A Construction Environment Management Plan (CEMP) has been prepared in accordance with guidelines from Inland Fisheries Ireland (2016). This should include a suitable silt fence or similar barrier which will ensure that the riparian zone of the River Mayne is protected from diffuse surface run-off which may be laden with sediment. Any run-off must pass through a suitably-designed settlement pond or similar so that only silt-free water enters the river. Dangerous substances such as oils, fuels etc. should be stored in a bunded area only. The site manager will be responsible for ensure that pollution prevention measures are fully implemented and monitored. A written record of at least daily checks should be maintained. Pollution incidents should be recorded and reported to the IFI in a timely manner.

The CEMP should detail how these measures are to be implemented on the site as well as the construction methods for construction activities and works to the floodplain. Were the site to flood during construction this could result in pollutants being lost to the river. This should be addressed by ensuring that dangerous substances are never stored in the flood zone and that reprofiling works are carried out during spring/summer months when the risk of flooding and soil saturation are lower.

3. Japanese Knotweed

A management plan has been prepared to ensure that Japanese Knotweed is eradicated and is not allowed to spread.

Operational Phase

4. Artificial lighting. The following text is taken from the bat survey report:

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. This is particularly important for the northern boundary along the Mayne River. There is no lighting proposed to the rear of the proposed development site and the following principals will be followed in relation to the overall lighting plan for the proposed development site:

- Lighting design will be flexible and be able to fully take into account the presence of protected species. Therefore, appropriate lighting should be used within a proposed development and adjacent areas with more sensitive lighting regimes deployed in wildlife sensitive areas.
- Dark buffer zones will be used as a good way to separate habitats or features from lighting by forming a dark perimeter around them. This could be used for habitat features noted as foraging areas for bats.
- Buffer zones will be used to protect Dark buffer zones and rely on ensuring light levels (levels of illuminance measured in lux) within a certain distance of a feature do not exceed certain defined limits. The buffer zone can be further subdivided in to zones of increasing illuminance limit radiating away from the feature or habitat that requires to be protected.
- Luminaire design 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 will 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 is recommended to reduce the blue light component of the LED spectrum).
    - o Luminaires should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats.
    - o The use of specialist bollard or low-level downward directional luminaires should be considered in bat sensitive areas to retain darkness above.
    - o Column heights will be carefully considered to minimise light spill. The shortest column height allowed should be used where possible.
    - o Only luminaires with an upward light ratio of 0% and with good optical control will be used.
    - o Luminaires will always 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.
    - 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.

5.8 PREDICTED IMPACTS

Construction Phase
After mitigation, no significant residual effects are likely to arise to biodiversity arising from the construction phase of this project

Operational Phase
After mitigation, no significant residual effects are likely to arise to biodiversity arising from the operation phase of this project.

5.9 'DO NOTHING' SCENARIO

In the absence of the project there can be expected to be little change to the biodiversity value of the lands. In the absence of management grasslands would revert to scrub and, ultimately, woodland.

5.10 WORST CASE SCENARIO

In a worst case scenario Japanese Knotweed would spread to other parts of the site, or to other sites away from its current location. Were pollution prevention measures to fail during the construction phase there would be a loss of sediment pollution to the River Mayne. Since this river is not of salmonid status, the effect of this would be limited to the coastal/intertidal area and would be temporary in nature.

5.11 MONITORING & REINSTATEMENT

Monitoring of the Japanese Knotweed will be required for at least three years post-construction to ensure that eradication measures are successful.

Continual monitoring of pollution prevention measures during the construction phase will be important to minimise the risk of pollution to the greatest extent possible. Monitoring measures are contained within the Construction and Environmental Management Plan and include daily checks by site management and training of site personnel.

The following reinstatement recommendation is made in the bat survey report:

It is important to ensure that the northern boundary of the proposed development site is retained and enhanced, where possible. The landscaping will incorporate:
- Semi-mature trees planting;
- Native tree planting in clumps along the external boundaries of the buildings and along the pathway adjacent to the river;
- Standard trees planting.

In addition, the following will be implemented:
- Any semi-natural habitats should be protected from potential damage construction phase and post-construction.
- Avoid the use of chemicals (weed killers, etc.) within the development zone.
- Any gaps should be planted along the new boundary of the proposed development. The shrub / tree mixture should be native plant species replication what already exists in the landscape: hawthorn, ash and oak.

5.12 DIFFICULTIES IN COMPILING INFORMATION

No difficulties have been encountered in compiling this information.

5.13 REFERENCES

Bullock C., Kretch C. & Candon E. 2008. *The Economic and Social Aspects of Biodiversity*. Stationary Office.
Clabby, K.J., Bradley, C., Craig, M., Daly, D., Lucey, J., McGarrigle, M., O'Boyle, S., Tierney, D. and Bowman, J. 2008. *Water Quality in Ireland 2004 – 2006.* EPA.
Colhoun K. & Cummins S. 2013. *Birds of Conservation Concern in Ireland 2014 – 2019.* Irish Birds. Volume 9 Number 4 pg523-541.
Cooney R. & Dickson B. 2005. *Biodiversity and the Precautionary Principle.* Earthscan.
Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora
Council Directive 97/11/EEC of 3rd March 1997 amending Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment
Council Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy – more commonly known as the Water Framework Directive
Department of Arts, Heritage and the Gaeltacht. 2011. *Actions for Biodiversity 2011 – 2016. Ireland's National Biodiversity Plan.*
DG Environment. 2010. *Natura 2000 European Commission Nature and Biodiversity Newsletter.* Number 28. June 2010. ISSN: 1026-6151.
EPA. 2002. *Guidelines on the information to be contained in Environmental Impact Statements.*
EPA, 2003. *Advice Notes on Current Practice (in the preparation of Environmental Impact Statements)*
Fitter R., Fitter A. & Farrer A. 1984. *Grasses, sedges, rushes and ferns of Britain and Northern Europe.* Collins.
Fossitt J. 2000. *A Guide to Habitats in Ireland*. Heritage Council.
Harris S. & Yalden D.W. 2008. *Mammals of the British Isles: Handbook, 4th Edition.* The Mammal Society.
Hill M.O., Blackstock T.H., Long D.G. and Rothero G.P 2008. *A Checklist and Census Catalogue of British and Irish Bryophytes.* British Bryological Society.
Hundt L. 2012. *Bat Surveys: Good Practice Guidelines. 2nd Edition.* Bat Conservation Trust.
IEEM. 2016. *Guidelines for Ecological Impact Assessment in the United Kingdom.* Institute of Ecology and Environmental Management.
Institute of Environmental Assessment, 1995. *Guidelines for Baseline Ecological Assessment*'
Johnson O. & More D., 2004. *Tree Guide*', Collins
Lewis L., Burke B. & Crowe O. 2016. *Irish Wetland Bird Survey: Results of Waterbird Monitoring in Ireland in 2014/15.*
Mason C.F. 1996. *Biology of Freshwater Pollution.* Longman.
Morris P. & Therivel R., 2001. *Methods of Environmental Impact Assessment,* Spon Press
NRA. 2009. *Guidelines for Assessment of Ecological Impacts of National Road Schemes.* National Roads Authority.
Parnell J. & Curtis T. 2012. *Webb's An Irish Flora.* Cork University Press.
Preston C.D., Pearman D.A. & Dines T.D. 2002. *New Atlas of the British & Irish Flora*. Oxford University Press.
Rich C. & Longcore T. Editors. 2006. *Ecological Consequences of Artificial Night Lighting.* Island Press.
Sargent G. & Morris P. 2003. *How to Find & Identify Mammals.* The Mammal Society.
Smith G. F., O'Donoghue P., O'Hora K. and Delaney E. 2010. *Best Practice Guidance for Habitat Survey and Mapping.* Heritage Council.
Stace C. 2010. *New Flora of the British Isles.* Cambridge University Press
Statutory Instrument No. 94 of 1999. Flora (Protection) Order
Treweek J., 1999. *Ecological Impact Assessment*', Blackwell Science.
United Nations. 1992. *Convention on Biological Divers*

6 LAND, SOIL AND GEOLOGY

6.1 INTRODUCTION

This chapter of the EIAR comprises an assessment of the likely impact of the proposed development on soils and geological environment as well as identifying proposed mitigation measures to minimize any impacts.

Proposed Development Site Location and Brief Description
This is as described in chapters 1 (introduction) and 3 (Description of Development) of this EIAR and as set out in the statutory notices.

Statement of Competence
In accordance with Article 5(3)(a) of the EU Directive, by appointing DBFL, the applicant has ensured that this chapter has been prepared by "Competent experts".

6.2 METHODOLOGY

This assessment meets the requirements for an EIAR as outlined in the relevant National and EU legislation. It should be noted that there is no Irish implementing legislation as yet and so compliance at an EU level is best practice. This chapter has been prepared in accordance with the Environmental Protection Agency (EPA) Draft guidance document 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, 2017ii, EPA guidance documents 'Guidelines on the Information to be Contained in Environmental Impact Statements, 2002iii, 'Advice Notes on Current Practice in the Preparation of Environmental Impact Statements, 2003iv, and the Institute of Geologists of Ireland guidance document 'Guidelines for Preparation of Soils, Geology, Hydrogeology Chapters of Environmental Impact Statements'.

The description of the baseline environment and the assessment of the likely impact of the proposed development on soils and geological environment has been informed by the following exercises:

- Preliminary Ground Investigations.
- Review of information available on the Geological Survey of Ireland (GSI) online mapping service.

A Preliminary Ground Investigations for the proposed development was carried out by Ground Investigations Ireland Limited between May and June 2019 (refer to Appendix 6.1) and included the following scope of work within the subject site:

- 8 No. Trial Pits.
- 2 No. Infiltration Tests.
- 9 No. Window Sample Boreholes.
- 1 No. Slit Trenches.
- 7 No. Cable Percussion Boreholes.
- 4 No. Rotary Core Follow-on Boreholes.
- 4 No. Groundwater Monitoring Wells.
- Laboratory testing.

6.3 RECEIVING ENVIRONMENT

6.3.1 Soils

Review of information available on the Geological Survey Ireland (GSI) online mapping service (Teagasc Soils and Subsoils Map) shows that the majority of the site's topsoil layer consists of 'mineral alluvium', while the southern boundary of the site consists of a topsoil layer described as 'mineral poorly drained (mainly basic)'. Similarly to the topsoil layers, the underlain subsoil in the majority of the site is described as 'alluvium undifferentiated', while the southern boundary of the site's subsoil is described as 'till derived from limestones'. Refer to Figures 6.1 and 6.2 below for graphical representation.

A Preliminary Ground Investigation carried out by Ground Investigation Ireland summarizes the ground conditions of the site as follows:

- Maximum of 0.4m thick topsoil overlaying;
- Made ground layer encountered beneath topsoil or from the surface and present to depths of between 0.6m and 2.6m below ground level overlying;
- Cohesive Deposits, generally described as clay, were encountered beneath Made Ground or Topsoil. Granular Deposits, generally described as gravel, were encountered within the cohesive deposits.
- Rotary core boreholes recovered Medium strong or strong grey fine grained Limestone bedrock with calcite veins. The depth to rock varies from 3.8m below ground level in BH05 to a maximum of 9.2m below ground level in BH01 and BH02.

Both infiltration tests carried out failed as the water level dropped too slowly to allow calculation of an infiltration rate.

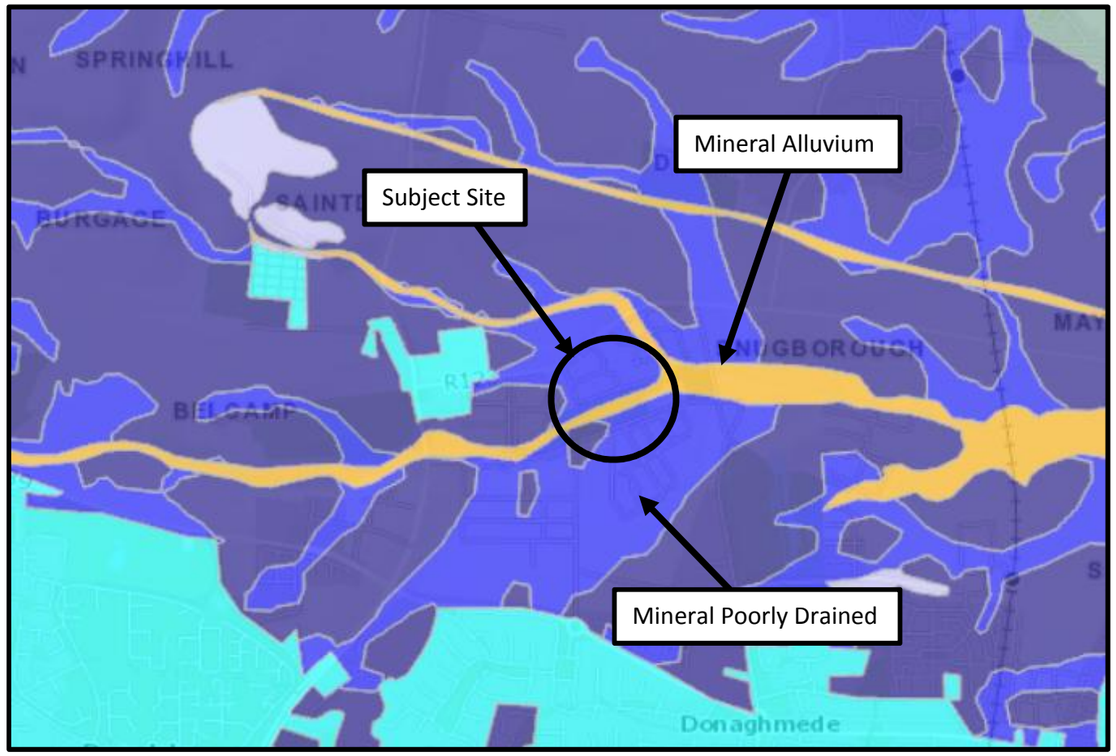

Figure 6.1Extract from Teagasc Soil Map.

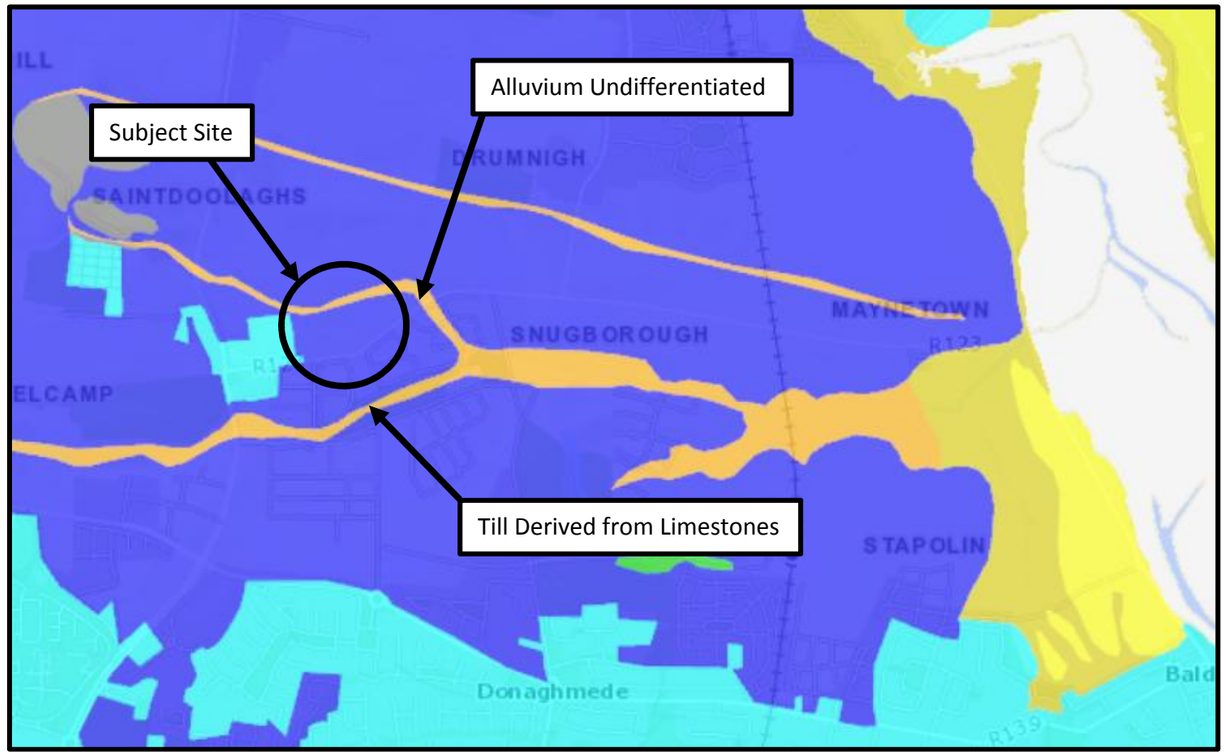

Figure 6.2 Extract from Teagasc Subsoil Map.

6.3.2 Geology

GSI's Online Mapping Service (1:100k Bedrock Unit Groups) describes the geology in the site as 'Argillaceous Bioclastic Limestone, Shale'.

GSI classifies the site's groundwater vulnerability as moderate and the underlying aquifer is classified as 'Locally Important Aquifer- Bedrock which is Moderately Productive only in Local Zones'. Refer to Figures 6.3 and 6.4 below for graphical representation.

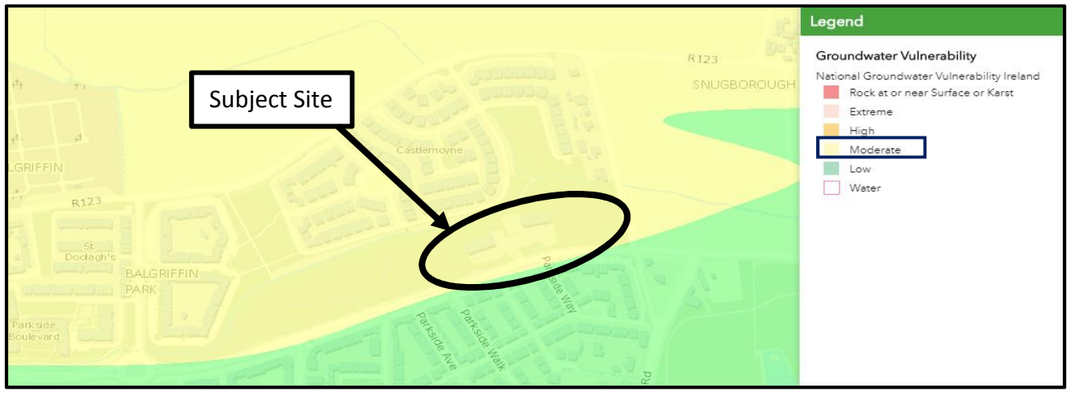

Figure 6.3 Extract from GSI Groundwater Vulnerability.

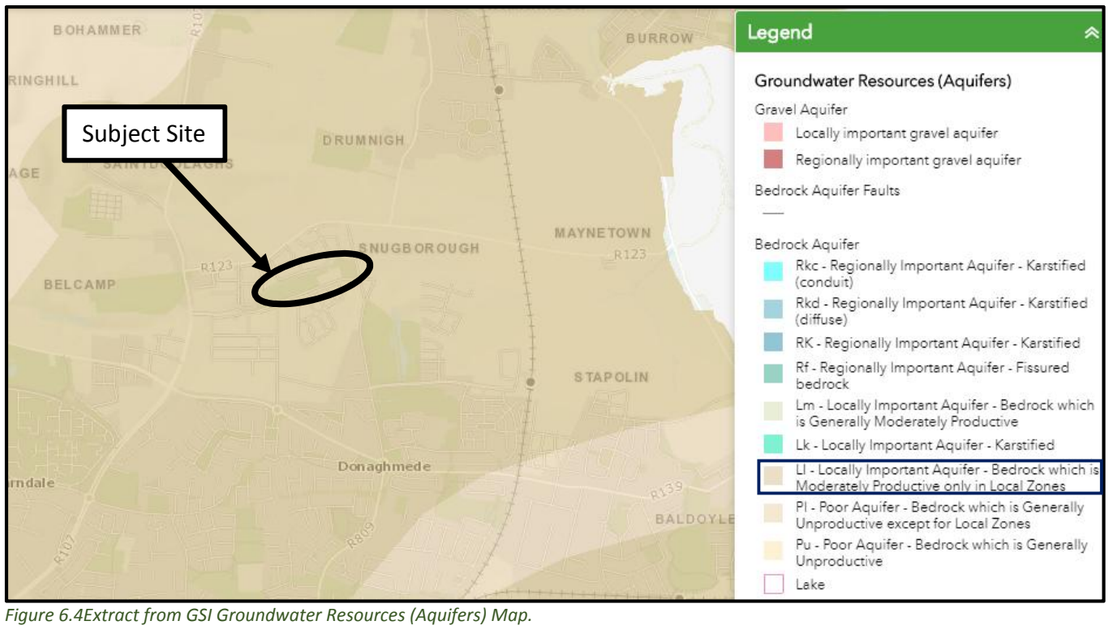

Figure 6.4Extract from GSI Groundwater Resources (Aquifers) Map.

6.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development, as set out in chapter 3 and in the statutory notices, will result in site development works that will include stripping of the 0.2m to 0.4m thick topsoil layer. It is expected that all stripped topsoil will be reused on site, incorporated into public open spaces and landscaped areas within the development.

Excavation of subsoil layers, made ground and rock will be required in order to allow basement construction, drainage and utility installation and provision of underground attenuation of surface water. Where feasible, excavated material will be reused as part of the site development works (e.g. use as fill material) although the majority of excavated material will be disposal off-site at a licenced facility.

The proposed development will also involve flood compensation works to mitigate any loss of flood plain in the green open space to the north of the subject site where the Mayne River flows in an easterly direction.

6.5 POTENTIAL IMPACTS

6.5.1 Construction Phase

This section identifies a list of likely and significant impacts to the soil and geology of the subject site caused by the construction of the proposed development.

6.5.1.1 Stripping of Topsoil

Two schools were formerly located on the subject site. These have since moved in April 2019 to a new permanent location off Belmayne Avenue. As a result of its last use the removal of existing topsoil layer will be required only in virgin areas to be used for the construction of the proposed development. It is expected that all stripped topsoil will be reused on site incorporated into public open spaces and landscaped areas within the development.

Stripping of topsoil will result in exposure of the underlying subsoil layers to the effects of weather and construction traffic and may result in subsoil erosion and generation of sediment laden runoff.

	Volume (m^3)
Topsoil Strip (200mm thick layer)	1,020
Topsoil Reuse (landscaping of open spaces etc.)	1,020

Table 6.1 Preliminary Estimated Topsoil Volume

6.5.2 Excavation of Subsoil Layers

Excavation of subsoil layers will be required in order to allow basement construction, drainage and utility installation and provision of underground attenuation of surface water. Subsoil will also be excavated for the flood compensation works in the green open space to the north of the subject site.

Where feasible, excavated material will be reused as part of the site development works (e.g. use as fill material) however, the majority of subsoil will have to be removed to an approved landfill.

	Volume (m^3)
Cut	38,900
Fill	550
Removal of Unsuitable Material	38,350

Table 6.2Estimated Cut/Fill Volumes.

6.5.2.1 Construction Traffic

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

6.5.2.2 Accidental Spills and Leaks

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

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

6.5.2.3 Geological Environment

Limestone was encountered in four of the exploratory holes (BH01, BH02, BH05 and BH07) as part of the Preliminary Ground Investigation. It is expected that the installation of drainage and the construction of the basement will require excavation of bedrock in some locations due to the depths to rock. It is not envisaged that this will have any discernible impact on the environment. Where bedrock is encountered it will be crushed, screened and tested for use within the designed works where possible.

6.5.3 Operational Phase

On completion of the construction phase, there will be no further impact on soils and the geological environment.

Drainage

The only direct discharge to the soil environment during the operational phase is likely to be associated with infiltration through landscaped areas. It is considered unlikely significant sources of contamination will exist in these areas. Therefore direct drainage to soils is considered to be a negligible impact to a low / medium significance/sensitivity environment and the significance of the impact is imperceptible.

Accidental Spills and Leaks

There will be no significant storage or use of hazardous / water polluting materials during the operational phase of the Proposed Development.

6.6 POTENTIAL CUMULATIVE IMPACTS

Cumulative impacts to land and soil, during construction and demolition processes are associated with spillage and leakage of oils and fuels and disturbance of land. Individual impacts from the Proposed Development are generally considered to be negligible to medium impacts to a low to medium sensitivity environment and the significance of the impacts has been assessed as imperceptible to moderate. As outlined in Section 6.7 below, mitigation measures proposed to manage and control potential impacts during construction of the Proposed Development will reduce the magnitude and significance of impacts from these developments to a minimum.

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

The majority of the planning applications in the vicinity of the Proposed Development are residential in nature with a new residential development occurring to the east of the site, on the opposite site of Balgriffin Park, along Marsfield Avenue DCC Planning Refs 3380/15 (as amended by 4266/16 and 2717/19), and 3247/14 (as amended by 2478/17, 3696/18, and 2719/19). Construction is also currently ongoing to the south of Parkside Boulevard, also for residential development under Reg. Ref.: 4315/03 / ABP PL29N.207192. The majority of this area the subject of this parent permission are controlled by Cairn Homes Properties Limited and are now known as Parkside. Parkside Phases 1, 2A, 2B are complete, while 2C is nearing completion. Parkside 3(P13 – P15), which was the subject of a joint venture between Cairn Homes Properties Limited and Nama is also complete. Phase 5A has just recently been granted permission. This is being developed to the highest standard with mitigation measures in place. As a result, the potential cumulative impact of the Proposed Development and other consented developments is considered to be slight.

Should any other developments be under construction or planned in the vicinity of the site, potential cumulative impacts are not anticipated once similar mitigation measures are implemented.

6.7 MITIGATION MEASURES

6.7.1 Construction Phase

6.7.1.1 Stripping of Topsoil

Stripping of topsoil will be carried out in a controlled and carefully managed way and coordinated with 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.

Temporary topsoil stockpiles will be protected for the duration of the works and not located in areas where sediment laden runoff may enter existing watercourse and surface water drains.

Topsoil stockpiles will also be located so as not to necessitate double handling.

The CEMP will outline proposals for the excavation and management of excavated material. Movement of material will be minimised in order to reduce degradation of soil structure and generation of dust. In order to minimise the potential environmental impact of stockpiles, the CEMP will contain the following mitigation measures that will be implemented during the construction phase:

· Position spoil and temporary stockpiles in locations which distant from drainage systems;
· Store excavated topsoil for reuse in graded stockpiles less than 2m high to prevent damage to the soil structure. Other excavated materials of lower engineering quality can be stored in higher piles;
· To help shed rainwater and prevent ponding and infiltration, the sides and top of the stockpiles will be regraded to form a smooth gradient with compacted sides reducing infiltration and silt runoff;
· Segregate different grades of soil where they arise and topsoil will first be stripped from any land to be used for storing subsoil; and
· Minimise movements of materials within the stockpiles in order to reduce the degradation of the soil structure.

Although there was limited evidence of contamination identified in soil laboratory analysis from the geotechnical site investigation works, all excavated materials will be visually assessed for signs of possible contamination such as staining or strong odours. Should any unusual staining or odour be noticed, this soil will be segregated and samples of this soil analysed for the presence of possible contaminants in order to determine an appropriate disposal outlet.

6.7.1.2 Excavation of Subsoil Layers

The design of the apartment blocks levels have been set as high as possible to reduce the excavation depth required for the basement. Drainage levels have been set as high as possible to reduce depth of excavation for drainage and services.

The duration the subsoil layers are exposed to the effects of weather will be minimised. Disturbed subsoil layers will be stabilized as soon as practicable (e.g. backfill of service trenches and underground attenuation, installation of basement slab and completion of landscaping).

Similar to stripped soil, stockpiles of excavated subsoil 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 the Mayne River).

6.7.1.3 Construction Traffic

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 any site entrances and road sweeping implemented as necessary in order to maintain the road network in the immediate vicinity of the site.

Refuelling and servicing of construction machinery will take place in a designated hardstand area which is also remote from the any surface water inlets when not possible to carry out such activities off site.

6.7.1.4 Accidental Spills and Leaks

In order to mitigate against spillages contaminating underlying soils, all oils, fuels, paints and other chemicals will be stored in a secure bunded hardstand area.

Refuelling and servicing of construction machinery will take place in a designated hardstand area which is also remote from any surface water inlets or the Mayne River when not possible to carry out such activities off site.

6.7.1.5 Geological Environment

At any given time, the extent of the 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 the use within the designed works to reduce the volume of material required to leave the site. This will also reduce the volume of material to be imported to the site.

Construction Environmental Management Plan

The 'Construction and Environmental Management Plan' (CEMP) prepared by DBFL will be further developed and maintained by the contractor during the construction phase of this development. The construction stage CEMP will cover all potentially polluting activities and include an emergency response procedure. All personnel working on the site will be trained in the implementation of the procedures. The CEMP will include requirements for the appropriate management of ACMs in soil.

The CEMP will also include a Waste Management Plan, to be prepared in accordance with Department of Environment, Community & Local Government guidelines. It will also include details of proposed environmental monitoring for the duration of the construction works.

6.7.2 Operational Phase

On completion of the construction phase no further mitigation measures are proposed as there will be no further impact on soils and the geological environment.

6.8 PREDICTED IMPACTS

6.8.1 Construction Phase

Implementation of the measures outlined in Section 6.7 will ensure that the potential impacts of the proposed development on soils and the geological environment do not occur during the construction phase and that any residual impacts will be short term.

The primary unavoidable impact, given the nature of the proposed development, is the removal of material unsuitable for reuse as fill material.

6.8.2 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

Under a 'worst case' scenario, the accidental release of fuel, oil, paints or other hazardous material occurs on site during the construction phase, through the failure of secondary containment or a materials handling accident on the site. If this were to occur over open ground then these materials could infiltrate through the soil contaminating the soil zone. If the materials were not recovered promptly, then the contaminants may contaminate the down gradient groundwater and surface water receptors.

The contractor must adhere to the Construction Management Plan to ensure that all containment is kept in working order to avoid this scenario to happen.

6.11 MONITORING & REINSTATEMENT

6.11.1 Monitoring

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

- Adherence to the Construction Management Plan and the Construction Environmental Management Plan by DBFL.
- Construction monitoring to the works (e.g. inspection of existing ground conditions during excavation for the basement and drainage, etc).
- Inspection of fuel/oil storage areas.
- Monitoring cleanliness of adjacent road network, implementation of dust suppression and provision of vehicle wheel wash facilities.
- Monitoring of contractor's stockpile management (e.g. protection of excavated material to be reused as fill, protection of soils for removal from site from contamination).
- Monitoring sediment control measures (sediment retention ponds, surface water inlet protection, etc).

No ongoing monitoring is proposed on completion of the construction phase.

6.11.2 Reinstatement

All temporary construction compounds and site entrances are to be removed upon completion of the construction phase. Such areas are to be reinstated in accordance with the landscape architects plan and engineer's drawings.

All construction waste and/or scrapped building materials are to be removed from site on completion of the construction phase.

Oil, fuel etc. storage areas are to be decommissioned on completion of the construction phase. Any remaining liquids are to be removed from site and disposed at an appropriate licenced facility.

All sediment control measures (e.g. sediment retention ponds) are to be decommissioned on completion of the construction phase. Such areas are to be reinstated in accordance with the landscape architects plan and engineer's drawings.

6.12 DIFFICULTIES IN COMPILING INFORMATION

No particular difficulties were encountered in completing this section.

6.13 REFERENCES

The baseline environment and the assessment of the development in this chapter was described based on the information collected from the sources outlined under section 6.2.

7 HYDROLOGY AND WATER SERVICES

7.1 INTRODUCTION

This chapter provides an assessment of the likely impact of the proposed development on the surrounding hydrology, existing surface water drainage, existing foul water drainage and existing water supply services in the vicinity of the site as well as identifying proposed mitigation measures to minimise any impacts.

The assessment must consider the potential for non-conformance with the EU Water Framework Directive (WFD) (Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for the Community action in the field of water policy) objectives and ensure that:

· The need for the avoidance and reduction of impacts on the water environment is taken fully into account in the environmental evaluation; and
· The selection of appropriate means of preventing any significant predicted impact is made through modification of the drainage design, choice of discharge location(s) and/or adoption of runoff treatment methods, with the objective of designing-out potential adverse environmental impacts.

It describes water, hydrology and flooding issues associated with the proposed development in accordance with the requirements of the relevant EIA Regulations and guidance on preparation and content of an EIAR, as outlined in Section 7.2 This section should also be read in conjunction with Chapter 6 Soils, and Geology and Chapter 5 Biodiversity/Ecology of this EIAR which pay particular attention to the potential for impacts upon the aquatic/riparian and hydrogeological environments respectively.

Proposed Development Site Location and Brief Description
This is as described in chapters 1 (introduction) and 3 (Description of Development) of this EIAR and as set out in the statutory notices.

Statement of Competence
In accordance with Article 5(3)(a) of the EU Directive, by appointing DBFL, the applicant has ensured that this chapter has been prepared by "Competent experts".

7.2 METHODOLOGY

7.2.1 Hydrology

This assessment meets the requirements for an EIAR, as outlined in the relevant National and EU legislation, and has been prepared in accordance with the Environmental Protection Agency (EPA) guidance documents 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, 20171'

The appraisal methodology considered a description of the impact i.e. the "quality" of the effects (i.e. whether it is adverse or beneficial), the "significance" of the effects (i.e. the magnitude of the effect in terms of the environment), the "probability" of the event occurring, and the "duration" of the effects (i.e. whether it is short or long term) and also considers the significance/sensitivity of the existing environment. Terminology for describing the quality, significance, extent, probability and duration of effects is set out in Section 3.7.3 of the EPA EIAR guidance.

Sources of information
Assessment of the likely impact of the proposed development on the surrounding surface water and hydrogeological environments included the following activities:

- Review of existing topographic survey information.
- Preliminary Ground Investigation carried out by Ground Investigations Ireland Limited between May and June 2019 (refer to Chapter 6 Appendix 6.1).
- Review of 'as built' records of adjacent developments.
- Review of information available on the Environmental Protection Agency (EPA) online mapping service.
- Review of information available on the Geological Survey of Ireland (GSI) online mapping service.
- Review of the Office of Public Works (OPW) National Flood Hazard Mapping and Catchment Flood Risk. Assessment and Management Studies (CFRAM Studies).
- Review of Dublin City Development Plan (2016-2022).
- Review of DBFL Infrastructure Design Report for Parkside 4
- Review of DBFL Site Specific Flood Risk Assessment for Parkside 4

7.2.2 Water Services

Assessment of 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).
- Method outlined in Irish Water Code of Practice for Wastewater Infrastructure.
- Method outlined in Irish Water's Code of Practice for Water Infrastructure.

Assessment of the likely impact of the proposed development on existing water services in the vicinity of the site included:

- Review of 'as built' records of adjacent developments.
- Consultation with Irish Water and Dublin City Council.
- Submission of a Pre-Connection Enquiry Application to Irish Water.

7.3 RECEIVING ENVIRONMENT

Site Area Description.
The subject site, as described in chapter 1, is bound to the north by the Mayne River (Refer to Figure 7.1 below).

Topography
Topographical surveys of the area indicate that the lands within the subject site generally fall in a north-easterly direction.

Surrounding land Use
Immediately surrounding the application site are land designated for open space and which form part of the Mayne River Linear Park. Beyond this immediate area, there are existing residential developments to the north and south, while to the east a new residential apartment block is currently under construction.

7.3.1 Hydrology

The Mayne River is a designated EPA water course that discharges to the sea at Belcamp approximately 2.5 Km east of the site. The application site is within the Eastern River Basin District, the Mayne Santry River Catchment, the Santry-Mayne-Sluice Water Management Unit and the Liffey and Dublin Bay Hydrometric Area.

Surface Water Quality
The EPA Quality Rating (Q-value) System has been used to monitor the ecological quality of streams and rivers in Ireland since 1971. River water quality has been provided by the EPA for the Mayne River has been classified as poor based on 2016 data.

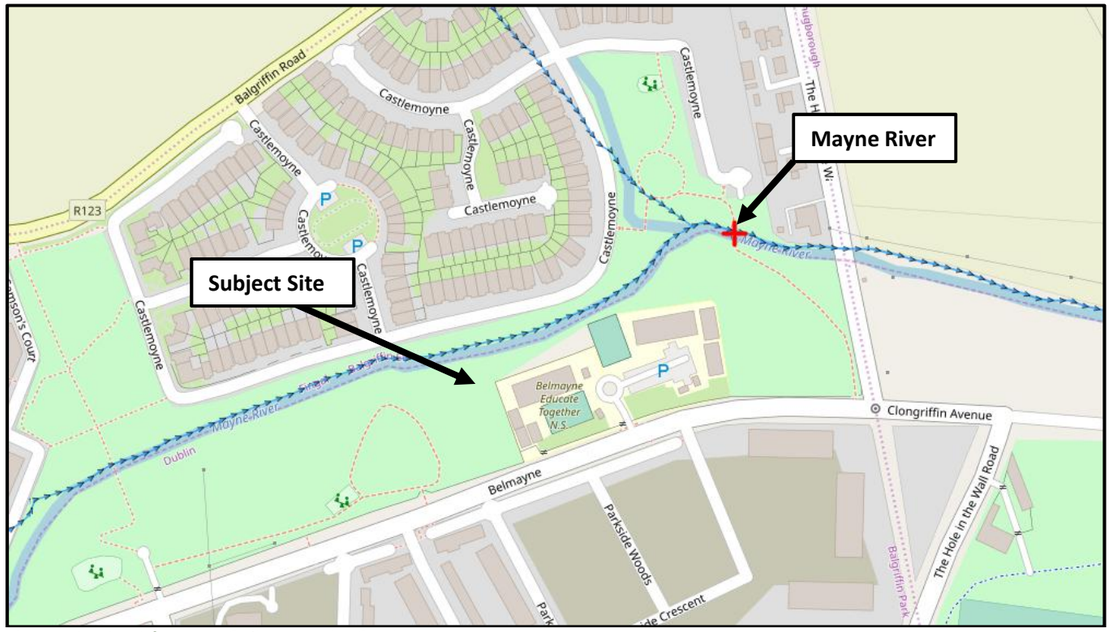

Figure 7.1 Extract from EPA Online Mapping Service.

Hydrogeology
GSI's Online Mapping Service (1:100k Bedrock Unit Groups) describes the geology in the site as 'Argillaceous Bioclastic Limestone, Shale'.

GSI classifies the site's groundwater vulnerability as moderate. The underlying aquifer is classified as 'Locally Important Aquifer-Bedrock which is Moderately Productive only in Local Zones'. Refer to Figures 7.2 and 7.3 below for graphical representation.

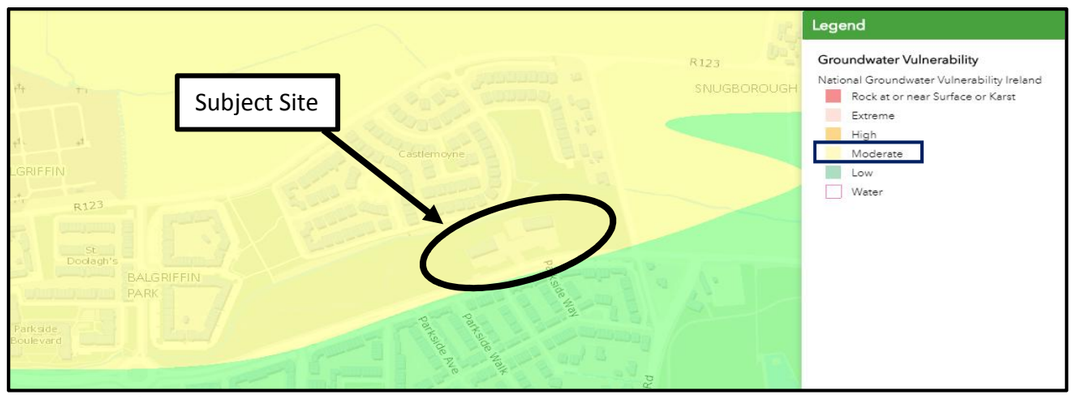

Figure 7.2 Extract from GSI Groundwater Vulnerability.

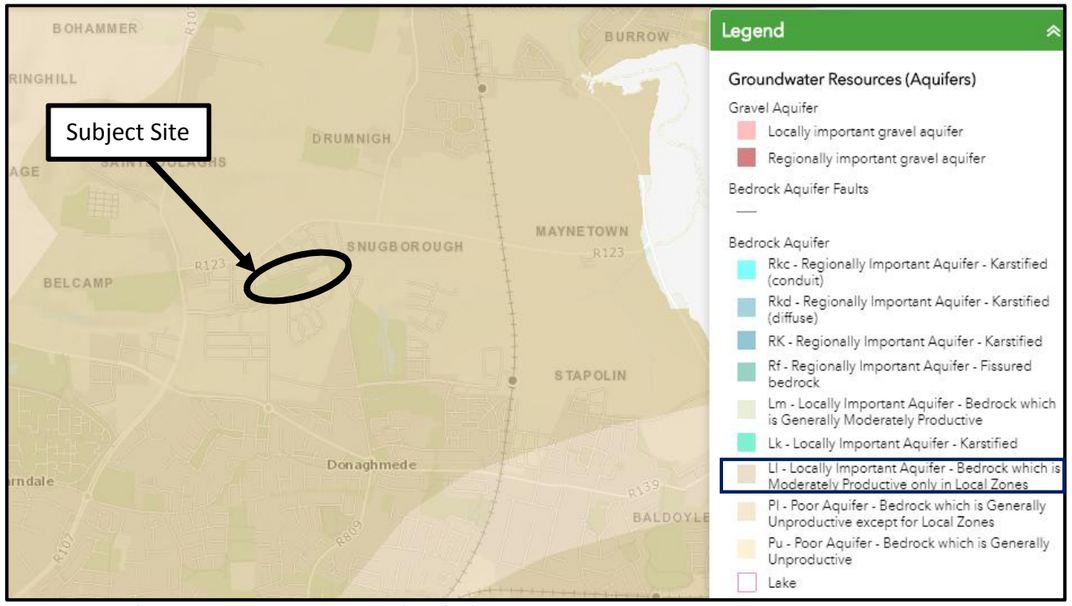

Figure 7.3 Extract from GSI Groundwater Resources (Aquifers) Map.

7.3.1.1 Flood Risk

DBFL Consulting Engineers has undertaken a flood hazard assessment by reviewing information from the Office of Public Works (OPW), National Hazard Mapping (www.floods.ie), the Fingal East Meath CFRAM (FEMFRAM) Project and other sources. This assessment has been carried out in accordance with the procedure for a 'Stage 1 Flood Risk Identification' as outlined in the OPW's Guidelines for Planning Authorities – The planning System and Flood Risk Management (November 2009).

A review of the Fingal East Meath CFRAM flood maps indicated a potential flood risk along the site's northern extents (Mayne River Floodplain) in the predicted 1% AEP and 0.1% AEP storm events. DBFL have mapped the flood extents of the Mayne River on the topographical survey for the subject site.

The flood water level was provided by the FEMFRAMS project team and the extent of the predicted 0.1% AEP Flood Event was marginally encroaching on the proposed residential development. In order to allow a regularised development to proceed with this minor encroachment, it is proposed to modify the floodplain and provide floodplain compensation on a 'level for level' basis (refer to drawing number 19001-3002 in Appendix 7.1). This strategy was agreed with Dublin City Council's flooding department as part of the pre-planning process.

On completion of Stage 2 – Initial Flood Risk Assessment, it was concluded that the proposed residential blocks will be located in Flood Zone C following the slight modification of the floodplain. The green open space to the north east of the proposed residential blocks is located within Flood Zone A and B but no development is proposed in this area (0.1% AEP event).

DBFL also carried out a Justification Test as some of the proposed residential blocks are located in the pre-development Flood Zone A and B. On completion of the Justification Test the proposed residential development is considered appropriate, and DBFL concluded that the proposed development will have a robust level of protection up to the 100 year return event.

7.3.2 Water Services

7.3.2.1 Surface Water Drainage

There is an existing surface water sewer within the subject site running parallel to Parkside Boulevard. This sewer connects to an existing 900mm diameter surface water sewer from the recently constructed Parkside Development which outfalls to the existing attenuation system to the west of the proposed development. The outfall from the above attenuation system traverses the subject site to the north of the proposed residential blocks. These sewers are not shown in the Dublin City Council records as they not taken in charge at present.

Existing surface water drainage sewers are shown on drawing number 19001-3000 in Appendix 7.2.

7.3.2.2 Foul Water Drainage

The North Fringe Sewer was constructed under the alignment of Parkside Boulevard in 2002. No building basement or structures are proposed within the wayleave of the existing North Fringe Sewer.

A 300mm diameter foul outfall from the Castlemoyne development crosses the subject site before discharging to the North Fringe Sewer.

Existing foul sewers are shown on drawing number 19001-3000 in Appendix 7.2.

7.3.2.3 Water Supply

Similar to the North Fringe Sewer, a 450mm diameter watermain was constructed under Parkside Boulevard as part of the North Fringe enabling works. No buildings, basements or structures are proposed within the wayleave of the existing North Fringe Watermain.

A series of existing watermains have been laid as part of the recently constructed Parkside Development to the south of Parkside Boulevard. These watermains include a 250mm diameter running parallel to Parkside Boulevard and a series of 100mm and 150mm diameter distribution mains.

Existing watermains are shown on drawing number 19001-3007 in Appendix 7.3.

7.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

A full description of the proposed development is outlined in Chapter 3. The following elaborates on the hydrological aspects.

7.4.1 Hydrology

The proposed development, as described in the statutory planning notices and in chapter 3 of this EIAR, will result in the surface water from the proposed development being attenuated in a geocellular underground attenuation facility. Outflow from the development will be controlled using a vortex flow control device (Hydrobrake or equivalent), limiting the discharge rate to 2l/s/ha in accordance with the GDSDS and Dublin City Council requirements.

In order to adhere to this requirement, the calculated allowable surface water runoff for the development has been calculated as 2.1 l/s. It has been determined that a total attenuation volume of 536 m^3 will therefore be required on site to accommodate the 100-year storm event (provision for climate change included), as required by the GDSDS.

A slight modification of the Mayne River floodplain is proposed on a 'level for level' basis as the development will be built on the pre-development Flood Zone A and B (i.e. before modification of the floodplain). DBFL have calculated the floodplain volume before and after the proposed floodplain modification using Civil 3D software and an excess floodplain volume of 430m^3 has been provided. On completion of the floodplain compensation works, the proposed residential blocks will be located in Flood Zone C (refer to drawing number 19001-3002 in Appendix 7.1).

The surface water drainage network, attenuation storage and site levels are designed to accommodate a 100-year storm event (provision for climate change included). The finished floor levels of each apartment block are set above the 100-year flood levels by a minimum of 0.5m. For storms in excess of 100 years, the development has been designed to provide an overland flood route towards the Mayne River. This overland flood routes also reduces the developments vulnerability to climate change.

7.4.2 Water Services

7.4.2.1 Surface Water Drainage

The proposed surface water drainage strategy is broken down in levels below to give a clearer understanding:

- Roof level and Terraces:

1. Green Roof – this will be an extensive type green roof with 80mm minimum construction depth. A minimum of 70% of the roof area is proposed to be green roof as requested by Dublin City Council (DCC), which will provide interception and reduction of flow rates at the beginning of the treatment train.
2. Planters will also be installed on the roof terraces locally acting to reduce run off and allowing an element of interception to occur.
3. The hardstanding of roof terraces will drain to the underlying free draining aggregate and drainage board allowing the surface water to slowly percolate through the build-up before discharged to the positive drainage system.
4. Remaining roof areas such as plant areas will drain to the green roof where possible and ultimately drain to the below surface water network.

- Podium Level (Ground Floor):

5. The podiums of the development will incorporate green landscaping and paved areas. Generally the paved areas will drain to the green landscaping and where not possible will drain to slot drains which outfall to the free draining aggregate and drainage board below.

   The green landscaped areas will constitute what is similar to an intensive green roof build-up, allowing surface run-off to slowly percolate through the build-up medium, reducing the flows through the drainage network and also allowing vegetation to intercept run-off creating a reduction in run-off volumes.

6. Smaller SuDs elements will also be located on podium such as Bio-swales, raised planters and rain gardens to slow any areas of hardstanding that need to be drained and also provide additional treatment and subsequent improvement of discharge quality.

- Ground Floor:

7. The remaining areas surrounding the 4 residential blocks and podiums will be green landscaped areas with no positive drainage to the surface water network. The verge between the realigned footpath and cycle track on Parkside Boulevard will be retained and realigned to reduce the impact on the existing surface water network.

One attenuation tank is required to the east of the proposed development within the open space. The tank is sized for the 1 in 100 year storm event plus climate change (20%). Attenuation volumes have been calculated based on an allowable outflow rate of 2 l/s/ha as required by Dublin City Council which equates to 2.1 l/s for the development based on a catchment area of 1.05 ha.

The outfall for the surface water drainage is to the Mayne River at the same location as the outfall from the existing Parkside attenuation system located in the open space to the west of the proposed development. It is proposed to divert part of the existing 450mm diameter surface water sewer to the north of the subject site, which outfalls the above attenuation system, outside the line of the proposed development, refer to drawing number 19001-3000 in Appendix 7.2.

The 100 year FEMFRAMS flood level of the Mayne River at the outfall point is 11.0m AOD which is 0.7m higher than the base of the attenuation system. To mitigate the risk of flood waters entering the attenuation system a "smart manhole" is proposed with a weir wall level of 11.00m AOD at the inlet to

the tank to ensure that flood waters cannot enter the attenuation system and a positive head is maintained behind the hydrobrake.

7.4.2.2 Foul Water Drainage

The proposed foul drainage layout for the apartment blocks will be constructed as slung drainage within the basement and connected to an external drainage manhole to the east of Block D. It is proposed to construct a manhole on the existing 300mm diameter foul outfall from the Castlemoyne development to the north. Foul flows for the development will connect to this manhole before discharging to the North Fringe Sewer via the existing 300mm diameter connection.

Basement incidental car park drainage will be collected in the basement before passing through a Class 2 Light Liquid Separator and pumped to the foul network as required by GDSDS.

It is also proposed to divert the existing 300mm diameter foul outfall from the Castlemoyne Development outside the line of the proposed development.

7.4.2.3 Water Supply

It is proposed to provide a watermain connection for the proposed development from the existing 250mm diameter watermain constructed as part of the Parkside Development. This existing watermain runs parallel to Parkside Boulevard and connects to the 450mm diameter North Fringe Watermain at a PRV approximately 450m to the west of the proposed development.

7.5 POTENTIAL IMPACTS

7.5.1 Hydrology

7.5.1.1 Construction Phase

The construction phase of the proposed development will impact on the ground and geological conditions through stripping of existing ground cover and topsoil; the slight modification of the Mayne River floodplain, use of temporary access routes; roadway and path construction; excavation and laying of services; basement and foundation excavation and construction; construction of hardstanding including permeable paving; and landscaping of gardens and public open spaces.

The civil works will include the following activities:

- Preliminary works, including site clearance, construction of haul roads and establishment of site compound(s) and lay down areas;
- Modification to the floodplain;
- Set up site office and welfare units and connection of associated services;
- Clearance of oversite and topsoil and reduction of levels;
- Drainage and service excavation and installation;
- Excavation of basement and foundations and casting basement/ foundations;
- Import of aggregate and fill materials;
- Segregation and stockpiling of excavated soils;
- Placement of excavated soil for reuse;
- Build new pedestrian paths & passive open spaces;
- Build new public open space and active recreational areas; and
- Landscaping, reinstatement and fencing.

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

- 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.
- Discharge of rain water pumped from excavations.
- Accidental spills and leaks associated with storage of oils and fuels, leaks from construction machinery and spillage during refuelling and maintenance contaminating the surrounding surface water and hydrogeological environments.
- Concrete runoff, particularly discharge of wash water from concrete trucks.
- Discharge of vehicle wheel wash water.
- Infiltration of groundwater into excavations.
- Uncontrolled sediment erosion and contaminated silty runoff; Silt laden groundwater from dewatering of excavations;
- Changes to the existing drainage network including interception and redirection of natural and artificial watercourses; and
- Outfall points.
- Pollution of surface waters by mobilised suspended solids (ss) can have significant adverse ecological impacts. Vegetation removal, site stripping and bulk earthworks as part of the landscaping and building construction would leave deposits exposed to erosion by wind or rain and this could potentially lead to increases in sediment loading of the surface water and sewerage network. Contamination from suspended sediments may also be caused by runoff from material stockpiles Attention will also need to be paid to preventing the build-up of dirt on road surfaces, caused by lorries and other plant entering and exiting the site.

7.5.1.2 Operational Phase

Potential operational phase impacts are noted below:

- Increased impermeable surface area will reduce local groundwater recharge and potentially increase surface water runoff if not attenuated to greenfield runoff rate.
- Fuel / oil leaks from parked vehicles;
- Excessive demand on the watermain network resulting in reduced supply or loss of pressure in the surrounding area;
- Siltation of surface water drainage system and attenuation system

7.5.1.3 Human Health

In the scenario where surface water runoff from the development gets contaminated by any of the potential impacts described in sections above, a risk to human health can be linked to the potential for contamination of the potable water supply. The ground water and watercourses (Mayne River) would present possible pathways. The risk is considered below.

7.5.2 Water Services

7.5.2.1 Construction Phase

Potential impacts that may arise during the construction phase include:

- Contamination of surface water runoff due to construction activities.
- Improper discharge of foul drainage from contractor's compound.
- Cross contamination of potable water supply to construction compound.

7.5.2.2 Operational Phase

Potential operational phase impacts on the water infrastructure are noted below:

- Increased impermeable surface are will reduce local ground water recharge and potentially increase surface runoff if not attenuated to greenfield runoff rate.
- Accidental hydrocarbon leaks and subsequent discharge into piped surface water drainage network or watercourses.
- Increase maximum discharge to foul drainage network (Average Daily Foul Discharge Volume = 125 m^3).
- Increased potable water consumption (Average daily domestic demand = 114 m^3).
- Contamination of surface water runoff from foul sewer leaks.

7.5.2.3 Human Health

As the proposed surface water drainage outfalls to the Mayne River any contamination or cross-contamination to surface water will impact on water bodies and a risk to human health can be linked to the potential for contamination of the potable water supply. The ground water and watercourses (Mayne River) would present possible pathways. The risk is considered below.

7.6 POTENTIAL CUMULATIVE IMPACTS

The proposed surface water drainage infrastructure has been designed in accordance with the relevant guidelines. Development are generally considered to be negligible to medium impacts to a low to medium sensitivity environment and the significance of the impacts has been assessed as imperceptible to moderate. As outlined in Section 7.7 below, mitigation measures proposed to manage and control potential impacts during construction of the Proposed Development will reduce the magnitude and significance of impacts from these developments to a minimum. Any other future development in the vicinity of the site would have to be similarly designed in relation to permitted surface water discharge, surface water attenuation and SUDS, therefore, no potential cumulative impacts are anticipated in relation to surface water drainage and flooding.

No potential cumulative impacts are anticipated in relation to wastewater as Irish Water have advised that provision of a wastewater connection is feasible. Irish Water review the other developments in the area either completed or under construction when assessing the impact.

No potential cumulative impacts are anticipated in relation to water supply as Irish Water have advised that provision of a water connection is feasible. Irish Water review the other developments in the area either completed or under construction when assessing the impact.

The majority of the current planning applications in the vicinity of the Proposed Development are residential in nature with a new residential development occurring to the east of the site, on the opposite site of Balgriffin Park, along Marsfield Avenue DCC Planning Refs 3380/15 (as amended by 4266/16 and 2717/19), and 3247/14 (as amended by 2478/17, 3696/18, and 2719/19). Construction is also currently ongoing to the south of Parkside Boulevard, also for residential development under Reg. Ref.: 4315/03 / ABP PL29N.207192. The potential cumulative impact of the Proposed Development and other consented developments is considered to be slight. These other developments either under construction or planned in the vicinity of the site are likely to have similar impacts during the construction phase. Should the construction phase of any developments coincide with the development of this proposed site, potential cumulative impacts are not anticipated once similar mitigation measures are implemented.

7.7 MITIGATION MEASURES

The operational phase of this development is unlikely to have any significant adverse impacts on the local water environment/hydrology due to the environmental design considerations incorporated into the development. These measures will seek to avoid or minimise potential effects in the main through the implementation of best practice construction methods and adherence to all relevant legislation.
The nature of the proposed development dictates that the greatest potential impact on surface waters associated with the development will be in the construction phase. In order to prevent / minimise potential impacts, it is necessary to devise mitigation measures to be adopted as part of the construction works on site.

Due to the inter-relationship between surface water and soils, hydrogeology and ecology the mitigation measures discussed will are also considered applicable to these sections and this chapter should be read in conjunction with Chapter 5 Ecology and Chapter 6 Land, Soils, and Geology.

7.7.1 Construction Phase

A site-specific Construction and Environmental 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. All personnel working on the site will be trained in the implementation of the procedures. The CEMP will also include a Waste Management Plan, to be prepared in accordance with Department of Environment, Community & Local Government guidelines. It will also include details of proposed environmental monitoring for the duration of the construction works.

- Rain water pumped from excavations is to 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.

- 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.

- In order to mitigate against spillages contaminating the surrounding surface water and hydrogeological environments, all oils, fuels, paints and other chemicals shall be stored in a secure bunded hardstand area. Refuelling and servicing of construction machinery will take place in a designated hardstand area which is also remote from any surface water inlets (where not possible to carry out such activities off site).

- Concrete batching will take place off site and wash out of concrete trucks will take place off site.

- Discharge from any vehicle wheel wash areas is to be directed to on-site settlement ponds.

- Groundwater pumped from excavations is to be directed to on-site settlement ponds.

- 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 tankered off site to a licensed facility until a connection to the public foul drainage network has been established.

- Excavations will only remain open for the shortest possible time to reduce groundwater ingress. Silt
- traps will be placed around the site to reduce silt loss and these will be inspected and cleaned or replaced regularly.

- Drains carrying high sediment load will be diverted through settlement ponds. Surface water runoff from working areas will not be allowed to discharge directly to the local watercourses. To achieve this, the drainage system and settlement ponds should be constructed prior to the commencement of major site works. All design and construction will be carried out in accordance with CIRIA C532 Control of Water Pollution from Construction Sites Guidance for Consultants and Contractors.

- Runoff from spoil heaps will be prevented from entering watercourses by diverting it through the on-site settlement ponds and removing material off-site as soon as possible to designated storage areas.

- The construction compound's potable water supply shall be located where it is protected from contamination by any construction activities or materials.

7.7.2 Operational Phase

The slight modification of the Mayne River floodplain ensures the proposed residential blocks will be located in Flood Zone C. The floodplain compensation is proposed on a 'level for level' with a greater floodplain volume provided following the modification. DBFL have calculated the floodplain volume before and after the proposed floodplain modification using Civil 3D software and an excess floodplain volume of 430m^3 has been provided. On completion of the floodplain compensation works, the proposed residential blocks will be located in Flood Zone C (refer to drawing number 19001-3002 in Appendix 7.1).

Surface water runoff from the site will be attenuated to the greenfield runoff rate as outlined in the Greater Dublin Strategic Drainage Study (GDSDS). Surface water discharge rates will be controlled by a Hydrobrake type vortex control device in conjunction with attenuation storage. In addition, the installation of a 'smart manhole' upstream to the outfall to Mayne River will ensure that no backflow takes place from the Mayne River into the attenuation tank.

The proposed surface water drainage contains a series of features as outlined in section 7.4.2.1 that will provide treatment and reduce surface water runoff from the proposed development, including SUDs features such as green roofs, green areas over podium and bio swales.

All new foul drainage lines will be pressure tested and will be subject to a CCTV survey in order to identify any possible defects prior to being made operational.

No specific mitigation measures are proposed in relation to water supply, however water conservation measures such as dual flush water cisterns and low flow taps will be included in the design.

7.8 PREDICTED IMPACTS

7.8.1 Water Services

7.8.1.1 Construction Phase

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

7.8.1.2 Operational Phase

As water services design has been carried out in accordance with the relevant guidelines, there are no predicted residual impacts on the water and hydrogeological environment arising from the operational phase.

7.9 'DO NOTHING' SCENARIO

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

7.10 WORST CASE SCENARIO

Under a 'worst case' scenario, if the proposed mitigation measures under Section 7.7 are not efficiently applied surface water bodies (e.g. Mayne River) and aquifers may be contaminated and become a pathway of exposure to contamination for humans and wildlife.

7.11 MONITORING & REINSTATEMENT

7.11.1 Monitoring

Proposed monitoring during the construction phase in relation to the hydrology and water supply are as follows:

- Adherence to Construction Management Plan.
- Inspection of fuel / oil storage areas.
- Monitoring cleanliness of adjacent road network, implementation of dust suppression and vehicle wheel wash facilities.
- Monitoring sediment control measures (sediment retention ponds, surface water inlet protection etc.).
- Monitoring of discharge from sediment retention ponds (e.g. pH, sediment content).

During the operational phase an inspection and maintenance contract is to be implemented in relation to the proposed Class 1 and Class 2 fuel / oil separators, hydrobrakes and attenuation facilities.

7.11.2 Reinstatement

Oil, fuel etc. storage areas are to be decommissioned on completion of the construction phase. Any remaining liquids are to be removed from site and disposed of at an appropriate licenced facility. Dublin City Council's Environmental Control Section is to be notified of the proposed destination for disposal of any liquid fuels.

All sediment control measures (e.g. sediment retention ponds) are to be decommissioned on completion of the construction phase. Such areas are to be reinstated in accordance with the landscape architects plan and engineer's drawings.

Reinstatement of any excavations relating to the provision of surface and foul drainage connections is to be carried out in accordance with the relevant asset provider's requirements and the requirements of DCC.

7.12 DIFFICULTIES IN COMPILING INFORMATION

No particular difficulties were encountered in completing this section.

7.13 REFERENCES

The baseline environment and the assessment for the development in this chapters was described based on the information collected from the sources outlined under section 7.2.

8 NOISE AND VIBRATION

8.1 INTRODUCTION

This section of the EIAR identifies and assesses the potential noise and vibration impacts associated with the proposed development in the context of current relevant standards and guidance. It includes:

- A description of the receiving ambient noise climate in the vicinity of the subject site;
- An assessment of the potential noise and vibration impact associated with the proposed development during
    - The short-term construction phase and
    - The long-term operational phase on its surrounding environment.
- The assessment of direct, indirect and cumulative noise and vibration impacts on the surrounding environment have been considered as part of the assessment.

Mitigation measures are included, where relevant, to ensure the proposed development is constructed and operated in an environmentally sustainable manner in order to ensure minimal impact on the receiving environment.

Proposed Development Site Location and Brief Description
This is as described in chapters 1 (introduction) and 3 (Description of Development) of this EIAR and as set out in the statutory notices.

Statement of Competence
In accordance with Article 5(3)(a) of the EU Directive, by appointing Traynor Environmental, the applicant has ensured that this chapter has been prepared by Competent experts.

Figure 8.1: Parkside in Red

8.2 METHODOLOGY

This assessment meets the requirements for an EIAR, as outlined in the relevant National and EU legislation, and has been prepared in accordance with guidance documents;

- BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites - Part 1 – Noise;
- BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites - Part 2 -Vibration;
- BS 7385-2:1993 *Guide for measurement of vibrations and evaluation of their effects on buildings*;
- *BS 4142: 2014: Methods for Rating and Assessing Industrial and Commercial Sound;*
- BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings;
- BS 6841 (1987): Measurement and evaluation of human exposure to whole-body mechanical vibration and repeated shock;
- *ISO 1996: 2017: Acoustics - Description, Measurement and Assessment of Environmental Noise;*
- ProPG: Planning & Noise;
- EPA Advice Notes for Preparing Environmental Impact Statements, (Draft, September 2015);
- 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 Statements, (EPA, 2002);
- EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports, (Draft August 2017);
- TII (formerly NRA) Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (TII, 2014), the Guidelines for the Treatment of Noise and Vibration in National Road Schemes (TII, 2004).

The study has been undertaken using the following methodology:

- Baseline Noise monitoring and an Environmental Noise Survey has been undertaken across the development area to determine the range of noise levels at varying locations across the site. 3 Larson Davis noise meters were used. The monitoring took place in August 2019;
- A review of the most applicable standards and guidelines has been conducted in order to set a range of acceptable noise and vibration criteria for the construction and operational phases of the proposed development, this is summarised in the following sections;
- Predictive calculations have been performed to estimate the likely noise emissions during the construction phase of the project at the nearest sensitive locations (NSL) to the site;
- Predictive calculations have been performed to assess the potential impacts associated with the operation of the development at the most sensitive locations surrounding the development site; and,

- A schedule of mitigation measures has been proposed, where relevant, to control the noise and vibration emissions associated with both the construction and operational phases of the proposed development.

8.2.1 Construction Phase – Noise Assessment Criteria

There is no published statutory Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. Dublin City Council (DCC) typically controls construction activities by imposing limits on the hours of operation and consider noise limits at their discretion.

In order to set appropriate construction noise limits for the development site, reference has been made to *BS 5228 -1:2009 +A1 2014 Code of practice for noise and vibration control on construction and open sites-Noise*. Part 1 of this document Noise provides guidance on selecting appropriate noise criteria relating to construction works.

BS 5228-1:2009+A 1:2014 gives several examples of acceptable limits of construction and demolition noise, the most simplistic being based on upon the exceedance of fixed noise limits. For example, paragraph E.2 states:

> *' noise from construction and demolition sites should not exceed the level at which conversation in the nearest building would be difficult with windows shut.'*

Paragraph E.2 goes on to state:

> *' noise levels, between 07:00 and 19:00 hours; outside the nearest window of the occupied room closest to the site boundary should not exceed:*
>
> *70 decibels (dBA) in rural, suburban areas away from the main road traffic and industrial noise;*
>
> *75 decibels (dBA) in urban areas near main roads in heavy industrial areas.'*

Note that a typical planning condition in relation to construction noise issued by Local Authorities refer also to the compliance with BS 5228 part 1 as a means of controlling impacts to the surrounding environment. BS 5228 has therefore been used to inform the assessment approach for construction noise in line with Local Authorities requirements.

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 their sensitive receptors including amenity space. Table 8.1 specifies the recommended Project noise limit criteria in accordance with NRA Maximum Permissible Construction Phase Noise Levels at the façade of Dwellings during road developments.

Construction Phase Noise Limit Criteria		
Days & Times	**L_{Aeq}, (1hr) dB**	**$L_{pA(max)}$ slow dB**
Monday to Friday - 07:00 to 19:00	70	80
Monday to Friday - 19:00 to 22:00	60[1]	65[1]
Saturday - 08:00 to 16:30	65	75
Sundays and Bank Holidays	60[1]	65[1]

Table 8.1: NRA Maximum Permissible Construction Phase Noise levels at the façade of Dwellings during Road developments.
Note 1: Construction activity at these times, other than that required in respect of emergency works, will normally require the explicit permission of the relevant local authority.

For the appropriate assessment period (i.e. daytime in this instance) the ambient noise level is determined. If the construction noise exceeds noise levels outline in table 8.1, then a significant effect is deemed to occur.

The closest neighbouring noise sensitive receptors to the proposed development are residential properties to the north and south, residential development under construction to the west, which are located approximately 20 - 30m from the EIAR Study area boundary.

8.2.2 Construction Phase – Vibration Assessment Criteria

Guidance relevant to acceptable vibration in order to avoid damage to buildings is contained within *BS 7385-2 (1993*). The guidance values contained within *BS 7385* are reproduced also in *British Standard BS 5228-2 (2009).*

These standards differentiate between transient and continuous vibration. Surface construction activities are considered to be transient in nature as they occur for a limited period of time at a given location. The standards note that the risk of cosmetic damage to residential buildings starts at a Peak Particle Velocity (PPV) of 15mm/s at 4Hz. The standard also notes that below 12.5mm/s PPV the risk of damage tends to zero. Both standards note that important buildings that are difficult to repair might require special consideration on a case by case basis but building of historical importance should not (unless it is structurally unsound) be assumed to be more sensitive. If a building is in a very unstable state, then it will tend to be more vulnerable to the possibility of damage arising from vibration or any other ground borne disturbance. Table 8.2 below summarises the proposed vibration criteria below which there is no risk of damage to buildings. These limits apply to vibration frequencies below 15Hz where the most conservative limits are required. If there are any protected buildings near the works there is a greater potential for these to be more vulnerable than other adjacent modern structures. Therefore, on a precautionary basis, the guidance values for structurally sound buildings are reduced by 50% in line with the guidance documents referred to above.

Category of Building	Threshold of potential significant effect (Peak Particle Velocity - PPV - at building foundation) for Transient Vibration
Structurally sound and non-protected buildings	12 mm/s
Protected and / or potentially vulnerable buildings	6 mm/s

Table 8.2: Transient Vibration Impact Criteria for Buildings (Conservative Criteria below which there is No Risk of Cosmetic Damage). Source: "Guidelines for the Treatment of Noise & Vibration in National Road Schemes", NRA, 2004

Building Response

As previously mentioned in table 8.1 the standard notes that below 12.5 mm/s PPV the risk of damage tends to zero. It is therefore common, on a cautious basis to use this lower value. Taking this into consideration the vibration criteria in table 8.3 is recommended.

Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of		
Less than 15Hz	15 to 40Hz	40Hz and above
12 mm/s	20 mm/s	50 mm/s

Table 8.3: Recommended Vibration Criteria during Construction Phase

Expected vibration levels from the construction works will be discussed further in Section 8.5.

Human Perception

It is acknowledged that humans are sensitive to vibration stimuli and that perception of vibration at high magnitudes may lead to concern. Vibration typically becomes perceptible at around 0.15 to 0.3 mm/s and may become disturbing or annoying at higher magnitudes. However, higher levels of vibration are typically tolerated for single events or events of short-term duration, particularly during construction projects and when the origin of vibration is known. For example, piling can typically be tolerated at vibration levels up to 6 mm/s respectively if adequate public relations are in place. These values refer to the day and evening time periods only.

8.2.3 Operational Phase -Noise Assessment Criteria

Mechanical Plant

Due consideration must be given to the nature of the primary noise sources when setting criteria. Criteria for noise from these sources, with the exception of additional vehicular traffic on public roads, will be set in terms of the $L_{Aeq,T}$ parameter (the equivalent continuous sound level). In relation to day-to-day Operational Phase noise impacts on off-site residential locations Local Authorities would apply noise conditions to a development of this nature.

Guidance from Dublin City Council (DCC) on noise emissions from mechanical plant items typically makes reference to the *British Standard BS 4142: 2014: Methods for Rating and Assessing Industrial and Commercial Sound.* This guidance is the industry standard method for analysing building services plant noise emissions to residential receptors and is the document typically used by DCC in their standard planning conditions and also in complaint investigations.

BS 4142 describes methods for rating and assessing sound of an industrial and / or commercial nature. The methods described in this British Standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

The subjective method for applying a penalty for tonal noise characteristics outlined in *BS 4142* recommends the application of a 2dB penalty for a tone which is just perceptible at the noise receptor, 4dB where it is clearly perceptible, and 6dB where it is highly perceptible.

The following definitions as discussed in BS 4142 are summarised in Table 8.4 below:

Noise	Description
ambient noise level, $L_{Aeq,T}$	is the noise level produced by all sources including the sources of concern, i.e. the residual noise level plus the specific noise of mechanical plant, in terms of the equivalent continuous A-weighted sound pressure level over the reference time interval [T]
residual noise level, $L_{Aeq,T}$	is the noise level produced by all sources excluding the sources of concern, i.e. the ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound, in terms of the equivalent continuous A-weighted sound pressure level over the reference time interval [T]
specific noise level, $L_{Aeq,T}$	is the sound level associated with the sources of concern, i.e. noise emissions solely from the mechanical plant, in terms of the equivalent continuous A-weighted sound pressure level over the reference time interval [T]
rating level, $L_{Ar,T}$	is the specific sound level plus any adjustments for the characteristic features of the sound (e.g. tonal, impulsive or irregular components)
background noise level, $L_{A90,T}$	is the sound pressure level of the residual noise that is exceeded for 90% of the time period T

Table 8.4: Tonal Noise Characteristics

If the rated plant noise level is +10dB or more above the pre-existing background noise level then this indicates that complaints are likely to occur and that there will be a significant adverse impact. A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.

The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact.

Traffic Noise

Given that traffic to and from the development will make use of existing roads already carrying traffic volumes, it is appropriate to consider the increase in traffic noise level that arises as a result of vehicular movements associated with the development.

In order to assist with the interpretation of the noise associated with vehicular traffic on public roads, Table 8.5 offers guidance as to the likely impact associated with any particular change in traffic noise level (Source DMRB, 2011). It shows that small changes in noise levels are not normally noticeable, whereas an increase

of 10dB would be described as a doubling of loudness. In summary the assessment looks at the impact with and without development at the nearest noise sensitive locations.

Change in Sound Level (dB)	Subjection Reaction	Magnitude of Impact	EPA Glossary of Effects[1]
0	None	No Change	Neutral
0.1 - 2.9	Imperceptible	Negligible	Imperceptible
3-4.9	Perceptible	Minor	Slight
5 - 9.9	Up to a doubling of loudness	Moderate	Moderate
10+	Over a doubling of loudness	Major	Significant

Table 8.5: Significance in Change of Noise Level
[1]EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports, (Draft August 2017)

Mechanical Plant Criteria

During the operational phase, potential noise sources relate to building and mechanical services used to serve the proposed development.

In order to set appropriate operational noise criteria for these potential sources, guidance has been taken from BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings. The recommended internal noise levels for dwellings are set out in Table 8.6.

In order to set an external noise level based on the internal criteria noted above, this is done by factoring in the degree of noise reduction afforded by a partially open window, which BS 8233 suggests as 15dB. Using this value, external noise levels of 50 and 45dB $L_{Aeq,T}$ are considered appropriate for day and night-time periods respectively. The time period for day-time noise levels has been set over a 1-hour period to provide a robust criterion. Given the higher sensitivity of people to noise at night, the time period for night-time levels is set as 15mins. In this instance, the following criteria relate to the nearest noise sensitive properties external to the site.

- Daytime (07:00 to 23:00hrs) 50dB $L_{Aeq,1hr}$
- Night-time (23:00 to 07:00hrs) 45 dB $L_{Aeq,15min}$

For an appropriate *BS 4142* assessment it is necessary to compare the measured external background noise level (i.e. the $L_{A90,T}$ level measured in the absence of plant items) to the rating level ($L_{Ar,T}$) of the various plant items, when operational. Where noise emissions are found to be tonal, impulsive in nature or irregular enough to attract attention, *BS 4142* also advises that a penalty be applied to the specific level to arrive at the rating level.

Inward Noise Impact

The Professional Guidance on Planning & Noise (ProPG) report was published in May 2017. This guidance 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 its 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; and
Element 4 - Other Relevant Issues.

The initial noise risk assessment is intended to provide an early indication of any acoustic issues that may be encountered. It calls for the categorisation of the Site as a *negligible, low, medium or high risk* based on the pre-existing noise environment. Figure 8.2 presents the basis of the initial noise risk assessment, it provides appropriate risk categories for a range of continuous noise levels either measured and / or predicted onsite.

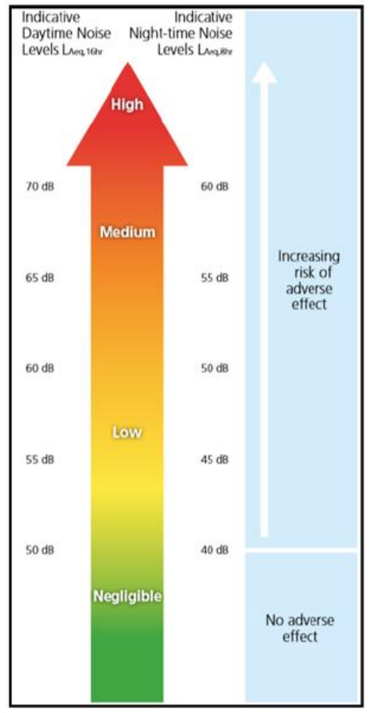

Figure 8.2: ProPG Stage 1- Initial Noise Risk Assessment

A site should not be considered a negligible risk if more than 10 L_{AFmax} events exceed 60dB during the night period and the site should be considered a high risk if the L_{AFmax} events exceed 80dB more than 20 times a night.

Element 2 of the ProPG document sets out recommended internal noise targets derived from *BS 8233 (2014).* The recommended indoor ambient noise levels are set out in Table 8.6 below and are based on annual average data, that is to say they omit occasional events where higher intermittent noisy events may occur.

Activity	Location	(07:00 to 23:00)	(23:00 to 07:00)
Resting	Living room	35 dB $L_{Aeq,16hr}$	-
Dining	Dining room / area	40 dB $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$ 45 dB $L_{Amax,T*}$

Table 8.6: ProPG Internal Noise Levels

**Note The document comments that the internal LAFmax,T noise level may be exceeded no more than 10 times per night without a significant impact occurring.*

In addition to these absolute internal noise levels ProPG provides guidance on flexibility of these internal noise level targets. For instance, in cases where the development is considered necessary or desirable, and noise levels exceed the external noise guidelines, then a relaxation of the internal L_{Aeq} values by up to 5dB can still provide reasonable internal conditions.

The ProPG guidance provides the following advice with regards to external noise levels for amenity areas in the development:

'The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50-55dB LAeq,16hr.'

8.2.4 Operational Phase – Vibration Assessment Criteria

Taking into account the proposed development under consideration here, there are no vibration sources associated with the operational phase. Operational criteria relating to this issue are therefore not included.

8.3 RECEIVING ENVIRONMENT

The proposed development of the subject site is located in Parkside 4, and as described in chapter 1 of this EIAR. The development area includes a number of sources of transportation principally Parkside Boulevard which is the main vehicular, pedestrian and cycle access to the residential development and Balgriffin Park.

Noise Monitoring Equipment

The equipment used during the baseline noise and environmental noise survey was installed and removed by Traynor Environmental. The noise measurements were carried out using the following equipment mentioned in Table 8.7 below. The instruments were checked and calibrated before and after the survey with no significant drift noted.

Instrumentation Details				
Manufacturer	**Instrument**	**Calibrated by**	**Calibration Certificate Ref**	**Last Laboratory Calibration**
Larson Davis Sound Expert LxT	(Serial No.5595)	Environmental Measurements, Unit 12, Tallaght Business Park, Dublin 24	2018004505	30th April 2018
Larson Davis Sound Expert 831	(Serial No.3913)	Environmental Measurements, Unit 12, Tallaght Business Park, Dublin 24	31417	8th March 2018
Larson Davis Sound Expert LxT	(Serial No.5901)	Environmental Measurements, Unit 12, Tallaght Business Park, Dublin 24	2019007353	12th June 2019

Table 8.7: Instrumentation Details Noise Monitoring Locations

Measurement Parameters

The noise survey results are presented in terms of the following parameters:

L_{Aeq} This is the equivalent continuous sound level. It is an average and is used to describe a fluctuating noise in terms of a single noise level over the sample period. The closer the Laeq value is to either the L_{A10} or L_{A90} value indicates the relative impact of the intermittent sources and their contribution. The relative spread between the values determines the impact of intermittent sources such as traffic on the background.

L_{A90} This is the sound that is exceeded for 90% of the sample period. It is typically used as a descriptor for traffic noise.

L_{A10} This is the sound that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise.

L_{AFMIN} is the instantaneous minimum sound level measured during the sample period using the 'F' time weighting.

L_{AFmax} is the instantaneous maximum sound level measured during the sample period using the 'F' time weighting.

The *"A:'* suffix denotes the fact that the sound levels have been "A-weighted" in order to account for the non-linear nature of human hearing. All sound levels in this report are expressed in terms of decibels (dB) relative to $2x10^{-5}$ Pa.

8.3.1 Baseline Noise Survey

A Baseline noise survey has been conducted at the site in order to quantify the existing noise environment. The survey was conducted in August 2019 in general accordance with *ISO 1996: 2017: Acoustics - Description, Measurement and Assessment of Environmental Noise*.

One measurement location was selected as shown in Figure 8.3 below and described below.

Location A -Centre of Proposed Development

Figure 8.3: Baseline noise monitoring location

Survey Periods

Baseline noise survey measurements were conducted at Location A over the following survey periods:

Location	Period	
	Start Time/Date	End Time/Date
A	15:30hrs on 09/07/19	16:30hrs on 11/07/19

Table 8.8: Baseline survey dates and times

Survey Results and Discussion

Time	L_{Aeq}	L_{AFmax}	$L_{AF10.00}$	$L_{AF90.00}$
15:30	54.3	71.1	57.0	44.4
16:00	60.1	66.4	62.2	56.6
16:30	58.2	68.2	64.5	50.6
Average	**57.5**	**68.6**	**61.2**	**50.5**

Table 8.9:Location A: Average Baseline Noise

The noise environment at the measurement location A was dominated by intensive short duration noise events which are characteristic of road traffic noise from the Parkside Boulevard. Average noise levels measured at 57.5 dB(A) L_{Aeq} and 50.5 dB(A) L_{A90}.

Discussion and conclusions

Location A indicate that the dominate intensive short duration noise events are characteristic of road traffic noise from the Parkside Boulevard. The baseline noise environment will not require additional constraints to be imposed on the majority of the proposed Project outside of the normal criteria applicable to a development of the scale and nature of that proposed.

8.3.2 Environmental Noise Survey

An environmental noise survey has been conducted at the site in order to quantify the existing noise environment. The survey was conducted in general accordance with ISO 1996: 2017: *Acoustics - Description, Measurement and Assessment of Environmental Noise*. Specific details are set out below. Six measurement locations were selected as shown in Figure 8.4 and described in Table 8.10 below.

Noise Measurement Location	Description
Location NM1	Castlemoyne housing estate beside Castlemoyne playground, north of the proposed site
Location NM2	Tillage field beside the Malahide R124 road and Moyne R123 road, opposite a motor dealer, northeast of the proposed site
Location NM3	Father Collins Park, southeast of the proposed site
Location NM4	Just off the Parkside Boulevard at Parkside Way housing estate, south of the proposed site
Location NM5	Roundabout on the Parkside Boulevard and Churchwell drive, west of the proposed site
Location NM6	Balgriffin cottages, west of the proposed site

Table 8.10: Description of Noise Measurement Location

Figure 8.4: Noise Monitoring Locations (Image Source: Google Maps)

Survey Periods

The noise survey was carried out at six locations over the following period:

12:00hrs to 16:30hrs on 12nd August 2019.

For the purpose of this assessment, daytime is taken to be between 07:00 and 23:00, whilst nighttime is between 23:00 and 07:00. The weather during the daytime survey period was showery and with windspeeds range between 1 and 3m/s daytime temperature was 18 ˚C. (Weather information from met Éireann synoptic Dublin Airport weather station).

Survey Results and Discussion

The noise survey results for the six monitoring locations are summarised in Tables 8.11 – 8.16 below.

Location NM1

Time		Measured Noise Levels (dB re. $2x10^{-5}$Pa)				
		LA_{max}	LA_{min}	$LA_{10.00}$	$LA_{90.00}$	L_{Aeq}
Day	12:00	71.7	45.9	63.3	51.2	60.3
	12:30	73.5	47..1	65.3	52.2	61.3
	13:00	67.1	51.3	63.9	54.7	60.7

Table 8.11: Measured Noise Levels at NM1

The dominant noise source at this location was passing traffic in the housing estate, children playing in the playground and various activities within the Castlemoyne Estate. These include cars on the R123, car parking at estate, dogs out walking, gardening activities etc. Background noise from the R123 and the Parkside Boulevard was a significant noise source at this location. Other minor noise sources included birdsong and low flying aircrafts on the way to Dublin airport located to the west of the site. The L_{Aeq} ranged from 60.3 to 61.3dB. The L_{A90} ranged from 51.2 to 54.7 dB.

Location NM2

Time		Measured Noise Levels (dB re. $2x10^{-5}$Pa)				
		LA_{max}	LA_{min}	$LA_{10.00}$	$LA_{90.00}$	L_{Aeq}
Day	13:45	78.3	44.7	61.5	48.8	57.9
	14:15	86.6	43.4	62.5	49.2	59.2
	14:45	83.6	44.5	62.9	49.0	59.3

Table 8.12: Measured Noise Levels at NM2

NM2 was located in a tillage field, beside a house and in an agricultural setting. The dominant noise source at this location was traffic on the R123 and R124 roads. Other various activities include low flying aircrafts on the way to Dublin airport located and construction work to the north. Background noise from the R123 and R124 was a significant noise source at this location. Other minor noise sources included birdsong. The L_{Aeq} ranged from 57.9 to 49.3 dB. The L_{A90} ranged from 49.0 to 49.2 dB. The variation in L_{Aeq} can be attributed to traffic volumes on the R123 and R124.

Location NM3

Time		Measured Noise Levels (dB re. $2x10^{-5}$Pa)				
		LA_{max}	LA_{min}	$LA_{10.00}$	$LA_{90.00}$	L_{Aeq}
Day	15:30	89.7	39.8	59.4	45.3	57.3
	16:00	79.4	40.5	60.8	44.5	56.7
	16:30	82.9	41.8	60.2	45.5	56.2

Table 8.13: Measured Noise Levels at NM3

The existing noise environment at NM3 is made up of the various activities in Father Collins Park. These include people walking/running, dogs barking, children playing, vehicles on the surrounding roads and construction work location to the north of the park. Background noise from the Parkside Boulevard and Hole in the Wall Road was a significant noise source at this location. The L_{Aeq} ranged from 56.2 to 57.3 dB. The L_{A90} ranged from 44.5 to 45.5 dB. The variation in L_{Aeq} can be attributed to the noise from people talking and near the measurement location.

Location NM4

Time		Measured Noise Levels (dB re. $2x10^{-5}$Pa)				
		LA_{max}	LA_{min}	$LA_{10.00}$	$LA_{90.00}$	L_{Aeq}
Day	13:45	66.9	40.9	56.9	45.1	52.9
	14:15	68.9	40.3	56.6	44.1	52.5

	14:45	70.6	40.7	57.0	43.6	52.8

Table 8.14: Measured Noise Levels at NM4

The existing noise environment at NM4 is made up of the various activities within the estate and the neighbouring construction site. These include cars on the estate roads, dogs barking, lawnmowers, children playing, construction machinery and construction workers etc. Background noise from Parkside Boulevard was faintly audible but was not a significant noise source at this location. The L_{Aeq} ranged from 52.5 to 52.8 dB. The L_{A90} ranged from 43.6 to 45.1 dB. The variation in L_{Aeq} can be attributed to the noise from car doors slamming near the measurement location.

Location NM5

Time		Measured Noise Levels (dB re. $2x10^{-5}$Pa)				
		LA_{max}	LA_{min}	$LA_{10.00}$	$LA_{90.00}$	L_{Aeq}
Day	12:00	74.7	40.8	55.5	43.6	55.8
	12:30	76.0	41.9	64.3	45.9	59.4
	13:00	75.7	39.8	63.5	43.0	57.9

Table 8.15: Measured Noise Levels at NM5

NM5 was located along the west of the proposed site, beside Parkside Boulevard and Churchwell Drive. The ambient noise environment was primarily made up of background traffic noise from the Parkside Boulevard. Other noise sources included cars on the estate roads, dogs barking, lawnmowers, children playing and people walking. The ambient noise fluctuated from traffic on the Parkside Boulevard. The L_{Aeq} ranged from 55.8 to 57.9 dB. The L_{A90} ranged from 43.0 to 45.9 dB.

Location NM6

Time		Measured Noise Levels (dB re. $2x10^{-5}$Pa)				
		LA_{max}	LA_{min}	$LA_{10.00}$	$LA_{90.00}$	L_{Aeq}
Day	14:30	66.3	44.1	63.2	47.0	58.2
	15:00	64.6	45.7	63.1	48.1	59.7
	15:30	65.0	46.0	58.1	48.8	54.9

Table 8.16: Measured Noise Levels at NM6

NM6 was located to the west of the proposed site, in the Balgriffin cottages estate. The ambient noise environment was primarily made up of background traffic noise from the R107 and Balgriffin Road. Other noise sources included cars on the estate road, dogs barking, lawnmowers, children playing and low flying aircrafts on the way to Dublin airport. The ambient noise fluctuated when there were cars on the estate roads. The L_{Aeq} ranged from 54.9 to 59.7 dB. The L_{A90} ranged from 47.0 to 48.8 dB.

Conclusion

The results of the baseline study suggest the baseline noise environment will not require additional constraints to be imposed on the majority of the proposed project outside of the normal criteria applicable to a development of the scale and nature of that proposed.

8.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development is as described in chapter 3 of this EIAR and as set out in the statutory planning notices.

When considering a development of this nature, the potential noise and vibration impact on the surroundings is considered for each of two distinct stages:

- Construction phase;
- Operational phase

The construction phase will involve excavation over the development site, landscaping and construction of internal roads, excavation of foundations, building and transport of materials to site using the local road network. This phase will generate the highest potential noise impact due to the works involved, however the time frame is short term in nature.

The primary sources of outward noise in the operational context are deemed to be long term in duration and will comprise traffic movements to site using the existing road network. These issues are discussed in detail in the following sections.

8.5 POTENTIAL IMPACTS

The potential noise and vibration impacts associated with the construction and operational phases of the proposed development are discussed in the following sections.

Construction Phase

Noise

The construction programme will create typical construction activity related noise onsite. During the construction phase of the proposed project, a variety of items will be in use such as compressors, excavators, dumper trucks and generators.

A review of the baseline noise survey and the threshold values detailed in Table 8.1 indicates that the daytime noise guidance limit for construction noise is **65dB L_{Aeq}**. It is assumed that construction works will take place during normal working hours only.

Due to the nature of daytime activities undertaken on a construction site of this nature, there is potential for generation of significant levels of noise. The flow of vehicular traffic to and from a construction site is also a potential source of relatively high noise levels.

Taking into account the outline construction programme, it is possible to predict typical noise levels using guidance set out in BS 5228-1:2009+A1:2014. Table 8.17 outlines typical plant items and associated noise levels that are anticipated for various phases of the construction programme.

Activity	Item of Plant (BS5228 Ref)	L_{Aeq} at 10m
Site Clearance/Demolition	Tracked excavator (C2.21)	71
	Dump Truck (D2.30)	79

	Diesel Generator (C4.76)	61
	Cumulative Site Clearance	80
General Construction	Dump Truck (C2.30)	79
	Tracked excavator (02.21)	71
	Compressor (D7.08)	70
	Telescopic Handler (C4.54)	79
	Hand Held Circular Saw (C4.72)	79
	Diesel Generator (C4.76)	61
	Internal Fit out	70
	Cumulative General Construction	84
Road Works/Landscaping	Asphalt Paver & Tipping Lorry (C5.30)	75
	Electric Water Pump (C5.40)	68
	Vibratory Roller (C5.20)	75
	Cumulative General Landscaping and Road Work	78

Table 8.17: Predicted Noise Levels from Key Pieces of Equipment

The calculations also assume that the equipment will operate for 66% of the 12-hour working day (i.e. 8 hours) and that a standard site hoarding, typically 2.4m height will be erected around the perimeter of the construction site for the duration of works. It is assumed that construction works will take place during normal working hours only.

The closest noise sensitive locations (NSL) have been identified as shown in Figure 8.5 and described below in table 8.18.

Noise Sensitive Locations	Description
Location NSL1	This represents the Castlemoyne Housing Estate off the R123 to the north of the proposed site. Approx. 21m from the nearest house to the purposed site boundary.
Location NSL2	This represents the Clongriffin Apartment development, currently under construction, located east of the proposed site. Approx. 20m from the nearest Apartment façade to the purposed site boundary.
Location NSL3	This represents the Parkside residential development located along Parkside Boulevard south of the proposed site. Approx. 25m from the nearest house to the purposed site boundary.
Location NSL4	This represents the Balgriffin Park residential property located west of the proposed site. Approx. 252m from the nearest house to the purposed site boundary.

Table 8.18: Description of Noise Measurement Location

Figure 8.5: Site Context & Noise Assessment Locations (Image Source: Google Maps)

Predicted Noise Level at Various Locations

In order to assess the level of Environmental noise associated with the proposed development a number of noise sensitive locations were considered. Figure 8.4 details the locations from the nearest façade of the neighbouring building to the proposed development.

Table 8.19 below presents the predicted daytime noise levels from an indicative construction period at these noise sensitive locations (NSLs).

Construction Phase	Item of Plant (BS5228-1 Ref)	L_{Aeq} distance (m) to NSL			
		NSL1 (21m)	NSL2 (20m)	NSL3 (25m)	NSL4 (252m)
Site Clearance/Demolition	Tracked excavator (C2.21)	58	58	57	47
	Dump Truck (D2.30)	65	66	65	55
	Diesel Generator (C4.76)	48	48	47	37
	Cumulative Site Clearance	**67**	**67**	**66**	**56**
General Construction	Dump Truck (C2.30)	66	66	65	55
	Tracked excavator (02.21)	58	58	57	47
	Compressor (D7.08)	57	57	56	46

	Telescopic Handler (C4.54)	66	66	65	55
	Hand Held Circular Saw (C4.72)	66	66	65	55
	Diesel Generator (C4.76)	48	48	47	37
	Internal Fit out	57	57	56	46
	Cumulative General Construction	**71**	**71**	**70**	**60**
Road Works/Landscaping	Asphalt Paver & Tipping Lorry (C5.30)	62	62	61	51
	Electric Water Pump (C5.40)	55	55	54	44
	Vibratory Roller (C5.20)	62	62	61	51
	Cumulative General Landscaping and Road Work	**65**	**65**	**64**	**54**

Table 8.19: Indicative Construction Noise Levels at Nearest Noise Sensitive Locations

Taking into account these assumptions and allowing for the attenuation of sound over distance, the predicted construction noise level at the nearest sensitive receptors is above the relevant construction noise criteria, i.e. the level at which a potential significant impact could be expected to occur, at noise sensitive locations within 25m of site work. Also, considering the proximity of NSL1 and NSL2 (approx. 20-21m at nearest point), a potential significant impact is associated with this aspect of the site clearance, general construction and road/landscaping phase in the absence of mitigation. NSL3 (approx. 25m at the nearest point) has potential significant impact associated with this aspect of site clearance/demolition and general construction phase, in the absence of mitigation. NSL4 (approx. 252m at the nearest point) has no potential significant impact associated with all construction phases, in the absence of mitigation.

Specifically, the closest residential buildings to the works are approx. 20m – 25m away (properties represented by NSL1 and NSL2 (influenced by all construction phases) and NSL3 (influenced by site clearance/demolition and general construction phase)). Review of the predicted noise levels at these locations are above the criteria at which a significant impact is deemed to occur (65dB $L_{Aeq,T}$) and therefore, in the absence of noise mitigation, a **negative**, **significant** and **short-term** impact is likely.

At greater distances (property represented by NSL4) predicted construction noise levels are lower, therefore any impact is expected to be **negative, moderate and short-term.**

Construction Traffic

The noise levels associated with mobile plant items such as concrete mixer trucks, loaders etc. operational on site have been included as part of the construction noise assessment and calculated noise levels in Table 8.25. Consideration should also be given to the addition of construction traffic along the site access routes. Access to the development site for construction traffic will be via the Parkside Boulevard to the south of the proposed development.

It is possible to calculate the noise levels associated with the passing vehicle using the following formula.

$$L_{Aeq,T} = L_{AX} + 10\log_{10}(N) - 10\log_{10}(T) + 10\log_{10}(r_1/r_2)dB$$

Where: $L_{Aeq,T}$ = is the equivalent continuous sound level over the time period T in seconds;
L_{AX} = is the "A-weighted" Sound Exposure Level of the event considered(dB);
N = is the number of events over the course of time period T;
r_1= is the distance at which LAX is expressed;
r_2= is the distance to the assessment location

A calculation distance of 5m from the road has been used to assess noise levels at the closest buildings along the construction routes. The mean value of Sound Exposure Level for truck moving at low to moderate speeds (i.e. 15 to 25km/hr) is of the order of 82dB L_{ax} at a distance of 5 metres from the vehicle. This figure is based on a series of measurements conducted under controlled conditions. Construction vehicle are predicted in the table below for peak hours associated with each key phase. Table 8.20 below summarises the calculated noise level associated with passing haul vehicles during each phase, assuming the peak hour flows per day.

Construction Phase	No. of Trucks/peak hour	Calculated Noise at edge of road (5m),dB $L_{Aeq,\ 1hr}$
Phase 1	2	51
Phase 2	8	57
Phase 3	3	53

Table 8.20: Calculated Construction Traffic Noise Levels at Edge of Road

The calculated noise levels associated with the various phases are in the range of 51 to 57dB $L_{Aeq,1hr}$. The calculated noise levels are below the construction noise criterion of 65dB. In addition, it should be noted that, in order to assess a worst- case scenario, a large proportion of the daily vehicle numbers have been assumed to arrive/depart over an hour-long period.

Vibration

The main potential source of vibration during the construction programme is associated ground-breaking activities.

Considering the low vibration levels at very close distances to the ground-breaking activities, vibration levels at the nearby buildings are not expected to pose any significance in terms of cosmetic or structural damage to any of the residential or sensitive buildings in proximity to the development works. In addition, the range of vibration levels is typically below a level which would cause any disturbance to occupants of nearby buildings.

It is anticipated that excavations will be made using standard excavation machinery, which typically do not generate appreciable levels of vibration close to the source. Taking this into account and considering the distance that these properties are from the works and the attenuation of vibration levels over distance, the resultant vibration levels are expected to be well below a level that would cause disturbance to building occupants or even be perceptible.

The associated impact with these activities is considered to be **neutral** and **imperceptible.**

Operational Phase

Noise

There are two primary potential sources of noise associated with the development once operational these are:

- additional vehicular traffic on public roads and
- mechanical plant noise.

Each of these primary noise sources is addressed in turn in the following sections. Note there is no significant source of vibration associated with the operational phase of the development.

Additional Traffic on Adjacent Roads

During the operational phase of the proposed development, there will be an increase in vehicular traffic associated with the site on some surrounding roads.

A traffic impact assessment relating to the proposed development has been prepared by DBFL, as part of this EIAR. Using this information, the related noise impacts along the relevant road links has been assessed.

Figure 8.6: Parkside Boulevard (Link 1) Monitored by DBFL

Figure 8.5 Illustrate traffic flow on the Parkside Boulevard. Table 8.21 below displays the predicted change in noise level at Parkside Boulevard link around the site for the year of opening and the design years using the Annual Average Daily Traffic (AADT) flows along the road links.

Road Link	Traffic Flows AADT		
	Do nothing - 2021 (Without development)	**Do something - 2021 (With development)**	**Predicted Change in Noise Level (dB)**
1 (Parkside Boulevard)	2957	3513	0.3
	Do nothing - 2026 (Without development)	**Do something - 2026 (With development)**	**Predicted Change in Noise Level (dB)**
1 (Parkside Boulevard)	3160	3716	0.3
	Do nothing - 2036 (Without development)	**Do something - 2036 (With development)**	**Predicted Change in Noise Level (dB)**
1 (Parkside Boulevard)	3410	3966	0.3

Table 8.21: Predicted Change in Noise Level associated with Vehicular Traffic – Existing Road Network

With reference to Table 8.5, the predicted change in noise level associated with additional traffic accessing the proposed development, for the existing road network, has a negligible effect. The impact is therefore **imperceptible** and **long term.**

Mechanical Plant

It is expected that the principal items of building and mechanical services plant will be associated with the proposed development. These items will be selected at a later stage, however, they will be designed and located so that there is no negative impact on sensitive receivers within the development itself. The services plant will be designed/attenuated to meet the relevant plant noise criteria for day and night-time periods at nearby sensitive receivers as set out in Section 8.2(Human Perception)

Taking into account that sensitive receivers within the development are much closer than off-site sensitive receivers, once the relevant noise criteria is achieved within the development it is expected that there will be no negative impact at sensitive receivers off site.

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 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 noise and vibrational impacts of the development will be managed during the construction phase in a manner that will not have an adverse or unacceptable noise or vibrational impact on any other residential areas in the vicinity of the site through the implementation of mitigation and control measures throughout the construction and operational phases of the development. There are no other residential developments proposed for any adjacent or adjoining lands as all lands are currently developed.

There are several proposed or permitted developments in the wider area surrounding the proposed development under assessment. These are as follows:

- Marrsfield Apartment development to the east boundary;
- Parkside Housing Developments to the south boundary;
- Hole in the Wall site by Victoria Homes
- Strategic Housing Development (SHD) 1 & 2 on lands at Clongriffin Dublin 13 by Gerard Gannon Properties to the east of the proposed development.

Construction Phase
During the construction phase of the proposed development, construction noise on site will be localised and will therefore likely be the primary noise source at the nearest noise sensitive receivers. In the event that construction activities associated with the neighbouring development occur simultaneous to the proposed development, they are at sufficient distances such that the cumulative noise levels will remain dominated by the localised works referred to in Table 8.24.

In the event that works on site and works associated with the Marrsfield Apartment development, Parkside Housing and SHD 1 & 2 on lands at Clongriffin developments were ongoing simultaneously, there is potential for cumulative noise impacts at NSL1, NSL2 and NSL3. Under this scenario, construction activities will be audible at a number of facades of the residential areas due to their location with respect to both areas of works.

The contractor will be required to control noise impacts associated with this development in line with the guidance levels included in Table 8.1 and follow the best practice control measures within BS 8228-2.

The impact from any construction works associated with other development in the area is considered to be imperceptible as these works are expected to take place at large distances to the most exposed noise sensitive receivers to the proposed development under assessment.

Operational Phase
The operational phase of the developments listed above have the potential to generate additional traffic on the roads in the vicinity of the local area. These additional vehicle movements have been taken into account in the traffic assessment in the operational phase of the potential impact section. The cumulative impact of this source is determined to be imperceptible and long term.

8.7 PREDICTED IMPACTS

Construction Phase
During the construction phase of the project there is the potential for significant and moderate impacts on nearby noise sensitive properties due to noise emissions from site activities. The application of binding noise limits, hours of operation, along with implementation of appropriate noise and vibration control measures, will ensure that noise and vibration impact will have a **negative, moderate** and **short-term** impact on the surrounding environment.

Operational Phase
Additional Vehicular Traffic
The predicted change noise levels associated with additional traffic is predicted to be of imperceptible impact along the existing road network. In the context of the existing noise environment, the overall contribution of induced traffic is considered to be of neutral, imperceptible and long-term impact to nearby residential locations.

Mechanical Plant
Noise levels associated with operational plant (vehicles, service rooms and heating units, etc.) are expected to be well within the adopted day and night-time noise limits at the nearest noise sensitive properties considering the site layout, the nature and type of units proposed and distances to nearest residences. Assuming the operational noise levels do not exceed the adopted design goals, the resultant residual noise impact from this source will be of neutral, Imperceptible, long term impact.

8.8 MITIGATION MEASURES

Construction Phase - Noise
With regard to construction activities, best practice control measures for noise and vibration from construction sites are found within BS 5228 (2009 +A1 2014) *Code of Practice for Noise and Vibration Control on Construction and Open Sites Parts 1 and 2*. Whilst construction noise and vibration impacts are expected to vary during the construction phase depending on the distance between the activities and noise sensitive buildings, the contractor will ensure that all best practice noise and vibration control methods will be used, as necessary in order to ensure impacts at off-site noise sensitive locations are minimised.

The best practice measures set out in BS 5228 (2009) Parts 1 and 2 includes guidance on several aspects of construction site mitigation measures, including, but not limited to:

- Selection of quiet plant;
- Noise control at source;
- Screening;
- Liaison with the public, and;
- Monitoring

A detailed comment is offered on these items in the following paragraphs. Noise control measures that will be considered include the selection of quiet plant, enclosures and screens around noise sources, limiting the hours of work and noise and vibration monitoring, where required.

Selection of Quiet Plant
This practice is recommended in relation to static plant such as compressors and generators. It is recommended that these units be supplied with manufacturers' proprietary acoustic enclosures. The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. The least noisy item should be selected wherever possible. Should a particular item of plant already on the site be found to generate high noise levels, the first action should be to identify whether or not said item can be replaced with a quieter alternative.

Noise Control at Source
If replacing a noisy item of plant is not a viable or practical option, consideration will be given to noise control "at source". This refers to the modification of an item of plant or the application of improved sound reduction methods in consultation with the supplier. For example, resonance effects in panel work or cover plates can be reduced through stiffening or application of damping compounds; rattling and grinding noises can often be controlled by fixing resilient materials in between the surfaces in contact.

Referring to the potential noise generating sources for the works under consideration, the following best practice mitigation measures should be considered:

- Site compounds will be located in excess of 30m from noise sensitive receptors within the site constraints. The use lifting bulky items, dropping and loading of materials within these areas should be restricted to normal working hours.
- For mobile plant items such as dump trucks, excavators and loaders, the installation of an acoustic exhaust and/or maintaining enclosure panels closed during operation can reduce noise levels by up to 10dB. Mobile plant should be switched off when not in use and not left idling.
- For steady continuous noise, such as that generated by diesel engines, it may be possible to reduce the noise emitted by fitting a more effective exhaust silencer system or utilising an acoustic canopy to replace the normal engine cover. For concrete mixers, control measures should be employed during cleaning to ensure no impulsive hammering is undertaken at the mixer drum.
- For all materials handling ensure that materials are not dropped from excessive heights, lining drops chutes and dump trucks with resilient materials.
- For compressors, generators and pumps, these can be surrounded by acoustic lagging or enclosed with in acoustic enclosures providing air ventilation.
- Demountable enclosures can also be used to screen operatives using hand tools and will be moved around site as necessary.
- All items of plant should be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.

Screening
Screening is an effective method of reducing the noise level at a receiver location and can be used successfully as an additional measure to all other forms of noise control. Construction site hoarding will be constructed around the site boundaries as standard. The hoarding will be constructed of a material with a mass per unit of surface area greater than 7 kg/m^2 to provide adequate sound insulation.

In addition, careful planning of the site layout will also be considered. The placement of site buildings such as offices and stores will be used, where feasible, to provide noise screening when placed between the source and the receiver.

Liaison with the Public
A designated environmental liaison officer will be appointed to site during construction works. Any noise complaints should be logged and followed up in a prompt fashion by the liaison officer. In addition, where a particularly noisy construction activity is planned or other works with the potential to generate high levels of noise, or where noisy works are expected to operate outside of normal working hours etc., the liaison officer will inform the nearest noise sensitive locations of the time and expected duration of the noisy works.

Monitoring
Where required, construction noise monitoring will be undertaken at periodic sample periods at the nearest noise sensitive locations to the development works to check compliance with the construction noise criterion.

Noise monitoring should be conducted in accordance with the International Standard ISO 1996: 2017: *Acoustics - Description, measurement and assessment of environmental noise.*

Project Programme
The phasing programme will be arranged so as to control the amount of disturbance in noise and vibration sensitive areas at times that are considered of greatest sensitivity. During excavation or when other high noise generating works are in progress on a site at the same time as other works of construction that themselves may generate significant noise and vibration, the working programme will be phased so as to prevent unacceptable disturbance at any time.

Vibration
The vibration from construction activities will be limited to the values set out in Section 8.2 (Methodology). Magnitudes of vibration slightly greater than those in the table are normally unlikely to cause cosmetic damage, but construction work creating such magnitudes should proceed with caution. Limit values have been provided for soundly constructed residential and commercial properties.

Operational Phase
Additional Traffic on Adjacent Roads
During the operational phase of the development, noise mitigation measures with respect to the outward impact of traffic from the development are not deemed necessary as the impact is deemed Imperceptible. There will be no significant increase in noise on the existing neighbouring residential area due to the nature of the proposed development.

Mechanical Services Plant
Taking into account that sensitive receivers within the development are much closer than off-site sensitive receivers, once the relevant noise criteria is achieved within the development it is expected that there will be no negative impact at sensitive receivers off site, and therefore no further mitigation required.

8.9 'DO-NOTHING' SCENARIO

Should the project not proceed there would be no increase in noise emanating from the site.

8.10 'WORST-CASE' SCENARIO

The 'worst case' scenario is that the development is not constructed as per the drawings and details provided in the planning application. While one would expect the development is required to be constructed in accordance with the planning documents which includes various mitigation measures outlined above.

Daytime Noise levels from the baseline noise survey range from 54.3 – 60.1dB L_{Aeq}. These figures will increase with negative impact, when the development becomes fully operation. Due to people walking/running, dogs barking, children playing, mechanical plant, vehicles on the proposed development roads and addition vehicular traffic on Parkside Boulevard.

The 'worst case' scenario would be that the attributes, mitigation measures were not carried out, the ProPG Internal Noise Levels guidelines were not meet and subsequently not appropriately enforced by the local authority. The 'worst case' scenario would have negative impact on human health.

8.11 MONITORING AND REINSTATEMENT

It is recommended that monthly noise monitoring surveys be carried along the boundary of the proposed site in order to monitor the effectiveness of noise management for the duration of the construction phase. Noise Levels at Residential Noise Sensitive Locations should not exceed the construction phase noise limit criteria in Table 8.1. Any breaches of these limits will require a review of operations and noise mitigation measures if the exceedance is due to the construction works on site. When the subject site is operational it will not result in an increase in noise levels at any of the noise sensitive locations beyond the site boundary therefore no monitoring is deemed necessary going forward.

8.12 DIFFICULTIES IN COMPILING INFORMATION

No difficulties were encountered during the preparation of the EIAR chapter.

8.13 REFERENCES

- BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites - Part 1 - Noise.
- BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites - Part 2 -Vibration.
- BS 6841 (1987): Measurement and evaluation of human exposure to whole-body mechanical vibration and repeated shock
- BS 4142: 2014: Methods for Rating and Assessing Industrial and Commercial Sound
- BS 7385-2:1993 Guide for measurement of vibrations and evaluation of their effects on buildings.
- BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings
- Design Manual for Roads and Bridges, 2011
- EPA Advice Notes for Preparing Environmental Impact Statements, (Draft, September 2015);
- 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 Statements, (EPA, 2002);
- EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports, (Draft August 2017)
- ISO 1996: 2017: Acoustics - Description, measurement and assessment of environmental noise.
- ProPG: Planning & Noise
- The Transport Infrastructure Ireland (TII, formerly NRA) Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (TII, 2014), the Guidelines for the Treatment of Noise and Vibration in National Road Schemes (TII, 2004) was also considered in the preparation of the assessment. This document sets out noise and vibration limits for the construction phase which are generally applied by planning authorities to all construction projects.

9 CLIMATE & AIR QUALITY

9.1 INTRODUCTION

This section identified and assesses the potential air quality and climatic impacts associated with the proposed development both the Construction and Operational Phases of the development.

It includes a comprehensive description of

- the existing air quality and climate at and in the vicinity of the subject site,
- how the construction and operational phases of the development may impact existing air quality and finally;
- the mitigation measures that shall 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.

Proposed Development Site Location and Brief Description
This is as described in chapters 1 (introduction) and 3 (Description of Development) of this EIAR and as set out in the statutory notices.

Statement of Competence
In accordance with Article 5(3)(a) of the EU Directive, by appointing Traynor Environmental, the applicant has ensured that this chapter has been prepared by Competent experts.

9.2 METHODOLOGY

The general assessment methodology of the potential impact of the proposed development on air quality and climate has been devised in accordance with:

- 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).
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (DoHPLG, August 2018).
- 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.
- Environmental Impact Assessment (EIA), Guidance for Consent Authorities Regarding Sub-Threshold Development (DoEHLG 2003).
- Development Management Guidelines (DoEHLG, 2007).
- European Union (Planning & Development) (Environmental Impact Assessment Regulations 2018).
- Design Manual for Roads and Bridges (DMRB).

Baseline Environment
The existing ambient air quality in the vicinity of the site has been characterised with information obtained from a number of sources including EPA Annual Air Quality in Ireland Reports and Local air monitoring stations data.

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

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

In order to reduce the risk to health from poor air quality, National and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values or “Air Quality Standards” are health or environmental-based levels for which additional factors may be considered. For example, natural background levels, environmental conditions and socio-economic factors may all play a part in the limit value which is set (Ref Table 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 2018 Annual report entitled Air Quality in Ireland. This EPA report provides detailed monitoring data collected from a number of monitoring locations throughout Ireland on an annual basis to assess national compliance with National Air Quality Regulations. Given the location of the site in Parkside, Dublin 13 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 currently in place in Ireland in 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 zones changed on 1 January 2013 to reflect the results of the 2011 census.

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.

Design Manual for Roads and Bridges (DMRB) Guidelines.
The DMRB Model is based on the UK Highway Agency"s DMRB and adapts it for use on national roads in Ireland through a series of implementation documents. Due to the lack of such a model in Ireland the UK DMRB was used to predict vehicle emissions from the new development.

DMRB Volume II, section 3, Part 1 Air Quality provides a screening model which is used to predict vehicle emissions for NO_2, NO_x, PM_{10}, carbon monoxide, benzene and 1,3-butadiene at sensitive receptors which have potential to be affected by the proposed development.

The DMRB model requires a number of inputs such as traffic flow (AADT), speed and vehicle mix and annual background pollutant concentrations. Background pollutant concentrations according to air zone were attained by averaging six years of data, from yearly EPA air quality reports for 2013-2018. Predicted concentrations for the construction and operation phase of the project were compared with the Irish ambient air quality standard – S.I. No.180 of 2011 – Air Quality Standards Regulations 2011. These regulations set limit values and averaging periods, which are used to assess the impact of emissions on human health, vegetation and ecosystem.

Key pollutant concentrations were predicted for nearby sensitive receptors for the following scenarios:

- The baseline scenario (2021), for model verification;
- Do-Nothing scenario (DN), which assumes the retention of present site usage with no development in place (2026);
- Opening Year Do-Something scenario (DS), which assumes the proposed development in place (2026);
- Design Year Do-Nothing scenario (DN), which assumes the retention of present site usage with no development in place (2036); and
- Design Year Do-Something scenario (DS), which assumes the proposed development in place (2036).

The assessment methodology involved using the DMRB Screening Model (Version 1.03c, July 2007), the NO_x to NO_2 Conversion Spreadsheet (Version 5.1, June 2016), and following guidance issued by the TII, and the EPA. The TII guidance states that the assessment must progress to detailed modelling if:

- Concentrations exceed 90% of the air quality limit values when assessed by the screening method; or
- Sensitive receptors exist within 50m of a complex road layout (e.g. grade separated junctions, hills etc).

The TII guidance, states that road links meeting one or more of the following criteria can be defined as being 'affected' by a proposed development and should be included in the local air quality assessment:

- Road alignment change of 5 metres or more;
- Daily traffic flow changes by 1,000 AADT or more;
- HGV flows change by 200 vehicles per day or more;
- Daily average speed changes by 10 km/h or more; or
- Peak hour speed changes by 20 km/h or more.

Concentrations of key pollutants are calculated at sensitive receptors that have the potential to be affected by the proposed development. For road links which are deemed to be affected by the proposed development and within 200 m of the chosen sensitive receptors inputs to the air dispersion model consist of: road layouts, receptor locations, annual average daily traffic movements (AADT), percentage heavy goods vehicles, annual average traffic speeds and background concentrations. The DMRB guidance states that road links at a distance of greater than 200 m from a sensitive receptor will not influence pollutant concentrations at the receptor. Using this input data the model predicts the road traffic contribution to ambient ground level concentrations at the worst-case sensitive receptors using generic meteorological data. The DMRB model uses conservative emission factors, the formulae for which are outlined in the DMRB Volume 11 Section 3 Part 1 – HA 207/07 Annexes B3 and B4. These worst-case road contributions are then added to the existing background concentrations to give the worst-case predicted ambient concentrations. The worst-case ambient concentrations are then compared with the relevant ambient air quality standards to assess the compliance of the proposed development with these ambient air quality standards. The TII Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes detail a methodology for determining air quality impact significance criteria for road schemes and this can be applied to any project that causes a change in traffic flows. The degree of impact is determined based on both the absolute and relative impact of the proposed development.

The TII significance criteria have been adopted for the proposed development. The significance criteria are based on PM_{10} and NO_2 as these pollutants are most likely to exceed the annual mean limit values (40 $\mu g/m^3$). However, the criteria have also been applied to the predicted 8-hour CO, annual benzene and annual $PM_{2.5}$ concentrations for the purposes of this assessment.

Transport Infrastructure Ireland (TII) Guidelines
Construction Phase
As stated in the TII Guidance it is *"very difficult to accurately dust emissions arising from construction activities". "A semi quantitative approach is recommended to determine the likelihood of a significant impact, which should be combined with an assessment of the proposed mitigation measures".*

The semi-quantitative assessment outlined is used to assess the impact of the dust during the construction phase. TII guidance states that dust emissions from construction sites can lead to elevated PM_{10} concentrations and can cause soiling of properties. The impact of dust emissions during the construction phase is assessed by estimating the area over which there is a risk of significant impacts, in line with the TII guidance. Emissions from construction vehicles are assessed where construction traffic results in a significant (>10%) increase in AADT flows near sensitive receptors in accordance with the TII guidance.

Significance criteria outlined in Tables 9.10, 9.11 and 9.12 are used to assess the impact of the construction traffic on worst-case sensitive for receptors.

Operational Phase
The TIFs Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes specifies that the changes in pollutant concentrations alongside roads with a significant change in traffic should be assessed. It states that receptors should be considered at all road links where a greater than 5% change in flows or speeds is predicted for the "Do-Something" option.

Significance criteria have been adopted from the TII guidelines and these are presented in Appendix 9.2. The TII guidelines requires the consideration of NO_x and nitrogen deposition impacts at ecological sites that are located within 200m of the proposed development.

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	40% until 2003 reducing linearly to 0% by 2010	200 µg/m^3
		Annual limit for the protection of human health	40% until 2003 reducing linearly to 0% by 2010	40 µg/m^3
		Annual limit for the protection of vegetation	None	400 µg/m^3 NO & NO^2
LEAD	2008/50/EC	Annual limit for the protection of human health	100%	0.5 µg/m^3
SULPHUR DIOXIDE	2008/50/EC	Hourly limit for protection of human health – not to be exceeded more than 24 times/year	150 µg/m^3	350 µg/m^3
		Daily limit for protection of human health – not to be exceeded more than 3 times/year	NONE	125 µg/m^3
		Annual and Winter limit for the protection of ecosystems	NONE	20 µg/m^3
PARTICULATE MATTER PM_{10}	2008/50/EC	24-hour limit for protection of human health – not to be exceeded more than 35 times/year	50%	50 µg/m^3
		Annual limit for the protection of human health	20%	40 µg/m^3
PARTICULATE MATTER $PM_{2.5}$ 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/m^3
PARTICULATE MATTER $PM_{2.5}$ STAGE 2	2008/50/EC	Annual limit for the protection of human health	NONE	20 µg/m^3
BENZENE	2008/50/EC	Annual limit for the protection of human health	20% until 2006. Decreasing linearly to 0% by 2010	5 µg/m^3
CARBON MONOXIDE	2008/50/EC	8-hour limit (on a rolling basis) for protection of human health	60%	10 mg/m^3
DUST DEPOSITION	German TA Luft Air Quality Standard [Note 1]	30 Day Average	NONE	350 mg/m^2/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.

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 impact of construction related dust emissions is assessed by estimating the area over which there is a risk of significant impacts as per the NRA guidance. The construction assessment criteria, reproduced from the NRA guidance, are set out in Table 9.13 below in the appendix.

Operational Impact Assessment Criteria
Once operational the proposed 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 amount of vegetative surfaces associated with the proposed development that will be converted to residential buildings and hard-standing has been considered.

The impact of the proposed scheme upon the macro-climate is assessed through the consideration of the change in CO_2 emissions that will occur due to the changes in traffic flow that occur in response to the proposed scheme. Ireland ratified the United Nations Framework Convention on Climate Change (UNFCCC) in April 1994 and the Kyoto Protocol in 1997 (FCCC 1997, 1999). For the purposes of the EU burden sharing agreement under Article 4 of the Kyoto Protocol, Ireland agreed to limit the net anthropogenic growth of the six GHGs under the Kyoto Protocol to 13% above the 1990 level over the period 2008 to 2012 (ERM 1998). The UNFCCC is continuing detailed negotiations in relation to GHGs reductions and in relation to technical issues such as Emission Trading and burden sharing. The most recent Conference of the Parties (COP24) to the agreement was convened in Katowice, Poland December 2018. COP24 was viewed as an important step towards the new 2015 agreement on climate change which was signed in Paris in late 2015. Contributions to greenhouse gas emissions will be based on Intended Nationally Determined Contributions (INDCs) which will form the foundation for climate action post 2020. Significant progress was also made on elevating adaption onto the same level as action to cut and curb emissions.

The EU, 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.

In 1999, Ireland signed the Gothenburg Protocol to the 1979 UN Convention on Long Range Transboundary Air Pollution. The initial objective of the Protocol was to control and reduce emissions of Sulphur Dioxide (SO_2), Nitrogen Oxides (NO_X), Volatile Organic Compounds (VOCs) and Ammonia (NH_3). To achieve the initial targets Ireland was obliged, by 2010, to meet national emission ceilings of 42 kt for SO_2 (67% below 2001 levels), 65 kt for NO_X (52% reduction), 55 kt for VOCs (37% reduction) and 116 kt for NH3 (6% reduction). In 2012, the Gothenburg Protocol was revised to include national emission reduction commitments for the main air pollutants to be achieved in 2020 and beyond and to include emission reduction commitments for $PM_{2.5}$. In relation to Ireland, 2020 emission targets are 25 kt for SO_2 (65% below 2005 levels), 65 kt for NO_X (49% reduction), 43 kt for VOCs (25% reduction), 108 kt for NH_3 (1% reduction) and 10 kt for $PM_{2.5}$ (18% reduction). COM (2013) 917 Final is the "Proposal for a Council Decision for the acceptance of the Amendment to the 1999 Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution to Abate Acidification, Eutrophication and Ground level Ozone".

European Commission Directive 2001/81/EC, the National Emissions Ceiling Directive (NECD), prescribes the same emission limits as the 1999 Gothenburg Protocol. A National Programme for the progressive reduction of emissions of these four transboundary pollutants has been in place since April 2005 (DEHLG 2004, 2007). The most recent data available from the EU in 2010 indicated that Ireland complied with the emissions ceilings for SO_2, VOCs and NH_3 but failed to comply with the ceiling for NO_X (EEA 2011). COM (2013) 920 Final is the "Proposal for a Directive on the reduction of national emissions of certain atmospheric pollutants and amending Directive 2003/35/EC". The proposal will apply the 2010 NECD limits until 2020 and establish new national emission reduction commitments which will be applicable from 2020 and 2030 for SO_2, NO_X, NMVOC, NH_3, $PM_{2.5}$ and CH_4. In relation to Ireland, 2020-29 emission targets are for SO2 (65% below 2005 levels), for NO_X (49% reduction), for VOCs (25% reduction), for NH_3 (1% reduction) and for $PM_{2.5}$ (18% reduction). In relation to 2030, Ireland's emission targets are for SO_2 (83% below 2005 levels), for NO_X (75% reduction), for VOCs (32% reduction), for NH_3 (7% reduction), for $PM_{2.5}$ (35% reduction) and for CH_4 (7% reduction).

Guidance issued by the European Commission in 2013 entitled Guidance on Integrating Climate Change and Biodiversity into Strategic Environmental Assessment has been applied to this assessment in order to determine the potential impacts the proposed developments may have a climate change and biodiversity.

9.3 RECEIVING ENVIRONMENT

Description of the Baseline Environment/Context

The proposed development is located at Parkside 4, and as described in chapter 1 of this EIAR. The development area is located within a zone which includes a number of sources of transportation principally Parkside Boulevard which is the main vehicular, pedestrian and cycle access to the residential development and Balgriffin Park.

Description of Existing Climate

The nearest representative synoptic meteorological station to the subject site is at Dublin Airport which is located approximately 6km northwest of the Parkside 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 2011-2018 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 750mm and 1000 mm of rainfall in the year.

Temperature

The annual mean temperature at Dublin Airport (2011-2018) is 9.5ºCwith a mean maximum of 15.3ºC and a mean minimum of 4.0ºC. Given the relative close proximity of this meteorological station to the proposed development site, similar conditions would be observed. Table 9.2 sets out meteorological data for Dublin Airport from 2011-2018.

Year	Period	Rainfall (mm)	Maximum mean Temperature (0C)	Minimum mean Temperature (0C)	Mean Temperature (0C)
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
Mean		762	15.3	4.0	9.5

Table 9.2 - Meteorological Data for Dublin Airport 2011-2018

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 - 2018 is 5.7 m/s.

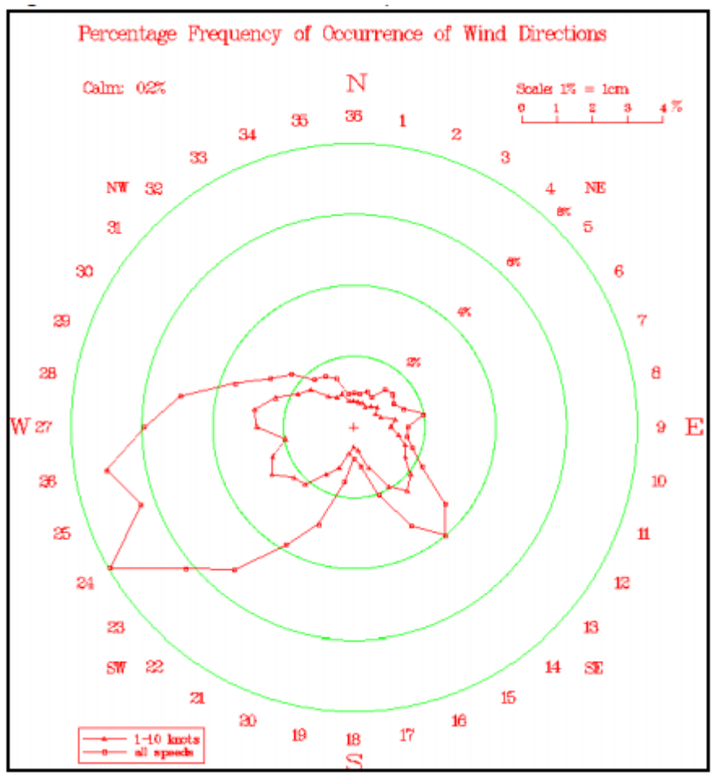

Figure 9.1: Dublin Airport Windrose 2009-2018

Description of Existing Air Quality

The existing ambient air quality at and in the vicinity of the site is typical of a city urban 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

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 2018– Key Indicators of Ambient Air Quality" details the range and scope of monitoring undertaken throughout Ireland with Dublin 13 categorised as Zone A.

The most recent 2018 EPA publication includes a number of Zone A monitoring locations which would be broadly comparable to the expected air quality at the subject site. The various Zone A air quality monitoring stations within Ireland provide a comprehensive range of air quality monitoring data sets which have been selected as part of this assessment to describe the existing ambient air quality at the subject site.

Baseline Air Quality – Review of Available Background Data

Air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities. The most recent annual report on air quality in Ireland is "*Air Quality in Ireland 2018 – Indicators of Air Quality*" (EPA, 2019). The EPA website details the range and scope of monitoring undertaken throughout Ireland and provides both monitoring data and the results of previous air quality assessments (EPA, 2019).

In terms of air monitoring and assessment, the proposed development site is within Zone A. The long-term monitoring data has been used to determine background concentrations for the key pollutants in the region of the proposed development. The background concentration accounts for all non-traffic derived emissions (e.g. natural sources, industry, home heating etc.) The most recent EPA publication includes a number of monitoring locations in Dublin City which would be broadly comparable to the expected air quality at the subject site. The various air quality monitoring stations within the Dublin area provides 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 (NO_2)

With regard to NO_2, continuous monitoring data from the EPA at the Zone A locations of Ringsend, Swords, Blanchardstown, Ballyfermot, Dun Laoghaire, Rathmines, Colaraine St and Winetavern St show that levels of NO_2 are below the annual limit values. The results at the swords location has been used in the DMRB screening model, due to its proximity to the proposed development. A reduction in Max 1-hour No_2 levels was seen in 2017 (see Table 9.3). Average long-term Annual Mean concentrations range from 13.0 – 16 µg/m^3 for the period 2013 – 2018 at the swords location; suggesting an average over the six year period of no more than 14.65µg/m^3. Based on these results from 2018 a current maximum daily 1-hr mean of 112µg/m^3 has been used in the DMRB screening model.

Air Quality Zone A		Nitrogen Dioxide (NO_2)					
Station	Averaging Period	Year					
		2013	2014	2015	2016	2017	2018

Ringsend	Annual Mean NO_2 ($\mu g/m^3$)	-	-	-	-	21.9	27
	Max 1-hr NO_2 ($\mu g/m^3$)	-	-	-	-	137.7	121
Swords	Annual Mean NO_2 ($\mu g/m^3$)	15.0	14.0	13.0	15.7	14.2	16
	Max 1-hr NO_2 ($\mu g/m^3$)	221.0	325.0	170.0	205.9	107.3	112
Blanchardstown	Annual Mean NO_2 ($\mu g/m^3$)	29.0	31.0	25.0	30.2	26.2	25
	Max 1-hr NO_2 ($\mu g/m^3$)	154.0	215.0	178.0	160.2	331.2	149
Ballyfermot	Annual Mean NO_2 ($\mu g/m^3$)	16.0	16.0	16.0	17.3	16.5	17
	Max 1-hr NO_2 ($\mu g/m^3$)	107.0	128.0	142.0	127.3	148.2	217
Dun Laoghaire	Annual Mean NO_2 ($\mu g/m^3$)	16.0	15.0	16.0	18.6	17.4	19
	Max 1-hr NO_2 ($\mu g/m^3$)	123.0	105.0	103.0	141.7	153.3	135
Rathmines	Annual Mean NO_2 ($\mu g/m^3$)	19.0	17.0	18.0	20.0	17.1	20
	Max 1-hr NO_2 ($\mu g/m^3$)	107.0	112.0	106.0	102.0	115.9	138
Colaraine St.	Annual Mean NO_2 ($\mu g/m^3$)	26.0	25.0	25.0	27.6	25.6	-
	Max 1-hr NO_2 ($\mu g/m^3$)	118.0	130.0	157.0	146.5	189.4	-
Winetavern St.	Annual Mean NO_2 ($\mu g/m^3$)	31.0	31.0	31.0	36.6	27.2	29
	Max 1-hr NO_2 ($\mu g/m^3$)	158.0	188.0	182.0	193.9	196.4	165

Table 9.3: Trends in Zone A Air Quality - Nitrogen Dioxide (NO_2)

Particulate Matter (PM_{10})

Results of Continuous PM_{10} monitoring carried out at the locations of Ringsend, Tallaght, Blanchardstown, Ballyfermot, Dun Laoghaire, Rathmines, Winetavern St and Phoenix Park, with six years of annual mean concentrations are shown in Table 9.4 Long-term data for the period 2013 – 2018 show concentrations of the annual mean ranging from 9.1 – 20 $\mu g/m^3$; suggesting an average concentration over the six year period of no more than 14.05 $\mu g/m^3$. The daily limit for the protection of human health is no more than 35 days>50$\mu g/m^3$. Based on the EPA data (Table 9.4) a conservative estimate of the current background PM_{10} concentration in the region of the proposed development is 14.05 $\mu g/m^3$.

Air Quality Zone A		**PM $_{10}$**					
Station	**Averaging Period**	**Year (PM_{10})**					
		2013	**2014**	**2015**	**2016**	**2017**	**2018**
Ringsend	Annual Mean PM_{10} ($\mu g/m^3$)	-	-	-	-	13.4	20
	Daily Max > 50 $\mu g/m^3$	-	-	-	-	2	3
Tallaght	Annual Mean PM_{10} ($\mu g/m^3$)	-	15.0	14.0	14.2	11.8	15
	Daily Max > 50 $\mu g/m^3$	-	2	4	0	2	1
Blanchardstown	Annual Mean PM_{10} ($\mu g/m^3$)	20	18.0	17.0	17.9	15.0	17
	Daily Max > 50 $\mu g/m^3$	11	5	9	2	3	2
Ballyfermot	Annual Mean PM_{10} ($\mu g/m^3$)	12	11	12.0	10.7	12	16
	Daily Max > 50 $\mu g/m^3$	2	2	3	0	1	0
Dun Laoghaire	Annual Mean PM_{10} ($\mu g/m^3$)	17	14	13.0	12.9	11.9	13
	Daily Max > 50 $\mu g/m^3$	5	2	3	0	2	0
Rathmines	Annual Mean PM_{10} ($\mu g/m^3$)	17	14	15.0	14.8	13.4	15
	Daily Max > 50 $\mu g/m^3$	8	3	5	3	5	2
Winetavern St.	Annual Mean PM_{10} ($\mu g/m^3$)	14	14	14.0	14.0	12.9	14
	Daily Max > 50 $\mu g/m^3$	3	1	4	2	3	1
Phoenix Park	Annual Mean PM_{10} ($\mu g/m^3$)	14	12	12.0	10.5	9.1	11
	Daily Max > 50 $\mu g/m^3$	3	0	2	0	1	0

Table 9.4: Trends in Zone A Air Quality - PM_{10}

Nitrogen Oxide (NO_x)

With regard to NO_x, continuous monitoring data from the EPA at the Zone A locations of Ringsend, Swords, Blanchardstown, Ballyfermot, Dun Laoghaire, Rathmines, Colaraine St and Winetavern St. The results at the swords location has been used in the DMRB screening model, due to its proximity to the proposed development. The average long-term concentrations range from 22 – 25 $\mu g/m^3$ for the period 2013 – 2018 at the Sword location. Based on these results a conservative estimate of the current background NO_X concentration in the region of the proposed development is 23.45 $\mu g/m^3$.

Air Quality Zone A		**Nitrogen oxide (NO_x)**					
Station	**Averaging Period**	**Year (NO_x)**					
		2013	**2014**	**2015**	**2016**	**2017**	**2018**
Ringsend	Annual Mean NO_x ($\mu g/m^3$)	-	-	-	-	54.3	50
	Hourly Max[1]	-	-	-	-	986.1	909
Swords	Annual Mean NO_x ($\mu g/m^3$)	25	24	22	24.5	22.2	23
	Hourly Max[1]	1018	7022	833	1173.4	653.8	735
Blanchardstown	Annual Mean NO_x ($\mu g/m^3$)	62	67	55	76.4	57.8	62
	Hourly Max[1]	1006	1440	962	953.2	1441.5	1032
Ballyfermot	Annual Mean NO_x ($\mu g/m^3$)	21	25	23	25.6	20.7	25
	Hourly Max[1]	523	839	553	705.2	789.4	704
Dun Laoghaire	Annual Mean NO_x ($\mu g/m^3$)	27	22	27	29.1	27.4	30
	Hourly Max[1]	424	416	915	570.9	796.4	614
Rathmines	Annual Mean NO_x ($\mu g/m^3$)	28	27	28	31.1	26.8	33
	Hourly Max[1]	668	750	593	558.1	946.2	681
Colaraine St.	Annual Mean NO_x ($\mu g/m^3$)	46	41	44	49.5	46.2	-
	Hourly Max[1]	1000	720	962	1008.2	1530.9	-
Winetavern St.	Annual Mean NO_x ($\mu g/m^3$)	50	59	49	63.4	45.6	47
	Hourly Max[1]	1209	1236	982	1222.1	1427.7	1144

Table 9.5: Trends in Zone A Air Quality - Nitrogen oxide (NO_x)

Note 1 NO_x is expressed as $\mu g/m^3$.

Note 2 NO_x annual mean limit value for the protection of Vegetation: 30 $\mu g/m^3$ (Limit only applies to rural stations in Zone D)

Particulate Matter ($PM_{2.5}$)

Continuous $PM_{2.5}$ monitoring was carried out by the EPA at the Zone A locations of Marino, Finglas, Rathmines and Coleraine showed annual mean levels of 6 - 11 µg/m3 over the period 2013 - 2018 period. Based on this EPA data shown in table 9.6, an average background PM2.5 concentration in the region of the proposed development is 8.40 $\mu g/m^3$. There were no exceedances of limit of 25 $\mu g/m^3$ in annual mean.

Air Quality Zone A		**PM $_{2.5}$**					
Station	**Averaging Period**	**Year ($PM_{2.5}$)**					
		2013	**2014**	**2015**	**2016**	**2017**	**2018**
Marino	Annual Mean PM_{10} ($\mu g/m^3$)	9	8	8	7	6.9	6
	Daily Max	55	50	84	111.3	71.3	30
Finglas	Annual Mean PM_{10} ($\mu g/m^3$)	-	7	8	8.5	6.6	8
	Daily Max	-	35	75	111.3	51.9	97
Rathmines	Annual Mean PM_{10} ($\mu g/m^3$)	11	9	10	10	8.5	9
	Daily Max	76	49	85	53.3	95.7	70

Coleraine	Annual Mean PM_{10} ($\mu g/m^3$)	11	9	9	9	8	-
	Daily Max	62	43	82	46.4	81.5	-

Table 9.6: *Trends in Zone A Air Quality - ($PM_{2.5}$)*

Note 1 $PM_{2.5}$ annual mean limit value for the protection of human health: 25 $\mu g/m^3$

Benzene

In terms of benzene, the annual mean concentration in the Zone A monitoring location of Rathmines from 2013 - 2018 was 0.83 $\mu g/m^3$. This is well below the limit value of 5 $\mu g/m^3$. Between 2013 - 2018 annual mean concentrations at Zone A sites ranged from 0.30 – 1.01 $\mu g/m^3$. Based on this EPA data a conservative estimate of the current background benzene concentration in the region of the proposed development is 0.83 $\mu g/m^3$

Air Quality Zone A		**Benzene**					
Station	**Averaging Period**	**Year**					
		2013	**2014**	**2015**	**2016**	**2017**	**2018**
Rathmines	Annual Mean Benzene($\mu g/m^3$)	0.94	0.94	0.92	1.01	0.92	0.30
	Daily Max	5.77	4.70	7.89	1.94	4.60	4.40

Table 9.7: Trends in Zone A Air Quality - Benzene 2013 - 2018

Carbon Monoxide (CO)

With regard to CO, annual averages at the Zone A, locations of Coleraine Street, Winetavin Street and Balbriggan over the 2013 – 2018 period are low, ranging from 0 to 0.6 $\mu g/m^3$ Based on this EPA data, a conservative estimate of the current background CO concentration in the region of the proposed development is 0.36 mg/m^3. The maximum daily 8-hr mean of 2.28mg/m^3 has been used in the DMRB screening model.

Air Quality Zone C		**Carbon Monoxide(CO)**					
Station	**Averaging Period**	**Year (CO)**					
		2013	**2014**	**2015**	**2016**	**2017**	**2018**
Coleraine Street	Annual Mean PM_{10} (mg/m^3)	0.4	0.4	0.4	0.5	0.43	-
	Max[1]	2.7	2.5	3	2.3	2.9	-
Winetavern Street	Annual Mean PM_{10} (mg/m^3)	0	0	0	0.1	0.14	0.2
	Max[1]	2.4	2.4	2	1.9	2.3	1.8
Balbriggan	Annual Mean PM_{10} (mg/m^3)	0.6	0.5	-	-	-	-
	Max[1]	1.6	1.9	-	-	-	-

Table 9.8: Trends in Zone A Air Quality - Carbon Monoxide(CO)

Note 1 maximum daily 8-hr mean limit value for protection of human health of 10 mg/m^3

Background concentrations for 2026 and 2036 have been calculated. These have used the predicted current background concentrations and the year on year reduction factors provided by Transport Infrastructure Ireland in the Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes and the UK Department for Environment, Food and Rural Affairs LAQM.TG.

9.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development as described in chapter 3 of this EIAR and set out in the statutory planning notices.

When considering a development of this nature, the potential air quality and climate impact on the surroundings must be considered for each of two distinct stages:

A. - Construction phase;
B. - Operational phase.

During the construction stage the main source of air quality impacts will be as a result of fugitive dust emissions from site activities. Emissions from construction vehicles and machinery have the potential to impact climate. The primary sources of air and climatic emissions in the operational context are deemed long term and will involve the change in traffic flows or congestion in the local areas which are associated with the development.

The following describes the primary sources of potential air quality and climate impacts which have been assessed as part of this EIAR.

Do-Nothing Scenario

The Do-Nothing scenario includes retention of the current site without the proposed residential development in place. In this scenario, ambient air quality at the site will remain as per the baseline and will change in accordance with trends within the wider area (including influences from potential new developments in the surrounding area, changes in road traffic, etc).

9.5 POTENTIAL IMPACTS

Construction Impacts

Air Quality

The greatest potential impact on air quality during the construction phase of the proposed development is from construction dust emissions and the potential for nuisance dust and PM_{10}/$PM_{2.5}$ emissions. The proposed development can be considered moderate in scale and therefore there is the potential for significant dust soiling 50m from the source (Table 9.8). While construction dust tends to be deposited within 200m of a construction site, the majority of the deposition occurs within the first 50m. In order to minimise dust emissions during construction, a series of mitigation measures have been prepared in the form of a dust minimisation plan. Provided the dust minimisation measures outlined in the plan (see Appendix 9.3) are adhered to, the air quality impacts during the construction phase will not be significant. Regard has also been taken for the import of infill materials from off-site locations and potential dust impacts as a result of this will also be mitigated. The mitigation measures are summarised in Section 9.7

Source		**Potential Distance for Significant Effects (Distance from Source)**		
Scale	**Description**	**Soiling**	**PM_{10}**	**Vegetation Effects**
Major	Large construction sites, with high use of haul roads	100m	25m	25m
Moderate	Moderate sized construction sites, with moderate use of haul roads	50m	15m	15m

Minor	Minor construction sites, with limited use of haul roads	25m	10m	10m

Table 9.9: Assessment Criteria for the Impact of Dust from Construction, with Standard Mitigation in Place

Climate

There is the potential for a number of greenhouse gas emissions to atmosphere during the construction of the development. Construction vehicles, generators etc., may give rise to CO_2 and NO_2 emissions. However, the impact on the climate is considered to be imperceptible in the long and short term.

Human Health

Best practice mitigation measures are proposed for the construction phase of the proposed development which will focus on the pro-active control of dust and other air pollutants to minimise generation of emissions at source. The mitigation measures that will be put in place during construction of the proposed development will ensure that the impact of the development complies with all EU ambient air quality legislative limit values which are based on the protection of human health. Therefore, the impact of construction of the proposed development is likely to be short-term and imperceptible with respect to human health.

Operational Phase

Local Air Quality

There is the potential for a number of emissions to the atmosphere during the operational phase of the development. In particular, the traffic-related air emissions may generate quantities of air pollutants such as NO_2, CO, benzene and PM_{10}.

Annual Average Daily Traffic Flow (AADT) information was obtained from DBFL Consulting Engineers on this project and has been used to model pollutant levels under various traffic scenarios and under sufficient spatial resolution to assess whether any significant air quality impact on sensitive receptors may occur. Cumulative effects have been assessed, as recommended in the EU Directive on EIA (Council Directive 2014/52/EU). Firstly, background concentrations have been included in the modelling study. These background concentrations are year-specific and account for non-localised sources of the pollutants of concern. Appropriate background levels were selected based on the available monitoring data provided by the EPA.

The impact of the proposed development has been assessed by modelling emissions from the traffic generated as a result of the development. The impact of CO, benzene, NO_2, NO_x and PM_{10} for the years 2026 and 2036 was predicted at the nearest sensitive receptors to the development. This assessment allows the significance of the development, with respect to both relative and absolute impact, to be determined.

The receptors modelled represent the worst-case locations close to the proposed development and were chosen due to their close proximity (within 200 m) to the road links impacted by proposed development. The worst-case traffic data which satisfied the assessment criteria detailed in Section 9.2 is shown in Table 9.10 and Figure 9.2 which has a 10% HGV flow. Four receptors have been identified in the vicinity of the proposed development. Sensitive receptors have been chosen as they have the potential to be adversely impacted by the development, these receptors are shown in Table 9.11 and Figure 9.3.

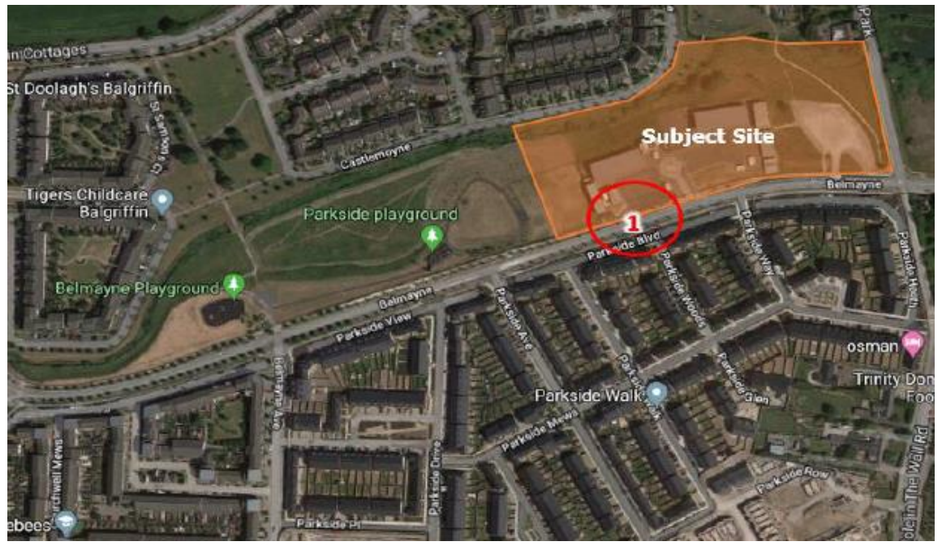

Figure 9.2 Eastbound and westbound traffic flows link 1

Link Number	Road Name	Speed (kph)	Base Year	Do-Nothing		Do-Something	
			2021	2026	2036	2026	2036
1	Link 1 (Parkside Boulevard)	25	2957	3160	3410	3716	3966

Table 9.10: *ADDT - Traffic Data used in Air Modelling Assessment*

Name	Distance from Link (meters)	Receptor Type	Coordinates	
			Eastings	Northings
R1	115	Residential (Detached House)	322136	241455
R2	22	Residential (Housing Estate)	321918	241249
R3	126	Residential (Housing Estate)	321726	241338
R4	52	Residential (Housing Estate)	321532	241202

Table 9.11: Description of Sensitive Receptors

Figure 9.3: Approximate Sensitive Receptor Locations used in Modelling Assessment

Modelling Assessment

Transport Infrastructure Ireland Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes detail a methodology for determining air quality impact significance criteria for road schemes and has been adopted for this assessment, as is best practice. The degree of impact is determined based on both the absolute and relative impact of the proposed development. Results are compared against the 'Do-Nothing' scenario, which assumes that the proposed development is not in place in future years, in order to determine the degree of impact.

NO_2

The results of the DMRB modelled impact of the proposed development for NO_2 in 2026 and 2036 are shown in Table 9.12 – 9.19. The annual average concentration is within the limit value at all worst-case receptors. Levels of NO_2 range between 36.8% - 38.7% in 2026 and in 2036 of the annual limit value using the annual mean concentrations for the EPA. The hourly limit value for NO_2 is 200 µg/m^3 and is expressed as a 99.8th percentile (i.e. it must not be exceeded more than 18 times per year). The daily maximum 1-hour NO_2 concentration is not predicted to be exceeded in 2026 or 2036. There are some increases in traffic flows between 2026 and 2036, therefore any reduction in concentrations is due to reduced background concentrations and greater efficiencies predicted in engines.

The impact of the proposed development on annual mean NO_2 levels can be assessed relative to "Do Nothing (DN)" levels in 2026 and 2036. Relative to baseline levels, some imperceptible increases in pollutant levels are predicted as a result of the proposed development. With regard to impacts at individual receptors, the greatest impact on NO_2 concentrations will be an increase of 0.33% of the annual limit value at Receptors 2. Thus, using the assessment criteria outlined in Appendix 9.2 Tables A1 – A2, the impact of the proposed development in terms of NO_2 is negligible. Therefore, the overall impact of NO_2 concentrations as a result of the proposed development is long-term and imperceptible at all of the receptors assessed.

PM_{10}

The results of the modelled impact of the proposed development for PM_{10} in 2026 and 2036 are shown in Table 9.14. Predicted annual average concentrations at all receptors in the region of the development range between 35.7% - 35.8 % of the limit value in 2026. Future trends with the proposed development in place indicate similarly low levels of PM_{10}. PM_{10} concentrations in 2036 range between 35.7% - 35.9% of the limit value.

The impact of the proposed development can be assessed relative to "Do Nothing" levels in 2026 and 2036. Relative to baseline levels, some imperceptible increases in PM_{10} levels at the worst-case receptors are predicted as a result of the proposed development. The greatest impact on PM_{10} concentrations in the region of the proposed development in either 2026 or 2036 will be an increase of 0.10% of the annual limit value at Receptor 2. Thus, the magnitude of the changes in air quality are negligible at all receptors based on the criteria outlined in Appendix 9.2, Tables A1 – A3. Therefore, the overall impact of PM_{10} concentrations as a result of the proposed development is long-term and imperceptible.

NO_x

The results of the modelled impact of the proposed development for NO_x in 2026 and 2036 are shown in Table 9.16 There is no limit valve assigned to Zone A, however the annual mean limit for the protection of vegetation in Zone D is 30µg/m^3. This limit value was used to assess the proposed development site. Levels of NO_x range between 78.7% - 87.3% in 2026 and range between 78.7% - 87.2% in 2036 of the annual limit value using the annual mean concentrations from the EPA.

The impact of the proposed development on annual mean NO_x levels can be assessed relative to "Do Nothing (DN)" levels in 2026 and 2036. Relative to baseline levels, some imperceptible increases in pollutant levels are predicted as a result of the proposed development. With regard to impacts at individual receptors, the greatest impact on NO_x concentrations will be an increase of 1.36% of the Zone D annual limit value at Receptors 2. Thus, using the assessment criteria for NO_2 and PM_{10} outlined in Appendix 9.2 and applying these criteria to CO and benzene, the impact of the proposed development in terms of NO_x is negligible, long-term and imperceptible.

$PM_{2.5}$

The Air Quality Standards Regulations 2011 specify a $PM_{2.5}$ target value of 25 µg/m^3 over a calendar year to be met by 1 January 2015. Long term $PM_{2.5}$ monitoring was carried out in four Zone A locations. Based on this EPA data shown in table 9.6, an average background PM2.5 concentration in the region of the proposed development is 8.40 µg/m^3. Therefore, long term averages were below the target value 25 µg/m^3.

CO and Benzene

The results of the modelled impact of CO and benzene in the development for 2026 and 2036 are shown in Table 9.17 and Table 9.18 respectively. Predicted pollutant concentrations with the proposed development in place are below the ambient standards at all locations. Levels of CO range between 22.8% - 23.0% of the

limit value in 2026 and 2036 levels of benzene ranging between 16.60% - 17.0% of the total limit value in 2026 and 2036. Future trends indicate similarly low levels of CO and benzene. Levels of both pollutants are below their respective limit values, with CO reaching 23.5% of the limit and benzene reaching 17.0% in 2026 and 2036.

The impact of the proposed development can be assessed relative to "Do Nothing" levels in 2026 and 2036. CO and benzene concentration from the DMRB Model in both 2026 and 2036 are not predicted to increase. Thus, using the assessment criteria for NO_2 and PM_{10} outlined in Appendix 9.2 and applying these criteria to CO and benzene, the impact of the proposed development in terms of CO and benzene is negligible, long-term and imperceptible.

Receptor	Impact Opening Year (2026)					Impact Design Year (2036)				
	DN	DS	DS-DN	Magnitude	Description	DN	DS	DS-DN	Magnitude	Description
1	14.72	14.74	0.02	Imperceptible	Negligible Increase	14.72	14.74	0.02	Imperceptible	Negligible Increase
2	15.36	15.49	0.13	Imperceptible	Negligible Increase	15.37	15.48	0.11	Imperceptible	Negligible Increase
3	14.71	14.72	0.01	Imperceptible	Negligible Increase	14.71	14.72	0.01	Imperceptible	Negligible Increase
4	14.99	15.05	0.06	Imperceptible	Negligible Increase	14.99	15.05	0.06	Imperceptible	Negligible Increase

Table 9.12: Annual Mean NO2 Concentrations (µg/m³)

Receptor	Daily Maximum 1-hour for NO_2 concentrations (µg/m³)					
	Impact Opening Year (2026)			Impact Design Year (2036)		
	DN	DS	DS-DN	DN	DS	DS-DN
1	112.15	112.17	0.02	112.24	112.28	0.04
2	113.10	113.6	0.16	114.34	114.72	0.38
3	112.12	112.14	0.02	112.18	112.21	0.03
4	112.57	112.66	0.09	113.11	113.29	0.18

Table 9.13 Daily maximum 1-hour for NO_2 concentrations (µg/m³)

Receptor	Impact Opening Year (2026)					Impact Design Year (2036)				
	DN	DS	DS-DN	Magnitude	Description	DN	DS	DS-DN	Magnitude	Description
1	14.07	14.08	0.01	Imperceptible	Negligible	14.08	14.08	0.00	Imperceptible	Negligible
2	14.29	14.33	0.04	Imperceptible	Negligible Increase	14.30	14.34	0.04	Imperceptible	Negligible Increase
3	14.07	14.07	0.00	Imperceptible	Negligible	14.07	14.07	0.00	Imperceptible	Negligible
4	14.16	14.18	0.02	Imperceptible	Negligible Increase	14.17	14.19	0.02	Imperceptible	Negligible Increase

Table 9.14: Annual Mean PM_{10} Concentrations (µg/m³)

Receptor	Impact Opening Year (2026)		Impact Design Year (2036)	
	DN	DS	DN	DS
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00

Table 9.15: Number of days with PM_{10} concentration > 50 µg/m³

Receptor	Impact Opening Year (2026)					Impact Design Year (2036)				
	DN	DS	DS-DN	Magnitude	Description	DN	DS	DS-DN	Magnitude	Description
1	23.69	23.73	0.04	Imperceptible	Negligible Increase	23.69	23.73	0.05	Imperceptible	Negligible Increase
2	25.77	26.18	0.41	Small	Negligible Increase	25.79	26.17	0.38	Imperceptible	Negligible Increase
3	23.63	23.66	0.03	Imperceptible	Negligible Increase	23.63	23.66	0.03	Imperceptible	Negligible Increase
4	24.55	24.74	0.19	Imperceptible	Negligible Increase	24.56	24.74	0.18	Imperceptible	Negligible Increase

Table 9.16: Annual Mean NO_x Concentrations (µg/m³)

Receptor	Impact Opening Year (2026)					Impact Design Year (2036)				
	DN	DS	DS-DN	Magnitude	Description	DN	DS	DS-DN	Magnitude	Description
1	0.83	0.83	0.00	Imperceptible	Negligible	0.83	0.83	0.00	Imperceptible	Negligible
2	0.85	0.85	0.00	Imperceptible	Negligible	0.85	0.85	0.00	Imperceptible	Negligible
3	0.83	0.83	0.00	Imperceptible	Negligible	0.83	0.83	0.00	Imperceptible	Negligible
4	0.84	0.84	0.00	Imperceptible	Negligible	0.84	0.84	0.00	Imperceptible	Negligible

Table 9.17: Annual Mean Benzene Concentrations (µg/m³)

Receptor	Impact Opening Year (2026)					Impact Design Year (2036)				
	DN	DS	DS-DN	Magnitude	Description	DN	DS	DS-DN	Magnitude	Description
1	2.28	2.28	0.00	Imperceptible	Negligible	2.28	2.28	0.00	Imperceptible	Negligible
2	2.29	2.30	0.01	Imperceptible	Negligible Increase	2.30	2.30	0.00	Imperceptible	Negligible
3	2.28	2.28	0.00	Imperceptible	Negligible	2.28	2.28	0.00	Imperceptible	Negligible
4	2.29	2.29	0.00	Imperceptible	Negligible	2.29	2.29	0.00	Imperceptible	Negligible

Table 9.18: Maximum 8-hour CO Concentrations (mg/m³)

Year	Scenario	CO (kg/annum)	NOx (kg/annum)	PM_{10} (tonnes/annum)	C (tonnes/annum)
2026	Do Nothing	1013	427	13	62
	Do Something	1191	502	15	73
2036	Do Nothing	1075	145	13	65
	Do Something	1250	169	15	75
Increment in 2026		178kg	72kg	2 Tonnes	11 tonnes
Increment in 2036		175kg	24kg	2 Tonnes	10 tonnes

Table 9.19: Regional Air Quality & Climate Assessment

Summary of Modelling Assessment

Levels of traffic-derived air pollutants for the development will not exceed the ambient air quality standards either with or without the proposed development in place. Using the assessment criteria outlined in Appendix 9.2, Table A1 – A3, the impact of the development in terms of PM_{10}, CO, NO_2, NO_x and benzene is negligible, long-term and imperceptible.

Regional Air Quality and Climate Impact

The regional impact of the proposed development on emissions of CO, NO_X, PM_{10} and C has been assessed using the procedures of Transport Infrastructure Ireland. The results (see Table 9.19) show that the likely impact of the proposed development has on the area. The likely overall magnitude of the changes on air quality and climate in the operational stage is imperceptible.

Human Health
Air dispersion modelling of operational traffic emissions was undertaken to assess the impact of the development with reference to EU ambient air quality standards which are based on the protection of human health. As demonstrated by the modelling results, emissions as a result of the proposed development are compliant with all National and EU ambient air quality limit values and, therefore, will not result in a significant impact on human health.

9.6 POTENTIAL CUMULATIVE IMPACTS

In accordance with The Planning and Development Regulations 2001 as amended, this section has considered the cumulative impact of the proposed development in conjunction with future and current development in the vicinity of the subject site. This section relates to the cumulative impact on the subject site itself and on surrounding sites.

The 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 existing residential development, under construction developments and existing local transport infrastructure together with the proposed development 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 capacity" to facilitate the proposed development.

It is predicted that the cumulative impact of the construction and operational phases of the proposed development and proposed or permitted neighboring developments (on Marrsfield, Hole in the Wall Road, and Parkside Housing Development) will not have an adverse long term impact on the receiving environment.

It is considered that 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. However, through the implementation of the mitigation measures and the integration into the design of the operational development of sustainable aspects and energy reduction features will ensure the receiving environment including off site residential receptors and existing habitats will not be adversely impacted.

9.7 MITIGATION MEASURES

Construction phase
Air Quality
The pro-active control of fugitive dust will ensure the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released. The main contractor will be responsible for the coordination, implementation and ongoing monitoring of the dust management plan. The key aspects of controlling dust are listed below. Full details of the dust management plan can be found in Appendix 9.3.

- The specification and circulation of a dust management plan for the site and the identification of persons responsible for managing dust control and any potential issues;
- The development of a documented system for managing site practices with regard to dust control
- The development of a means by which the performance of the dust management plan can be monitored and assessed;
- The specification of effective measures to deal with any complaints received.

At all times, the procedures within the plan will be strictly monitored and assessed. In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust would be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.

Climate
Construction traffic and embodied energy of construction materials are expected to be the dominant source of greenhouse gas emissions as a result of the construction phase of the development. Construction vehicles, generators etc., may give rise to some CO_2 and N_2O emissions. However, due to short-term and temporary nature of these works, the impact on climate will not be significant.

Nevertheless, some site-specific mitigation measures can be implemented during the construction phase of the proposed development to ensure emissions are reduced further. In particular the prevention of on-site or delivery vehicles from leaving engines idling, even over short periods. Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site.

Mitigation Measures (Construction)

- 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 unsurfaced roads will be restricted to essential site traffic only.
- Re-suspension in the air of spillages material from trucks entering or leaving the site will be prevented by limiting the speed of vehicles within the site to 10kmh and by use of a mechanical road sweeper.
- The overloading of tipper trucks exiting the site shall not be permitted.
- Aggregates will be transported to and from the site in covered trucks.
- Where the likelihood of windblown fugitive dust emissions is high and during dry weather conditions, dusty site surfaces will be sprayed by a mobile tanker bowser.
- Wetting agents shall be utilised to provide a more effective surface wetting procedure.

- Exhaust emissions from vehicles operating within the construction site, including trucks, excavators, diesel generators or other plant equipment, will be controlled by the contractor by ensuring that emissions from vehicles are minimised by routine servicing of vehicles and plant, rather than just following breakdowns; the positioning of exhausts at a height to ensure adequate local dispersal of emissions, the avoidance of engines running unnecessarily and the use of low emission fuels.
- All plant not in operation shall be turned off and idling engines shall not be permitted for excessive periods.
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.
- Material stockpiles containing fine or dusty elements including top soils shall be covered with tarpaulins.
- Where drilling or pavement cutting, grinding or similar types of stone finishing operations are taking place, measures to control dust emissions will be used to prevent unnecessary dust emissions by the erection of wind breaks or barriers. All concrete cutting equipment shall be fitted with a water dampening system.
- A programme of air quality monitoring shall be implemented at the site boundaries for the duration of construction phase activities to ensure that the air quality standards relating to dust deposition and PM_{10} are not exceeded. Where levels exceed specified air quality limit values, dust generating activities shall immediately cease and alternative working methods shall be implemented.
- A complaints log shall be maintained by the construction site manager and in the event of a complaint relating to dust nuisance, an investigation shall be initiated.

Operational Phase
No additional mitigation measures are required as the operational phase of the proposed development as it is predicted to have an imperceptible impact on ambient air quality and climate.

The operational phase mitigation by design measures to minimise the impact of the development on air quality and climate are as follows:

Mitigation Measures (Operational)
- Thermally efficient glazing systems on all units
- Mechanical Ventilation and Heat Recovery (MVHR) systems or equivalent installed in all apartments
- Thermal insulation of walls and roof voids of all units
- Natural Gas heating in all units
- Inclusion of electric car charging points to encourage electric vehicle ownership

Predicted Impacts
Various elements associated with the construction phase of the proposed development have the potential to impact local ambient air quality, however the potential construction phase impacts shall be mitigated as detailed in Section 9.7 above to ensure there is a minimal impact on ambient air quality for the duration of all construction phase works. It is predicted that the operational phase of the development will not generate air emissions that would have an adverse impact on local ambient air quality or local human health.

9.8 'DO NOTHING' SCENARIO

The Do-Nothing scenario includes retention of the current site without the proposed residential development in place. In this scenario, ambient air quality at the site will remain as per the baseline and will change in accordance with trends within the wider area (including influences from potential new developments in the surrounding area, changes in road traffic, etc).

9.9 WORST CASE SCENARIO

The main potential for adverse impact on local air quality 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 dust mitigation measures not be implemented during the construction phase, significant dust nuisance is likely in areas close to the construction site. Given the distance to sensitive receptors dust nuisance is not considered to be a significant issue providing mitigation measures are carried out.

9.10 MONITORING & REINSTATEMENT

Monitoring
Monitoring of construction dust deposition at nearby sensitive receptors (residential dwellings) during the construction phase of the proposed development is recommended to ensure mitigation measures are working satisfactorily. This can be carried out using the Bergerhoff method in accordance with the requirements of the German Standard VDI 2119. The Bergerhoff Gauge consists of a collecting vessel and a stand with a protecting gauge. The collecting vessel is secured to the stand with the opening of the collecting vessel located approximately 2m above ground level. The TA Luft limit value is 350 mg/(m2*day) during the monitoring period between 28 – 32 days.

There is no monitoring recommended for the operational phase of the development as impacts to air quality and climate are predicted to be imperceptible.

9.11 DIFFICULTIES IN COMPILING INFORMATION

There were no difficulties encountered in compiling this section of the EIAR.

9.12 RESIDUAL IMPACTS

Construction Phase
Air Quality
When the dust minimisation measures detailed in the mitigation section of this Chapter (Section 9.7) are implemented, fugitive emissions of dust from the site will be insignificant and pose no nuisance at nearby receptors.

Climate

Impacts to climate during the construction phase are considered imperceptible and therefore residual impacts are not predicted.

Operational Phase

The results of the air dispersion modelling study indicate that the impacts of the proposed development on air quality and climate is predicted to be imperceptible with respect to the operational phase for the long and short term.

9.13 REFERENCES

- German VDI (2002) Technical Guidelines on Air Quality Control – TA Luft
- Framework Convention on Climate Change (1997) Kyoto Protocol To The United Nations Framework Convention On Climate Change
- Framework Convention on Climate Change (1999) Ireland - Report on the in-depth review of the second national communication of Ireland
- Environmental Resources Management (1998) Limitation and Reduction of CO_2 and Other Greenhouse Gas Emissions in Ireland
- EU (2014) EU 2030 Climate and Energy Framework
- Department of the Environment, Heritage and Local Government (DEHLG) (2003) Strategy to Reduce Emissions of Trans-boundary Pollution by 2010 to Comply with National Emission Ceilings - Discussion Document
- DEHLG (2004) National Programme for Ireland under Article 6 of Directive 2001/81/EC for the Progressive Reduction of National Emissions of Transboundary Pollutants by 2010
- DEHLG (2007a) Update and Revision of the National Programme for Ireland under Article 6 of Directive 2001/81/EC for the Progressive Reduction of National Emissions of Transboundary Pollutants by 2010
- Environmental Protection Agency (EPA) (2002) Guidelines On Information To Be Contained in Environmental Impact Statements
- EPA (2003) Advice Notes On Current Practice (In The Preparation Of Environmental Impact Statements)
- EPA (2017) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports - Draft
- EPA (2015) Advice Notes for Preparing Environmental Impact Statements – Draft
- UK DEFRA (2016a) Part IV of the Environment Act 1995: Local Air Quality Management, LAQM. PG
- UK DEFRA (2016b) Part IV of the Environment Act 1995: Local Air Quality Management, LAQM.TG
- UK Department of the Environment, Transport and Roads (1998) Preparation of Environmental Statements for Planning Projects That Require Environmental Assessment - A Good Practice Guide, Appendix 8 - Air & Climate
- EPA (2016) Air Quality Monitoring Report 2015 (& previous annual reports 1997-2014)
- EPA (2017) EPA Website: http://www.epa.ie/whatwedo/monitoring/air/
- UK DEFRA (2016) NO_x to NO_2 Conversion Spreadsheet (Version 5.1)
- Transport Infrastructure Ireland (2011) Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes
- Transport Infrastructure Ireland (2009) Guidelines for Assessment of Ecological Impacts of National Roads Schemes (Rev. 2, Transport Infrastructure Ireland, 2009)
- Department of the Environment, Heritage and Local Government (2010) Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities
- World Health Organisation (2006) Air Quality Guidelines - Global Update 2005 (and previous Air Quality Guideline Reports 1999 & 2000)
- Highways England (2013) Interim Advice Note 170/12 v3 Updated air quality advice on the assessment of future NO_X and NO_2 projections for users of DMRB Volume 11, Section 3, Part 1 'Air Quality
- Institute of Air Quality Management (IAQM) (2014) Guidance on the Assessment of Dust from Demolition and Construction Version 1.1
- EU (2017) Ireland's Final Greenhouse Gas Emissions in 2015
- BRE (2003) Controlling Particles, Vapours & Noise Pollution From Construction Sites
- The Scottish Office (1996) Planning Advice Note PAN50 Annex B: Controlling The Environmental Effects Of Surface Mineral Workings Annex B: The Control of Dust at Surface Mineral Workings
- UK Office of Deputy Prime Minister (2002) Controlling the Environmental Effects of Recycled and Secondary Aggregates Production Good Practice Guidance
- USEPA (1997) Fugitive Dust Technical Information Document for the Best Available Control Measures
- USEPA (1986) Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition (periodically updated)

10 LANDSCAPE AND VISUAL

10.1 INTRODUCTION

This chapter assesses the potential effects of the proposed development on the landscape (or townscape – see 10.2.1.1 below) and views/visual amenity of the receiving environment. It should be read in conjunction with the verified photomontages contained in Appendix 10.1 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 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

10.2.1.1 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.

10.2.1.2 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 in the composition of a view.

10.2.1.3 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.

10.2.2.1 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

10.2.2.2 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

10.2.2.3 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*
	Negligible	*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.

10.2.3.1 Sensitivity of the Viewpoint/Visual Receptor

Viewpoint sensitivity is a function of two main considerations:

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

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

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

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

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

10.2.3.2 Magnitude of Change to the View

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

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

10.2.3.3 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 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

10.2.5.1 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.

10.2.5.2 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.

10.2.5.3 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.

10.2.5.4 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.

10.2.5.5 Presentation and Viewing

The individual photomontages are presented on A3 pages in landscape format. For each photomontage, the viewpoint number, location description, and the date and time of photography are provided.

In addition to the photomontage for each viewpoint showing the proposed view, a baseline view is provided. For this assessment the baseline views show a number of permitted but as yet not completed developments in the receiving environment. These permitted developments are shown in the baseline views as they affect the context, and the assessment of the proposal's potential effects on the context. These developments were modelled using the same method as the modelling of the proposed development, although they are shown in less detail.

10.3 RECEIVING ENVIRONMENT

10.3.1 Site Location in Wider Townscape Context

The site is located in the Clongriffin-Belmayne (North Fringe) area, a designated Strategic Development and Regeneration Area (SDRA 1) in the Dublin City Development Plan 2016-2022. This is a rapidly developing mixed density urban quarter at the northern fringe of the city.

- The area has two mixed use urban district centres, Clongriffin at the eastern edge of the area served by a DART station, and Belmayne in the western part of the area near Northern Cross/Clare Hall.
- There are two main roads linking the east and west district centres across the area, Main Street to the south and Parkside Boulevard/Marrsfield Avenue serving the northern perimeter of the area.
- Hole in the Wall Road/Balgriffin Park is the main north-south aligned route bisecting the district into eastern and western parts.
- Another key element of the area is Father Collins Park, which lies to the east of Hole in the Wall Road.
- The lands immediately north of the Clongriffin-Belmayne area, which fall into County Fingal, are zoned Green Belt in the Fingal Development Plan 2017-2023.

The site is strategically located in the urban context of the Clongriffin-Belmayne area. It is roughly halfway between the two district centres, within 10-15 minutes' walk of both. It is at the junction of Parkside Boulevard/Marrsfield Avenue and Balgriffin Park, with frontage to both streets. It is close to Father Collins Park and on the edge between the urban area and the green belt.

10.3.2 Surrounding Townscape Character

10.3.2.1 South of the Site

The site is located alongside (north of) Parkside Boulevard just west of the junction with Balgriffin Park. It has some 250m frontage to the street. Parkside Boulevard is a 'main street' with a distinctly urban treatment, including green verges with tree lines (Lime trees), footpaths and cycle paths on both sides.

To the south of the site across the street is the recently developed neighbourhood of Parkside, a large estate of two/three storey houses. An internal access road for the estate runs parallel to Parkside Boulevard forming a wide transport corridor along the southern boundary of the site. The houses south of Parkside Boulevard, facing the site, are thus some 28-30m from the site boundary.

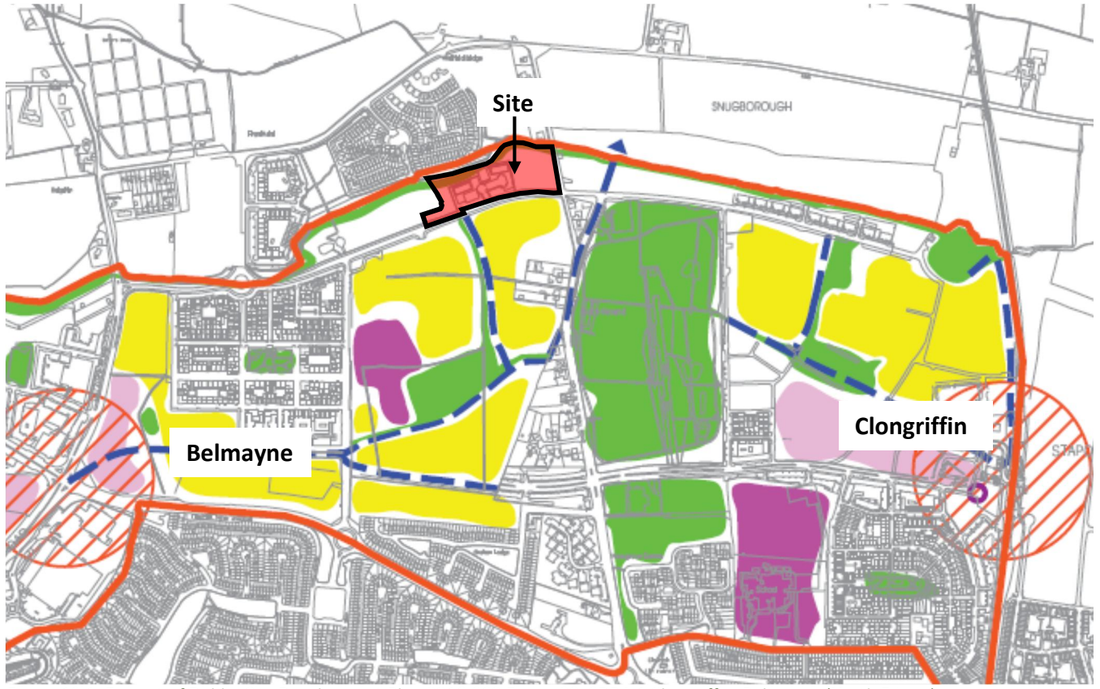

Figure 10.1: Excerpt of Dublin City Development Plan 2016-202 Figure 20: SDRA 1 Clongriffin–Belmayne (North Fringe)

Figure 10.2: Site location and surrounding townscape character

10.3.2.2 East of the Site

Balgriffin Park runs along the east boundary of the site, meeting Parkside Boulevard at the site's south east corner. To the east of the site across Balgriffin Park is a development currently under construction, comprising three six-storey apartment buildings forming a perimeter around a central open space. The buildings will create a strong urban edge to both Parkside Boulevard/Marrsfield Avenue and Balgriffin Park, marking this as an important junction in the townscape.

Planning permission was also recently granted for an apartment development of up to seven storeys on a small triangular site diagonally across Parkside Boulevard/Marrsfield Avenue from the site. These developments are part of the belt of plan-led high density development along Marrsfield Avenue defining the northern edge of Clongriffin.

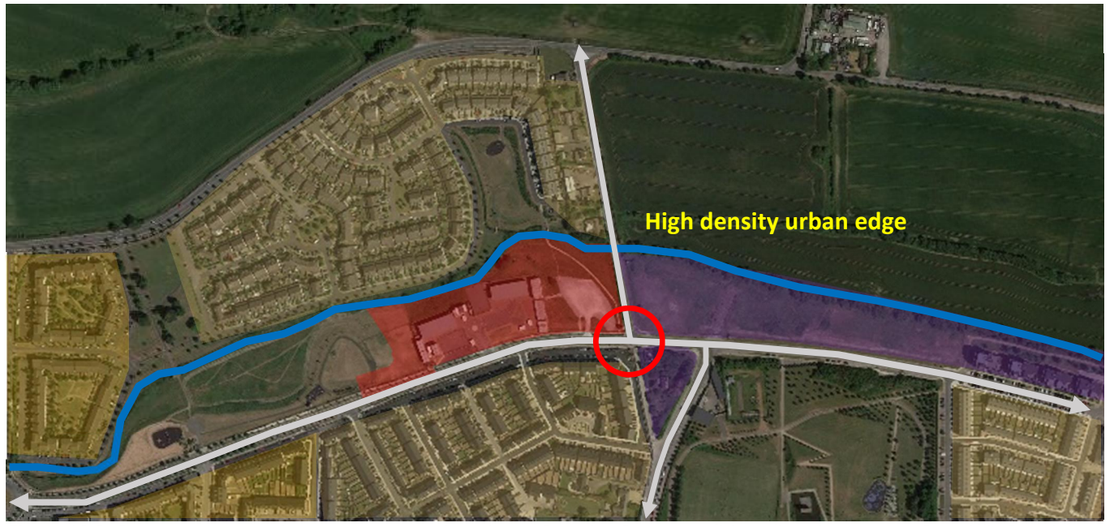

Figure 10.3: Development density around the key junction of Parkside Boulevard/Marrsfield Avenue and Balgriffin Park in the immediate environs of the site

10.3.2.3 West of the Site

Immediately to the west of the site is Belmayne Park. This is a neighbourhood park serving the Parkside estate to the south, the Castlemoyne estate to the north and St Sampson's to the west. The park is an open green area of roughly 2.5ha, with two playgrounds. The Mayne River runs along its northern edge.

Beyond Belmayne Park is the St Sampson's development comprising two perimeter blocks of two to four storey terraced houses, townhouses and apartments. Further to the west, towards the junction of Parkside Boulevard and Malahide Road, the density increases further. The Hermitage apartment development includes buildings of up to seven storeys alongside streets of two- and three storey houses.

10.3.2.4 North of the Site

North of the site and Belmayne Park is Castlemoyne, a low density estate of two storey houses. The houses around the southern edge of the estate orientate towards the site, overlooking the Mayne River. The estate has a central open space, which opens onto the Mayne River and affords views across the river towards the site.

10.3.2.5 Green Infrastructure

A key characteristic of the site is its position in relation to various elements of the local and district public open space/green infrastructure network:

Figure 10.4: Open space and green infrastructure in the immediate environs of the site

- The Mayne River runs along the site's northern boundary. The river corridor is identified in the Clongriffin – Belmayne Local Area Plan 2012 – 2018 as having potential for development as a green way.
- Belmayne Park lies immediately to the west of the site. This is a neighbourhood level amenity.
- The central open space of the Castlemoyne estate abuts the site to the north.
- The eastern portion of the site fronting Clongriffin Park is liable to flooding, therefore precluded from development. This area is currently in use as a parking area but has potential for development as open space.
- Father Collins Park, the district level public open space incorporating sports pitches and various amenity areas, is a short distance (1-2 minutes' walk) to the east of the site.
- The Fingal green belt lies immediately to the north east of the site across Clongriffin Park.

10.3.2.6 Summary of Townscape Character

In summary the townscape of the site's receiving environment is mixed in character. It includes elements that are distinctly urban in character such as Parkside Boulevard, the 'gateway' junction of Parkside Boulevard and Balgriffin Park, and high density developments to the east along Marrsfield Avenue and west near the Malahide Road junction. It also includes elements more suburban in character such as the existing Castlemoyne and Parkside estates to the north and south. There is an abundance of open space in the area, including the Mayne River corridor and local, neighbourhood and district level parks.

Figure 10.5: Clongriffin district centre

Figure 10.6: The view west from Belmayne Park showing the range of building typologies existing along Parkside Boulevard

Figure 10.7: The Hermitage development near the site includes a seven storey apartment building

Figure 10.8: The Parkside estate to the south of the site across Parkside Boulevard

Figure 10.9: The Castlemoyne estate north of the site beyond the Mayne River

Figure 10.10. Bird's eye view from the south east corner of the site showing (a) the three storey Parkside houses to the south (left), (b) the wide road corridor of Parkside Boulevard and the internal estate road, (c) the site in its disturbed/brownfield condition, (d) the Castlemoye estate to the north beyond the Mayne River, (e) mixed density (including high density) development further west along Parkside Boulevard.

Figure 10.11: Bird's eye view from the south west corner of the site. Note the high density (six storey) development under construction to the east of the site across Balgriffin Park

10.3.3 Relevant Policy

10.3.3.1 Dublin City Development Plan 2016-2022

The site falls into the area identified as Strategic Development and Regeneration Area (SDRA) 1: North Fringe (Clongriffin-Belmayne) in the Dublin City Development Plan 2016-2022 (DCDP). See Figure 10.1 above. The DCDP notes that a statutory Local Area Plan has been adopted for the area, setting out a detailed framework for the development of the remaining lands in the SDRA area. The DCDP notes that the LAP is based on the following key objectives/guiding principles:

"1. To create a highly sustainable, mixed use urban district, based around high quality public transport nodes, with a strong sense of place.
2. To achieve a sufficient density of development to sustain efficient public transport networks and a viable mix of uses and community facilities.
3. To establish a coherent urban structure, based on urban design principles, as a focus for a new community and its integration with the established community…"

The following are cited among the elements required to establish a coherent urban structure in the area:

- *"A series of smaller urban squares as significant place markers and activity nodes, e.g. a recreation square adjacent to Father Collins Park*
- *An interconnected network of streets and public spaces*
- *To promote the creation of a high-quality public domain by establishing a high standard of design in architecture and landscape architecture*
- *To use building heights to define key landmark locations…*
- *To develop the amenity potential of the Mayne River in the creation of a linear park…"*

10.3.3.2 Clongriffin – Belmayne Local Area Plan 2012-2018

The policy is addressed in detail elsewhere in the planning application. However certain of the LAP policies are specifically relevant to this assessment as they provide an indication of Dublin city Council's objectives for the site/area in terms of urban structure and amenities.

Urban Form
"The Local Area Plan seeks to create a new urban environment that will enhance and reflect the character of the place, create a distinctive identity and provide a mix of buildings that have an adaptable design to suit changing needs."

Density & Urban Structure
UDO1: *"To achieve high quality and sustainable densities to consolidate the area, maximise access for residents and employees to public transport and successfully define important locations and routes including the Main Street access and town centres…"*

Building Height
"The linear route following the River Mayne to the north… is another location where height has been used to distinguish an important route through the developing area. Future residential buildings, respecting appropriate setbacks from the River Mayne…, will help successful [integration] *with the character already established by these buildings (Marrsfield for example) and provide definition and opportunities for passive supervision along the designated linear park corridor".*
UDO7: *"The height strategy for the LAP will seek positive integration of new building height with established character. Locations identified for special height character are the designated Key District Centres (in general 5 storeys minimum) and the Main Street Boulevard axis (in general four to five storeys). Heights of 2-6 storeys (including a set back at the top floor of a 5/6 storey building) may be facilitated subject to quality design criteria and set back requirements along the river corridor to complete the urban form of pavilion buildings to complete Marrsfield…"*

It should be noted that the LAP and DCDP policy on building height has been superseded by more recently published national policy, including the National Planning Framework (NPF) and Building Height Guidelines. See 10.3.3.3 and 10.3.3.4 below.

Architecture
"Achieving a high quality design and layout will be paramount in the acceptability of planning applications for high density. All proposals for higher densities must demonstrate how the proposal contributes to place making and the identity of the area".

"To promote the creation of a high quality public domain by establishing a high standard of design in architecture and landscape architecture".

Public Realm and Landscape
UDO5: *"To design park spaces and all open spaces linkages to be part of the larger green network in particular from Father Collins Park to the surrounding area and along the River Mayne incorporating a dedicated network of cycle paths and pedestrian routes".*

EOSO1: *"To achieve best practice and innovations in SuDS design as part of development schemes including the successful co-ordination of surface water management with ecology and amenity functions of open space and landscaped areas."*

MTP3: *"To promote increased cycling and pedestrian activity by the development of cycle and pedestrian network of routes that connect with local parks, community facilities, employment areas, retail areas and public transport facilities".*

UDO3: *"To promote public spaces that provide both passive and active recreation and a connection to those forms of activities in the surrounding area".*

"The Mayne River … corridor presents an opportunity to add to the quality of Clongriffin-Belmayne area. This water side can be an attractive feature in the urban setting of the LAP area that will provide a place of relaxation and space to enjoy natural heritage. It can be used to provide new pedestrian or cycle walks, places to sit by, to enjoy, for play, relaxation and so on. To preserve the natural character of the river and at the same time enjoy the amenity, it would be appropriate that riparian buffer zone be provided".

Movement and Transport Strategy
The LAP identifies key infrastructure requirements to deliver the movement and transport strategy objectives for the area, including: *"v) Green Route and River Mayne Linear Park".*

10.3.3.3 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."

"To enable brownfield development, planning policies and standards need to be flexible, focusing on design led and performance-based outcomes… planning standards should be flexibly applied in response to well-designed development proposals that can achieve urban infill and brownfield development objectives in settlements of all sizes… This is in recognition of the fact that many current urban planning standards were devised for application to greenfield sites and cannot account for the evolved layers of complexity in existing built-up areas… A more dynamic performance-based approach appropriate to urban location type will also enable the level of public transport service to improve as more development occurs and vice-versa…"

10.3.3.4 Urban Development and Building Height Guidelines for Planning Authorities

Section 1.2: *"A key objective of the NPF is therefore to see that… 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…"*

Regarding the assessment of planning applications, the Guidelines state: *"it is Government policy that building heights must be generally increased in appropriate urban locations. There is therefore a presumption in favour of buildings of increased height in our town/city cores and in other urban locations with good public transport accessibility…*

"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 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 while being in line with the requirements of "The Planning System and Flood Risk Management – Guidelines for Planning Authorities" (2009).*
- *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.*

10.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development is described in detail in Chapter 3 and in the architectural and landscape design statements accompanying the planning application. The key elements/aspects of the proposal with regard to potential townscape and visual impacts are:

- Overall Layout
- Arrangement, height and materials of buildings
- Landscape treatment

Figure 10.12: Proposed Landscape Masterplan

10.4.1 Overall Layout

The buildings are located towards the southern and western boundaries of the site. This is in response to several key sensitivities and opportunities in the receiving environment:

- **Topography and drainage (the Mayne River and floodplain)**: The buildings are outside of the Mayne River valley which runs along the northern boundary, to facilitate the development of a greenway along the river. The buildings are also outside of the area liable to flooding in the eastern part of the site. This area is also proposed to be used as public open space.
- **Sensitive receptors (Castlemoyne and Parkside estates)**: The layout maximises the separation distance between the proposed buildings and the houses of Castlemoyne to the north. The buildings are separated by the proposed river greenway and an existing road around the perimeter of the Castlemoyne estate. To the south, the buildings are separated from the houses of Parkside by the dual road corridor of Parkside Boulevard (see Figures 10.10 and 10.11 above).

10.4.1.1 Arrangement, Height and Materials of Buildings

The buildings (Blocks, A, B, C and D) are arranged in a row fronting Parkside Boulevard, their linear footprints perpendicular to the street, with corridors of open space (courtyards) separating the buildings.

The arrangement of the buildings is intended to create a strong built frontage to the street, appropriate to its urban character and to the site's location beside a key junction in the North Fringe urban structure. The arrangement of the buildings also avoids a long/uninterrupted built edge to the northern and southern boundaries, so that the site is visually permeable from Castlemoyne and Parkside.

The buildings are six storeys tall except for an accent element of seven storeys in the south east corner (Block D) addressing the junction of Parkside Boulevard and Balgriffin Park. Set backs, protruding elements (stair cores and balconies) and variations in cladding material are used to articulate the facades and reduce the apparent massing. The materials are buff brick, render and metal cladding at the upper level.

10.4.1.2 Landscape Treatment

- **Eastern open space**: An urban plaza treatment is proposed in the south east corner of the site adjacent to the junction. This leads into the main public open space on the site to the east of (and overlooked by) Block D. The open space includes a large lawn kickabout area, a natural play area and a basketball court. Linear clumps of native trees are proposed along the boundary with Balgriffin Park and in front of Block D, for spatial definition and visual screening. A footpath leads from the corner entrance across this area to the river greenway.
- **River greenway**: The footpath arcs around the eastern open space and into the river greenway area inside the northern boundary of the site. This is a wide corridor of open space (approximately 18m at its narrowest and 39m at its widest) through which the footpath follows a meandering route parallel with the Mayne River. Patches of riparian planting and clumps of trees are proposed in the corridor, as well as formal and informal seating areas. In addition to the point of entry from the south east corner of the site, connections are proposed between the riverside path and (a) another site entrance on Balgriffin Park to the east, (b) the Castlemoyne local park to the north via a footbridge over the river, (c) the existing network of paths in Belmayne Park to the west, and (d) the central courtyard space between proposed Blocks B and C.
- **Courtyard spaces**: Semi-private courtyard spaces are proposed between the four buildings. These are laid out as formal gardens divided into hard and soft surfaced areas, with strips of ground cover, shrub and small flowering trees around the edges to provide privacy for the ground floor balconies, and visual amenity.
- **Western edge**: To the west of Block A, a similar strip of privacy/amenity planting is proposed and outside of this a wide belt of native trees as an additional visual buffer to Belmayne Park.
- **Edge to Parkside Boulevard**: The buildings are intentionally close to Parkside Boulevard to reinforce the urban character of the street. The narrow strip between the street edge and the buildings is proposed to be planted with strips of ornamental perennials and small flowering trees inside a clipped evergreen hedge.

10.5 POTENTIAL IMPACTS - TOWNSCAPE

10.5.1 Construction Phase

The proposed development is anticipated to be constructed over a 2-3 year period. The construction process would entail the following:

- Set up site perimeter hoarding;
- Site clearance;
- Excavation;
- Site services installations (drainage, power, water etc.);
- Construction of new buildings frames and envelopes;
- Interior fit-out of buildings;
- Exterior streetscape, landscaping and site boundary works.

During construction the site and immediate environs would be heavily disturbed by the above activities and the incremental growth of the buildings on site. The magnitude of change to the townscape would be medium (this takes into account the recent disturbance of the site by the removal of the school buildings). Overall, the sensitivity of the townscape can be considered medium (refer to 10.5.2). Therefore, the effects on the townscape would be 'moderate' and negative, although temporary.

10.5.2 Operational Phase

10.5.2.1 Townscape Character and Sensitivity to Change

- The site is a disused, brownfield parcel of land located in the Clongriffin-Belmayne SDRA, fully enclosed by the evolving urban area, with 250m frontage to a main street beside a 'gateway' junction, and within walking distance of the two district centres and a range of public transport options and open space amenities.
- There is a wide range of development types in the site's immediate environs, including low density residential estates (two and three storey houses), mixed density estates of houses, townhouses and apartment elements (up to four storeys), and apartment developments of up to seven storeys. There is thus no norm in building typology, scale, architecture or materials in the area, and there are no buildings of architectural or cultural-historic importance.
- There is a planned building height strategy which has been used to establish a clear edge between the urban area and the green belt to the north. This is manifest in the strip of high density development to the east of the site along Marrsfield Avenue and to the west along Parkside Boulevard. There is also an established pattern of increasing height at the corners of blocks to accentuate the junctions.
- There is generous provision of public open space/green infrastructure in the area including the Mayne River corridor, local, neighbourhood and district level parks, and the Fingal green belt. The site is located at the intersection of several of these elements.

The *Guidelines for Landscape and Visual Impact Assessment* notes that landscape/townscape sensitivity should be classified with consideration of 'the particular project or development that is being proposed and the location in question'. Sensitivity of the townscape is determined by two factors:

1. **Susceptibility to change**: *"This means the ability of the landscape receptor (whether it be the overall character or quality/condition of a particular landscape type or area, or an individual element and/or feature…) to accommodate the proposed development without undue*

consequences for the maintenance of the baseline situation and/or the achievement of landscape policies or strategies".

2. **Value of the landscape/townscape receptor**: This can be indicated by designations or, where there are no designations, by judgements based on criteria that can be used to establish landscape value.

In summary, the townscape character is mixed (incorporating developments of similar nature to that proposed, in similar positions in the townscape) and in a process of plan-led change. It is also prominently located in the townscape along a main street, at a junction, near the urban edge. Furthermore, the site is a brownfield parcel of land. Therefore, the receiving environment is not inherently sensitive to the proposed change. However, it does contain a valued and sensitive element in the Mayne River (and floodplain) and has neighbouring estates of lower density.

Overall, the sensitivity to townscape change can be classified 'medium' (definition: *Areas where the landscape has certain valued elements, features or characteristics but where the character is mixed or not particularly strong, or has evidence of alteration, degradation or erosion of elements and characteristics. The landscape character is such that there is some capacity for change. These areas may be recognised in landscape policy at local or county level and the principle management objective may be to consolidate landscape character or facilitate appropriate, necessary change*).

10.5.2.2 Magnitude of Townscape Change

The main elements, features and characteristics of the townscape include (a) the topography and drainage, (b) the urban grain (pattern of streets and blocks), (c) the land use pattern and related building typologies and architecture, (d) landscape/green infrastructure, and (e) perceptual and aesthetic factors. These are all potential receptors of change. The potential change to each receptor is discussed below.

Townscape Receptor	Sensitivity	Magnitude of Change	Description of Change & Significance
Topography	High	Low	The main development area on the site is already disturbed and the changes in this area (including excavation) would not be significant. The key and most sensitive topographic features of the site – the Mayne River and the flood zone in the eastern part of the site - would be retained and their condition improved and protected by the development. Significance: Moderate, positive.
Urban grain	Low	Low	There would be no change to the surrounding urban grain except the reinforcement (perceptual) of the status of Parkside Boulevard and its junction with Balgriffin Park. The arrangement of buildings and spaces on the site (i.e. the internal grain) responds appreciably to the strong grid theme of the Clongriffin-Belmayne area to the south east and south west (as opposed to the more organic grain of Castlemoyne to the north). The location of the site entrances and the provision (and alignment) of public paths across the site open space responds to all likely approaches and desire lines and improves the pedestrian permeability and navigability of the wider townscape. Significance: Low, positive.
Land use pattern, plot/building typologies and architecture	Medium	Medium	A disused site in a strategic development area within walking distance of two urban district centres, public transport services and ample public open space would be developed at a sustainable density. The high density cluster of up to seven storeys would be introduced to the Parkside Boulevard/Marrsfield Avenue corridor adjacent to a key junction (a gateway to the Northern Fringe), complementing the developments currently under construction or permitted around the junction. Parkside Boulevard/Marrsfield Avenue is a high order urban street with an established pattern of higher density/taller buildings (up to seven storeys), including accent elements at junctions. The existing mix of building type and scale in the area is such that the development could not be considered out of character. However, there would be a pronounced difference in type and height between the site and the houses of Castlemoyne and Parkside (two and three storeys respectively). In this regard the separation distance between the development and the neighbouring estates is important, with 45m between the blocks and the nearest house in Castlemoyne, and 35m between the blocks and the nearest houses in Parkside. There is also existing and proposed tree planting in the areas between the houses and the blocks.

			The wide separation distances and the trees would ensure that any perception of dominance is avoided. It is also a factor that increased density/height in well serviced urban areas is encouraged by national planning policy and guidelines. There is particular recognition of the potential to achieve this along urban thoroughfares and beside open spaces. Significance: Moderate, positive.
Landscape/ Green infra-structure	High	High	The condition of the Mayne River as both an ecological asset and an amenity would be significantly improved (contributing to the realisation of the LAP objective of developing a greenway along the river). The path along the river corridor would connect to Belmayne Park to the west, the Castlemoyne open space to the north, and to the footpaths along Balgriffin Park and Parkside Boulevard to the east and south. The flood zone area, currently used as a car park, would also be significantly enhanced, the car park replaced by amenity lawn and meadow areas, and substantial areas of native tree planting – with an urban plaza-type edge where the area transitions to the street. The courtyards and edges around the buildings would be appropriately planted with more ornamental vegetation and with a privacy screening objective. The roofs of the building are proposed to be sedum covered, providing habitat and water management benefits. Overall, the volume of vegetation/habitat on the site would be increased, the condition of the landscape would be improved and the key principles of green infrastructure (connectivity and multifunctionality) are clearly manifest in the proposals. Significance: Very significant, positive.
Perceptual & aesthetic factors	Low	Medium	The aesthetic of the area would be enhanced by the introduction of a development of evident design and material quality. Legibility would be improved by the creation of a new, recognisable built element at a key junction. Navigability would be improved by improvements, extensions and connections in the pedestrian route network. Significance: Moderate, positive.

Table 10.6 Magnitude of Change to Key Townscape Receptors

Overall, the magnitude of change can be classified 'medium' (definition: *Change that is moderate in extent, resulting in partial loss or alteration to key elements, features or characteristics of the landscape, and/or introduction of elements that may be prominent but not necessarily substantially uncharacteristic in the context. Such development results in change to the character of the landscape*).

10.5.2.3 Significance and Quality of Townscape Effects

Measuring the magnitude of change against the townscape sensitivity, the significance of the townscape effects is predicted to be 'moderate' (definition: *An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends*).

Considering the effects on the key townscape receptors (summarised in Table 10.6 above), the effects can be classified 'positive'.

10.6 POTENTIAL IMPACTS – VISUAL AMENITY

10.6.1 Construction Phase

During construction the site and immediate environs would be heavily disturbed by construction activities and haulage, and the incremental growth of the buildings on site. The most significantly affected views would be those from the houses of Parkside and Castlemoyne facing the site, and from the public open spaces to the north and west. The sensitivity of these visual receptors is medium (while the viewers are susceptible to change, currently the site is in brownfield condition, therefore the expectation of visual amenity is reduced). The magnitude of change to these views would range from medium to high, depending on proximity to the site/proposed buildings. The significance of the effects would range from moderate to significant and the effects would be negative, although temporary.

The significance of the effects on views from the streets approaching and passing by the site would be moderate to slight (the visual receptors are of lower sensitivity and the magnitude of visual change would be lower, also reducing with distance).

It should be recognised that in a new urban district of the scale of Clongriffin-Belmayne, development will happen incrementally. It is unavoidable that visual receptors in the completed areas (e.g. Castlemoyne and the existing Parkside estate) and will experience negative visual impacts while the urban area is completed.

10.6.2 Operational Phase

12 no. viewpoints in the receiving environment were selected for detailed assessment of the potential visual effects, informed by verified photomontages. The viewpoints were selected to address the key elements and sensitivities in the receiving environment, as well as to provide photomontages of the proposal from all angles and a range of distances:

- **Parkside Boulevard/Marrsfield Avenue road corridor east of the site**: Viewpoint 1 is at the junction of Parkside Boulevard and Balgriffin Park near the south east corner of the site. Viewpoint 2 is to the east along Marrsfield Avenue at the entrance to Fr Collins Park, representing a middle distant view approaching from the east;
- **Existing Parkside estate south of the site**: Viewpoint 3 is in front of the row of houses facing the site across the two parallel roads. Viewpoint 4 is a position back from Parkside Boulevard within the estate.
- **Parkside Boulevard road corridor to the west of the site**: Viewpoint 5 is at the junction of Belmayne Avenue representing the middle distant view of the site approaching from the west.
- **St Sampson's Square**: Viewpoint 6 represents the views from the St Sampson's estate and Belmayne Park to the west of the site.
- **Castlemoyne estate north of the site**: Viewpoints 7 and 8 are taken from in front of the houses facing the site across the Mayne River. Viewpoint 9 is a position to the north of the estate's central open space. Viewpoint 10 is taken from east of this space, looking along the Mayne River corridor.
- **Moyne Road north of site**: Viewpoint 11 is at the junction of the Moyne Road and Balgriffin Park, where the Fingal Green Belt meets the North Fringe urban area. Viewpoint 12 is from a position to the east along the road, representing views of the North Fringe from the green belt.

The viewpoint assessments below should be read in conjunction with the verified photomontages provided in Appendix 10.1, Volume 2 of the EIAR.

The photographs for the photomontages were taken in the winter. It should be noted that with the trees out of leaf all development is more exposed to view, so these views represent a 'worst case scenario'.

10.6.2.1 Viewpoint 1 – Junction of Parkside Boulevard and Balgriffin Park

Baseline View: To the left of the wide street is a three storey terrace of houses (Parkside) set back behind an internal estate road. The site is to the right of the street, with the parking area in the foreground and the prefabricated buildings of the two schools (now removed) arranged along the length of the site parallel with the road. The Castlemoyne estate is visible in the distance to the right beyond the Mayne River (the river is hidden from view). The temporary nature of the site condition is evident in the view; there is a degree of disconnection in the landscape and visual amenity is limited. The strategic position of the site in the urban structure, the road network and open space network is also not evident. Viewpoint sensitivity: Medium.

Proposed View: The temporary schools buildings are replaced by a row of buildings of distinctly urban character (in terms of scale, design and position in relation to the street and open space). Although large compared to the other buildings in view the impression of scale/massing is reduced by the division of the buildings into distinct volumes of different materials, and a high level of articulation in the facades. Although subtle, the accent corner of Block D addressing the junction is noticeable. The wide separation distance between Block D and houses across Parkside Boulevard is evident. In the foreground the plaza entrance and beyond that a green open space replace the existing fenced in parking area. Magnitude of change: High.

Significance and Quality of Visual Effects: Significant and positive. The composition, character and quality of the view would be positively transformed by the development. It responds appreciably to the strategic position of the site in the urban structure and would introduce a range of new elements/features of quality (buildings and open space) to the townscape, without loss or compromise of any valued element, feature or characteristic of the view.

10.6.2.2 Viewpoint 2 – Marrsfield Avenue East of Site at Fr Collins Park Entrance

Baseline View: To the left of the wide street is Father Collins Park, the strong line of boundary vegetation complementing the new buildings (under construction) across the street and generating a distinctly urban streetscape character. The school buildings (now removed) beyond the junction with Balgriffin Park and Parkside Boulevard indicate the site location in the view. The junction lacks definition in the townscape as the urban character is diluted by the site in its current condition. Viewpoint sensitivity: Medium.

Proposed View: Blocks D and C are visible in the middle distance, continuing the strong line of high density residential buildings on the north side of the street. The variation in materials and articulation of the façades are notable. The height accent (step up from six to seven storeys) at the south east corner of Block D subtly emphasises the road junction, which is also indicated by the wide gap between Block D and the row of buildings in the foreground. Magnitude of change: Medium.

Significance and Quality of Visual Effects: Moderate and positive. The composition, character and quality of the view would be improved by the development. The urban character of the street (at the edge of the Northern Fringe area) would be reinforced and a gap in the urban structure filled with a development that responds appropriately to its strategic location. There would be no loss or compromise of any valued element, feature or characteristic of the view.

10.6.2.3 Viewpoint 3 – House at Northern Edge of Parkside Estate

Baseline View: In front of the terrace of three storey houses is the internal estate road with parallel parking on both sides and a large number of young trees in planting beds (in the summer these will form a dense screen of foliage). Parkside Boulevard runs parallel to the estate road, also with numerous street trees in its verges. The prefabricated school buildings, yards and parking area are spread across the field of view beyond the street – clearly a temporary development (now removed) and somewhat unsightly. A small part of the Castlemoyne estate can be seen in the distance between the school buildings, and to the right a six storey apartment building (currently under construction) is prominent at the junction with Balgriffin Park. Viewpoint sensitivity: Medium.

Proposed View: The school campus is replaced in the view by the row of six-storey buildings fronting the street, distinctly urban in character (in terms of scale, design, building line), separated by corridors of

open space/courtyards. Although large (relative to the three storey houses), the impression of scale/massing is successfully reduced by the division of the buildings into volumes of different materials, and the articulation in the facades. At such close proximity the design and finish quality of the development would be appreciable. The buildings' height is in keeping with the existing apartment block further along the street at the junction. The width of the road corridor is such that the buildings can be accommodated without causing excessive enclosure. In time the numerous street trees will mature to provide substantial foreground screening. Magnitude of change: High.

Significance and Quality of Visual Effects: Significant and positive. The composition, character and quality of the view would be positively transformed by the development. It responds appreciably to the strategic position of the site in the urban structure, reinforcing the status of Parkside Boulevard on the approach to the gateway junction with Balgriffin Park. There would be no loss or compromise of any valued element, feature or characteristic of the view.

10.6.2.4 Viewpoint 4 – Junction of Parkside Way and Parkside Crescent

Baseline View: The view is taken from a position one block back from the edge of the existing Parkside estate, at the junction of Parkside Way and Parkside Crescent. The view along the street is framed by three storey houses. In the middle distance beyond Parkside Boulevard one of the school buildings can be seen (now removed) and to the side of this the distant houses of Castlemoyne. Viewpoint sensitivity: Medium.

Proposed View: Block C protrudes above the roofline of the houses at the end of the street and its east façade is revealed at an acute angle, while Block D (to the right across a courtyard space) is largely hidden from view by the houses in the foreground. Parkside Way is aligned with the courtyard; therefore, the vista is opened up between Blocks C and D, across the site and the Mayne River to the Castlemoyne estate in the distance. Magnitude of change: Medium.

Significance and Quality of Visual Effects: Moderate and positive. The change to the composition of the view would not be substantial but the development would change the character of the view, suggesting a more urban location, in keeping with the plan-led evolution of the urban structure. There would be no loss or compromise of any valued element, feature or characteristic of the view.

10.6.2.5 Viewpoint 5 – Parkside Boulevard West of Site

Baseline View: The road is flanked by rows of trees in green verges outside of which are cycle and pedestrian paths, forming a wide street of urban character. To the right of the street are the terraced three storey houses of Parkside set back behind an internal access road. To the left across the street is Belmayne Park, a large amenity grassland area. A belt of vegetation on the far side of the park indicates the alignment of the Mayne River. Beyond the park is the Castlemoyne estate. The school buildings can be seen in the middle distance alongside the street and beyond that the new six storey block at the junction of Marrsfield Avenue and Balgriffin Park is visible. Viewpoint sensitivity: Medium.

Proposed View: Replacing the school buildings in the view, the development forms a strong urban edge to the street on the approach to the junction, combining with the other buildings permitted and under construction around the junction to identify it in the urban structure. The nearest building, Block A, addresses Belmayne Park equally strongly, its alignment and proportions clearly responding to those of the large park, emphasising the open space in the urban structure. While the buildings are large compared to the low density houses that currently populate the townscape, this view shows the ample separation distance between the proposed buildings and the Parkside and Castlemoyne houses. Magnitude of change: Medium.

Significance and Quality of Visual Effects: Moderate and positive. The composition and character of the view would be substantially altered, appropriately for the context, shifting the character towards the urban. The development responds appreciably to the key elements in the urban structure, i.e. the main street, the junction and the open space. It would also add elements of high design and finish quality to the view. There would be no loss or compromise of any valued element, feature or characteristic of the view.

10.6.2.6 Viewpoint 6 – St Sampson's Square

Baseline View: The view is taken from a position in front of St Sampson's Square, a medium density development to the west of Belmayne Park. The wide open space of the park is the defining element of the view and in the foreground inside the park's northern boundary the Mayne River flows in a narrow, inconspicuous channel. (Further along the channel there is more vegetation on the banks.) The low density estates of Parkside to the right and Castlemoyne to the left frame the view along the park and the school buildings occupy a prominent position 'bookending' the open space. The six and seven storey buildings permitted and under construction around the junction beyond the site protrude above the school roofline, marking the junction in the townscape. Viewpoint sensitivity: Medium.

Proposed View: Replacing the school buildings in the view, the development forms a strong built edge to the park, its alignment and proportions clearly responding to those of the large open space, emphasising the park as a significant place in the urban structure. While the buildings are large compared to the houses, this view shows the ample separation distance between the proposed buildings and the Parkside and Castlemoyne estates. The building typologies are different but aspects of the design such as the use of complementary materials (to those of the houses) and the strongly articulated facades are appreciable. Magnitude of change: Medium.

Significance and Quality of Visual Effects: Moderate and positive. The composition and character of the view would be altered, appropriately for the context, shifting the character towards the urban. The development responds appreciably to the key element in the urban structure, emphasising Belmayne Park in the townscape. It would also add buildings of high design and finish quality to the view. There would be no loss or compromise of any valued element, feature or characteristic of the view.

10.6.2.7 Viewpoint 7 – Castlemoyne North West of Site

Baseline View: The view is taken from the road along the southern perimeter of the estate. The houses to the west along this road overlook Belmayne Park. The view is similar to that from St Sampson's Square, with the two estates framing the park and the school buildings prominent at the park's eastern end, the prefabricated buildings unsightly. The six and seven storey buildings permitted and under construction

around the junction beyond the site protrude above the school roofline, marking the junction in the townscape. Viewpoint sensitivity: Medium.

Proposed View: Replacing the school buildings in the view, the development forms a strong built edge to the park, its alignment and proportions clearly responding to those of the large open space, emphasising the park as a significant place in the urban structure. While the buildings are large compared to the houses, there is ample separation distance between the proposed buildings and the neighbouring estates. Aspects of the design such as the use of complementary materials (to those of the houses) and the strongly articulated facades are appreciable. At closer proximity the proposed landscaping, particularly the linear belts of multi-layered planting along the river and the west front of Block A, would be clearly visible, partly screening/filtering the buildings and further reducing their apparent massing. Magnitude of change: Medium.

Significance and Quality of Visual Effects: Moderate and positive. The composition and character of the view would be altered, appropriately for the context, shifting the character towards the urban. The development responds appreciably to the key element in the urban structure, emphasising Belmayne Park in the townscape. It would also add buildings of high design and finish quality to the view. There would be no loss or compromise of any valued element, feature or characteristic of the view.

10.6.2.8 Viewpoint 8 – Castlemoyne North of Site

Baseline View: The view is taken from the road in front of the row of houses north of the site. From their front windows and gardens the houses have a direct view of the site, which lies beyond the estate road and the adjacent river (hidden in the belt of scrubby vegetation on the banks) in the foreground. The school buildings are spread across the field of view to the left, while to the right the houses of Parkside can be seen beyond Belmayne Park. Viewpoint sensitivity: Medium.

Proposed View: The school campus is replaced in the view by the row of six-storey buildings separated by corridors of open space/courtyards. The buildings are distinctly urban in character (in terms of scale, design and arrangement on the site). Although large (relative to the Castlemoyne houses), the impression of scale is reduced open space corridors between the buildings, by the deconstructed massing, the division of the buildings into volumes of different materials, and the articulation in the facades. Additionally, the river corridor between the viewpoint and the buildings will be densely vegetated with wildflower and native tree belts outside the channel, and wetland species and trees on the banks of the river. In time this vegetation will mature to provide substantial foreground screening of the buildings. Magnitude of change: High.

Significance and Quality of Visual Effects: Significant and positive. The composition, character and quality of the view would be positively transformed by the development. There would be a shift in character towards the urban, appropriate to the location. Buildings of high design and finish quality would be added to the view. While large, the separation distance is such that the buildings can be accommodated without causing excessive enclosure. The most significant change will be the substantial increase in the volume of vegetation in the river corridor, improving visual amenity, with no loss or compromise of any valued element, feature or characteristic of the view.

10.6.2.9 Viewpoint 9 – Castlemoyne Open Space

Baseline View: The view is taken from the north side of the estate open space which connects to the river corridor along the north side of the site. The view across the open space is framed by the Castlemoyne houses. The school buildings (now removed) are visible beyond a belt of vegetation which marks the river course in the view. Beyond the school the three storey Parkside houses indicate the alignment of Parkside Boulevard. To the left of the view a recently permitted seven storey building is visible, marking the road's junction with Marrsfield Avenue and Balgriffin Park. Viewpoint sensitivity: Medium.

Proposed View: Replacing the school buildings in the view, the new apartment buildings are arranged in a row (parallel to the river and Parkside Boulevard, i.e. in aligned with the main elements of the urban grain), separated by corridors of open space. In addition, a wide space is retained in front (to the left of) Block D and this contributes to a general impression of generous open space provision. While the buildings are large compared to the houses, there is ample separation distance between them and the houses. A large volume of new planting is visible along the river corridor in front of the buildings, partly screening/filtering the buildings and further reducing the apparent massing. Aspects of the design such as the use of complementary materials (to those of the houses) and the strongly articulated facades are appreciable. Magnitude of change: Medium.

Significance and Quality of Visual Effects: Moderate and positive. The composition and character of the view would be altered, appropriately for the context/location, shifting the character towards the urban. The development responds to the key elements in the urban structure, emphasising the open spaces and the alignment of the river and Parkside Boulevard. It would also add buildings and landscaping of high design and finish quality to the view. There would be no loss or compromise of any valued element, feature or characteristic of the view.

10.6.2.10 Viewpoint 10 – Castlemoyne North East of Site

Baseline View: The view is taken from the side of the nearest house to the north east of the developable part of the site. The view west is along the river corridor, characterised by rough grassland and scrubby vegetation with some trees. The schools campus is prominent to the left of the river corridor, the prefabricated buildings unsightly. To the right the houses of Castlemoyne surround the estate open space. In the distance a cluster of taller urban buildings can be seen. These are the urban district centre of Northern Cross/Belmayne. There is a distinct lack of cohesion in the townscape and limited visual amenity despite the green infrastructure assets in view. Viewpoint sensitivity: Medium.

Proposed View: Replacing the school buildings in the view, the new apartment buildings are arranged in a row parallel to the river, the blocks divided by open space corridors/courtyards. The buildings are large compared to the Castlemoyne houses but there is ample separation distance between them and additionally a large volume of vegetation in the river corridor, providing screening. The apparent massing of the buildings is reduced by the high degree of articulation in the facades and variations in materials, as well as the screening effect of the new vegetation. The vegetation also gives added definition to the river corridor in the view. Magnitude of change: Medium.

Significance and Quality of Visual Effects: Moderate and positive. The composition and character of the view would be altered, appropriately for the context/location, shifting the character towards the urban. The development responds appreciably to the key elements in the urban structure, emphasising the open spaces and the alignment of the river and Parkside Boulevard. It would also add buildings and landscaping of high design and finish quality to the view. There would be no loss or compromise of any valued element, feature or characteristic of the view.

10.6.2.11 Viewpoint 11 – Junction of Balgriffin Park and Moyne Road

Baseline View: The Moyne Road runs east-west through the green belt to the north of the North Fringe Area. At the junction with Balgriffin Park it meets the urban area. In the view south from the junction there is a row of houses in mature gardens (typical of a suburban or peri-urban area) to the right of the road, and a field to the left. In the middle distance beyond the field the six storey apartment development (currently under construction) across Balgriffin Park from the site is prominent, with further high density development extending to the left (east, along Marrsfield Avenue). There is a distinct imbalance in the view, with a peri-urban landscape to the west (right) of Balgriffin Park, and the urban edge of the North Fringe to the east (left). Viewpoint sensitivity: Medium.

Proposed View: The development would protrude above the roofline of the houses to the right of Balgriffin Park, facing the new/existing apartment buildings across the road, forming a wide gateway to the urban edge. Magnitude of change: Low.

Significance and Quality of Visual Effects: Moderate and positive. Although the development would have relatively limited prominence, its contribution to the composition of the view would be significant, completing a visible gateway in the urban structure, thereby enhancing legibility. It would also improve the balance of built form in the view, strengthening the evolving townscape character. There would be no loss or compromise of any valued element, feature or characteristic of the view.

10.6.2.12 Viewpoint 12 –Moyne Road North East of Site

Baseline View: From a position further east along the Moyne Road, in the green belt, the edge of the North Fringe area is very clearly defined by the row of apartment buildings in the strip between the Mayne River and Marrsfield Avenue. This is one of few locations in Dublin where (as a result of plan-led development) the urban edge is so clearly defined. The high density strip ends abruptly (at the junction of Marrsfield Avenue, Parkside Boulevard and Balgriffin Park – although the junction is not legible in the view) and east of this the development pattern is suburban. There is an imbalance in the built form and a lack of cohesion in character. Viewpoint sensitivity: Medium.

Proposed View: The development would stand prominently opposite the new/existing apartment buildings across Balgriffin Park, forming a gateway in the urban structure, with the massing/height appearing to step down towards the lower density development to the west. Magnitude of change: Medium.

Significance and Quality of Visual Effects: Moderate and positive. The composition of the view would be significantly changed, creating a legible gateway in the urban structure, improving the balance of built form in the view and consolidating the urban character. There would be no loss or compromise of any valued element, feature or characteristic of the view.

No.	Location	Sensitivity	Magnitude of Change	Significance & Quality of Visual Effects
1	Junction of Parkside Boulevard and Balgriffin Park	Medium	High	Significant, Positive
2	Marrsfield Avenue East of Site at Fr Collins Park Entrance	Medium	Medium	Moderate, Positive
3	House at Northern Edge of Parkside Estate	Medium	High	Significant, Positive
4	Junction of Parkside Way and Parkside Crescent	Medium	Medium	Moderate, Positive
5	Parkside Boulevard West of Site	Medium	Medium	Moderate, Positive
6	St Sampson's Square	Medium	Medium	Moderate, Positive
7	Castlemoyne North West of Site	Medium	Medium	Moderate, Positive
8	Castlemoyne North of Site	Medium	High	Significant, Positive
9	Castlemoyne Open Space	Medium	Medium	Moderate, Positive
10	Castlemoyne North East of Site	Medium	Medium	Moderate, Positive
11	Junction of Balgriffin Park and Moyne Road	Medium	Low	Moderate, Positive
12	Moyne Road north east of site	Medium	Medium	Moderate, Positive

Table 10.7: Summary of Visual Impact Assessment

10.7 POTENTIAL CUMULATIVE IMPACTS

There is potential for cumulative townscape and visual impacts with the two developments to the east and south east of the site across the junction of Parkside Boulevard, Marrsfield Avenue and Balgriffin Park.

These permitted developments will (a) strengthen the emerging urban character locally (by their building typology and strong built frontage to the street), and (b) identify the junction as a place of significance in the urban structure (by their six-seven storey height), improving legibility. The proposed development will complement these developments, reinforcing this intended (plan-led) change.

10.8 MITIGATION MEASURES

Construction Phase
No mitigation is proposed other than standard best practice construction site management.

Operational Phase
The potential townscape and visual impacts have been assessed as positive. No operational phase mitigation measures are recommended.

10.9 PREDICTED IMPACTS

No mitigation measures have been recommended. Therefore, the predicted residual townscape and visual effects are as described, assessed and classified in sections 10.5 (townscape) and 10.6 (visual) above.

10.10 'DO NOTHING' SCENARIO

Where the site left in its current, disturbed condition (following the removal of the school campus), it would continue to contribute to a lack of coherence in townscape character which currently exists, leading to a disconnectedness in townscape character.

10.11 'WORST CASE' SCENARIO

No worst case scenario has been identified/assessed.

10.12 MONITORING & REINSTATEMENT

A landscape maintenance programme is specified in the Landscape Report prepared by Áit Urbanism + Landscape. No monitoring or reinstatement is recommended additional to this specified programme.

10.13 DIFFICULTIES IN COMPILING INFORMATION

None.

10.14 REFERENCES

Clongriffin – Belmayne Local Area Plan 2012 – 2018, Dublin City Council.
Dublin City Development Plan 2016-2022, Dublin City 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.
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 has been produced to assess and evaluate the likely impact of the proposed residential development on the local transportation network, as well as identifying proposed mitigation measures to minimise any identified 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 residential development. The scope of the assessment covers transport and related sustainability issues including means of vehicular access, pedestrians, cyclists and local public transport connections. This assessment is being carried out in accordance with the following guidance and established best practice:

- Environmental Protection Agency (EPA) Guidelines on the information to be contained in the EIAR;
- Transport Infrastructure Ireland (TII) (Formerly National Roads Authority) Traffic and Transportation Assessment Guidelines.

Reference has also been made to the Clongriffin-Belmayne Local Area Plan 2012 as well as the Dublin City Development Plan 2016 – 2022.

11.2 METHODOLOGY

This chapter should be read in conjunction with the site layout plans and the project description sections of the Report. The Traffic and Transportation topics associated with the proposed development site are described below.

The approach to the study accords with policy and guidance at EU, National and Local level. Accordingly, the adopted methodology responds to best practice, 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;

-'Traffic Management Guidelines' Dublin Transportation Office & Department of the Environment and Local Government (May 2003);

-'Guidelines for Traffic Impact Assessments', The Institution of Highways and Transportation (1994);

- Clongriffin – Belmayne LAP 2012; and

- Dublin City Council Development Plan 2016 – 2022.

Our methodology incorporated a number of key inter-related stages, including:

- **Site Audit**: A site audit was undertaken to quantify the existing road network and identify the local infrastructure characteristics, in addition to establishing the level of accessibility to the site in terms of walking, cycling and public transport.
- **Traffic Counts**: Traffic Counts were conducted in 2018 at number of junctions on the surrounding road network. These were undertaken with the objective of establishing the local traffic characteristics on the road network.
- **Trip Generation**: A trip generation exercise has been carried out to establish the potential level of vehicle trips generated by the proposed development.
- **Trip Distribution**: A distribution exercise has been undertaken for the generated development traffic onto the local road network. The development traffic has, where available, been distributed based on both the existing traffic characteristics and the network layout in addition to the spatial/land use configuration and density of the urban structure across the catchments area of the development.
- **Network Analysis**: Further to quantifying the predicted impact of vehicle movements across the local road network, more detailed analysis simulations have been undertaken at the junctions exceeding the impact threshold to assess the operational performance of these junctions in the post development future scenarios.

11.3 RECEIVING ENVIRONMENT

The subject site is located on a brownfield site within the North Fringe Area of north Dublin as described in chapter 1. The location of the proposed site in relation to the surrounding environment is shown below in Figure 11.1.

The Malahide Road is located approximately 900m west of the subject site development. This road forms part of the busy regional road (R107) and routes in a north south direction from Malahide to Clontarf.

Parkside Boulevard is a local street that runs in an east – west direction south of the subject site, terminating at the R107 Malahide Road. Belmayne Avenue is a local street within the vicinity of the site development to the south west. The Hole in the Wall Road is a busy local road located to the south east of the subject site. This road contains bus lanes as well as one traffic lane in both directions. Balgriffin Park is a road immediately to the east. These local streets connect to Parkside Boulevard and run in a north-south direction.

Figure 11.1: Site Location

Existing pedestrian and cycle facilities are good along Parkside Boulevard with footpaths and segregated cycle tracks located both sides of the street. There are priority crossings and good street lighting along the street also. Belmayne Avenue is a quiet residential street. There are currently no cycle facilities along this road and cyclists travel within the road carriageway. Footpaths are provided on both sides of the street. The Hole in the Wall Road provides footpaths both sides of the road. There is a cycle track on the eastern side of the road. The Malahide Road provides footpaths and crossings for pedestrians. There is an off-road cycle track located on the eastern side of the road for a section of the road from the junction with Parkside Boulevard to the junction of the R139. Balgriffin Park, located to the east of the site, provides a vehicular connection to Balgriffin Cottages (R123) to the north. Balgriffin Park provides a footpath and street lighting along its western side. There are a number of Dublin Bus services in close proximity to the subject site. the number 42 and 43 Dublin Bus routes travel along the R107 Malahide Road. Route numbers 15, 27 and 27X travel along the R139 approximately 540m south of the subject site. The vast majority of these Dublin Bus services operate daily and offer relatively frequent services. The Clongriffin Rail Station is located approximately 1.4km east of the subject site on Station Way. DART services call at Clongriffin Station with regular services throughout the day.

11.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development is set out in chapter 3 and in the statutory notices and is for a residential development. As noted in the site notices the proposed development includes basement parking for 277no. cars and 289 no. bicycles along with a further 134 no. surface bicycle spaces and 9 no. car parking spaces.

This provision of cycle parking provides 1.5 spaces per residential unit and is in accordance with DCC development plan standards. In terms of the car parking spaces, 14 spaces will be dedicated for mobility impaired users, which is in accordance with the DCC development plan standards. The total car parking provision has been determined with regard to both the DCC and DHPLG car parking requirements.

The proposed Media Centre and Gym facilities on site are ancillary activities and will be for the sole use of residents. Therefore, there is no requirement for car parking as part of these facilities.

The car parking provision of 277 spaces at basement level will be managed through the building management company, while the 9 surface level spaces will be taken in charge by DCC and shall not be assigned for private use. Therefore, the provision of 277 spaces equates to 0.98 spaces per unit and is therefore considered to be appropriate due to the accessible nature of the site by sustainable modes including bus and rail, the ample cycle parking provision on-site.

There will be one vehicular access from Parkside Boulevard. This access will serve the underground basement car parking area. An emergency vehicle access is also proposed for the development.

With regard to pedestrian and cycle access, the site will be highly accessible from Parkside Boulevard, Belmayne Avenue, Balgriffin Park and Hole in the Wall Road with 3 separate pedestrian/cycle accesses within the development as well as from the Mayne Linear Park to the north which this development will be completing. Within the internal site layout, there are a series of interconnected paths that are provided in order to ensure that desire lines are accommodated.

11.4.1 Previous Planning Applications

When reviewing the traffic and transport impacts of the development it is also necessary to consider the planning history of the surrounding area. The majority of the planning applications in the vicinity of the Proposed Development are residential in nature with a new residential development occurring to the east of the site, on the opposite site of Balgriffin Park, along Marsfield Avenue DCC Planning Refs 3380/15 (as amended by 4266/16 and 2717/19), and 3247/14 (as amended by 2478/17, 3696/18, and 2719/19).

The subject site, as part of a wider scheme, was previously granted planning permission as part of an overall Framework Plan for the development of the Belmayne Lands (Ref.4315-03) by Dublin City Council and by ABP. Construction is also currently ongoing to the south of Parkside Boulevard, also for residential development under Reg. Ref.: 4315/03 / ABP PL29N.207192. The majority of this area the subject of this parent permission are controlled by Cairn Homes Properties Limited and are now known as Parkside.

Subsequent planning permissions have been submitted and granted. The status of each of the Parkside development phases and the location for these phases are as follows and as illustrated in **Figure 11.2**:

- Phase 1 of the Parkside development (Ref. 2941/14, approved planning by DCC in October 2014) is fully completed and occupied.
- Phase 2A (Ref. 2296/16, approved planning by DCC in July 2016) is fully complete and occupied.
- Phase 2B (Ref. 2679/16, approved planning by DCC in November 2016) is fully complete and occupied.

- Phase 2C (Ref. 3486/17, approved planning by DCC in November 2017) is fully complete and nearly fully occupied.
- Phase 3 (Ref. 2114/15, approved planning by DCC in March 2015) is fully complete and occupied.
- Phase 5A (Ref. 3791/18, approved by DCC in March 2019)

As a result, the potential cumulative impact of the Proposed Development and other consented developments is considered to be slight.

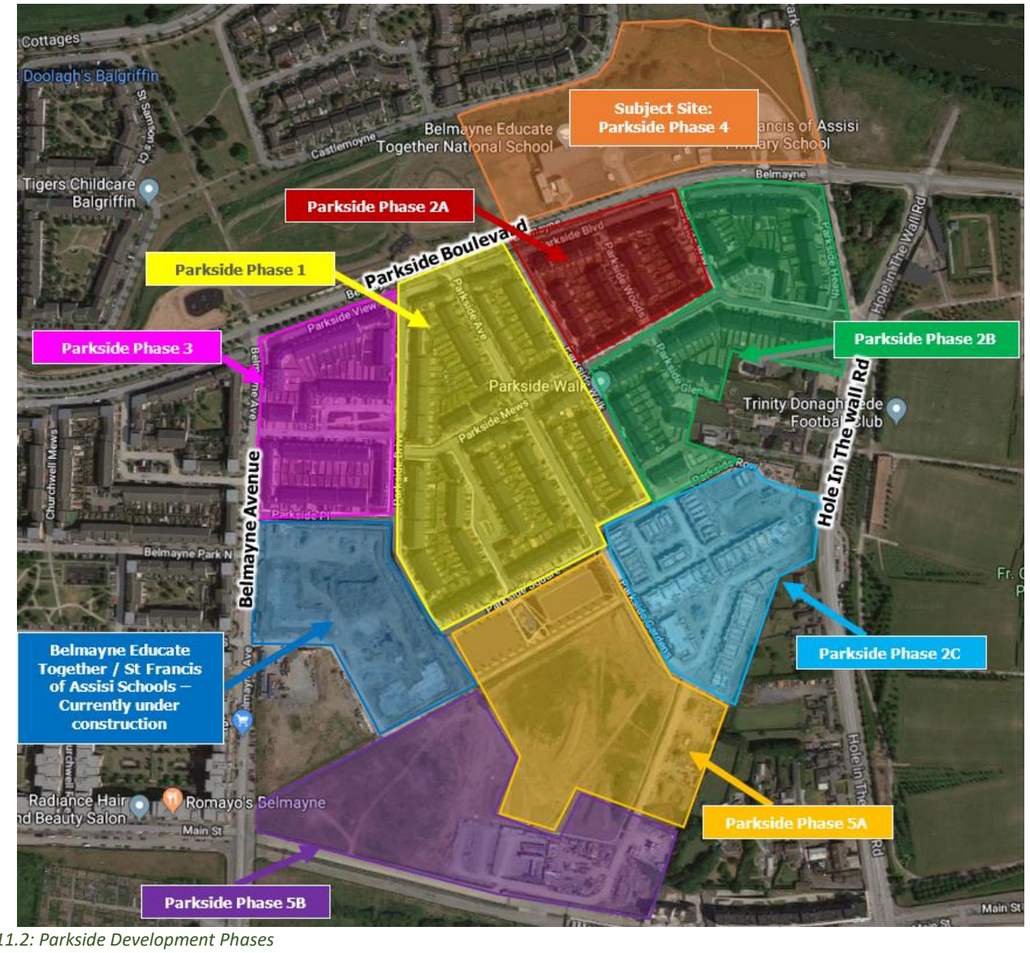

Figure 11.2: Parkside Development Phases

11.5 POTENTIAL IMPACTS

Construction Phase

All construction activities will be governed by a Construction Traffic Management Plan (CTMP), the details of which will be agreed with the local roads authority prior to the commencement of construction activities on site. The principal objective of the CTMP is to ensure that the impacts of all building activities generated during the construction of the proposed development upon both the public (off-site) and internal (on-site) workers environments, are fully considered and proactively managed / programmed, respecting key stakeholders requirements thereby ensuring that both the public's and construction workers safety is maintained at all times, disruptions minimised and undertaken within a controlled hazard free / minimised environment.

The likely impact of the construction works will be short-term in nature. The number of staff onsite will fluctuate over the implementation of the subject scheme. Nevertheless, based upon the experience of similar projects, it would be expected that approx. 20 – 30 staff will be on site at any one time, subsequently generating low levels of two-way vehicle trips during the peak AM and PM periods over the period of the construction works (construction workers will use shared transport). On site employees will generally arrive before 08:00, thus avoiding the morning peak hour traffic. These employees will generally depart after 16:00.

Likely deliveries to the site would be expected to arrive at a steady rate during the course of the day, the majority of which would be lorries with inert fill material that will be brought onto the site over the entire duration of the construction stage of the development. The proposed haul routes for the fill material will exit and enter the site via the Regional Road R107 and travel along Parkside Boulevard to the site.

The potential impact during the construction phase with all the above considered would have a short-term effect on the surrounding road network and with the CTMP and deliveries managed accordingly, this should further reduce the impact on the road network.

Operational Phase

Once the subject development is fully complete and occupied, there are two distinct peak arrival and departure times that are expected during a typical weekday. Specifically, there is expected to be a morning peak between 07:45 – 08:45 when people are leaving for work or educational purposes. An evening peak is expected between 16:15 – 17:15 when residents would be returning to the subject site.

The development traffic will be accommodated by one access junction on Parkside Boulevard. In order to assess and analyse the impact of the proposed development on the surrounding road network, a traffic generation and distribution model (excel based) of the following junctions was created:

- Junction 1 - Priority Control – Site Access / Parkside Boulevard;
- Junction 2 - Priority Control – Parkside Boulevard / Belmayne Avenue;
- Junction 3 - Roundabout – R139 / Belmayne Avenue / Clarehall; and
- Junction 4 - Priority Control – Parkside Boulevard / Malahide Road.

Once in operation, the proposed development is expected to establish permanent travel patterns and trip generation onto the surrounding road network. Potential impacts at the key junctions have been assessed (detailed within the Traffic and Transportation Assessment (TTA) report) and it is considered that the impact on the surrounding road network will be nominal. The subject development proposals support the Clongriffin-Belmayne Local Area Plan objectives of improving pedestrian and cycle connections/linkages through the LAP lands.

11.6 POTENTIAL CUMULATIVE IMPACTS

Potential cumulative impacts have been assessed in relation to the existing and permitted transportation schemes. A desktop study was conducted of planning applications in the vicinity of the subject development on the DCC planning database to assess any cumulative impacts from granted or committed applications close to the subject scheme.

There are four committed developments in the vicinity of the site which hold planning permissions and may have an effect on the local road network. The Parkside Phase 2C development (3486/17) site is located to the south of the proposed development site, across Parkside Boulevard, and forms a phase of the Parkside development lands. Phase 2C of the Parkside development proposes a total of 89. No residential units. The trips from this development access the local road network via Belmayne Avenue, with an access/egress priority-controlled junction.

The Parkside development Phase 5A (3791/18) site is also located to the southwest of the proposed residential site and accesses the local road network also via a priority controlled junction with Belmayne Avenue in accordance with this development's transportation analysis, with this development permitting 96 no. residential units.

The residential development located on lands at Marrsfield Avenue (Ref: 3696/18) located to the east of the proposed development site was granted permission and comprised 240 no. apartments with 204 basement car parking spaces and 28 on street parking spaces.

A second residential development located on lands at Marrsfield Avenue (Ref: 4266/16) located to the east of the proposed development site was granted permission for 132 no. apartments with 176 basement level car park spaces and 8 surface level car park spaces.

These committed development trip rates have been determined from their relevant transportation assessment reports and applied to the road network according to each development's scheduled proposals. Accordingly, trip rate information applied to this assessment for committed developments has been carried out to the rates and figures previously accepted by Dublin City Council. In the absence of a Traffic and Transport Assessment for the proposed third party residential developments, in order to provide a robust assessment DBFL have applied the same trip rates used for the subject residential development to determine potential level of traffic that could be generated as a result of this third party residential development.

It is noted that there are two potential future mixed-use development sites south of the subject site, located on the junction of Main Street and Belmayne Avenue. However, these sites will be the subject of independent planning applications requiring their own traffic and transport assessments. It is also noted that there are three current applications by Gannon Homes for a total of 1,950 residential units and commercial development comprising 14 retail units, a cinema, café and offices. This will all be the subject of a separate and independent EIAR assessment. There is also an application pending approval for a potential temporary post primary and primary school development (Ref: 3009/19) located on the south-eastern corner of Belmayne Avenue/Priory Hall.

11.7 MITIGATION MEASURES

Construction Phase

All construction related parking will be provided on site. Construction traffic will consist of the following two principal categories:

- Private vehicles owned and driven by site construction staff and by full time supervisory staff;
- Excavation plant 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.

It is anticipated that the generation of HGV's during the construction period will be evenly spread throughout the day and as such will not impact significantly during the peak traffic periods.

Operational Phase

A number of walking and cycling access points are proposed within the development. Good pedestrian and cycle connections and facilities will provide attractive, convenient and safe routes for residents.

A Mobility Management Plan (MMP) has been prepared for residents within the development in order to guide the delivery and management of coordinated initiatives post construction. The MMP ultimately seeks to encourage sustainable travel practices for all journeys to and from the proposed development.

11.8 PREDICTED IMPACTS

Construction Phase

At this initial stage, it is expected that the proposed residential dwellings will be constructed at a rate of 100 units per year (subject to market forces). It is envisaged that the full scheme is not likely to be fully completed until before 2022.

All construction activities will be governed by the Construction Traffic Management Plan (CTMP). The number of staff will fluctuate, as mentioned previously, however, based on similar project experience, a development of this type and scale would on average necessitate approximately 20 – 30 staff on site at any one time, subsequently generating no more than 10 – 15 two – way vehicle trips during the AM and PM peak hour periods with construction workers using shared transport.

In terms of deliveries to the site, it is not yet known the number of deliveries per day, however, it can be assumed, as a conservative assessment, that there will be 3 loads per hour. With a 10 hour working day, this equates to 30 loads per day approximately. This results in 60 vehicular movements per day over a 10 hour period, which equates to 6 vehicle movements per hour.

Operational Phase

Trip Generation & Distribution

The trips generated for this proposed development were based on previous planning applications of the adjacent phases of the Parkside development. The trip rates and traffic generation for the 282 no. residential units are outlined in Table 11.1 below for the Phase 4 residential development.

Land Use	Period	Trip Rates (per unit)		Traffic generation	
		Arr	Dep	Arr	Dep
Residential	AM	0.055	0.239	**16**	**66**
	PM	0.207	0.069	**58**	**19**

Table 11.1: Predicted Development Trip Rates and Vehicle Trips Generation

Due to the relocation of the former two schools located on the subject site, the trips associated with the schools have been redistributed throughout the road network. This redistribution has been examined within the TTA report.

The trips generated from the committed developments, as identified above, have been distributed onto the road network as per the TTA reports undertaken for each application.

Impact of Proposals

The NRA/TII document entitled Traffic and Transport Assessment Guidelines (2014) provides thresholds in relation to the impact of a proposed development upon the local road network. It is considered material when the level of traffic it generates surpasses the thresholds of 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.

The following junctions were assessed with regard to proposed impact from the development:

- Junction 1 - Priority Control – Site Access / Parkside Boulevard;
- Junction 2 - Priority Control – Parkside Boulevard / Belmayne Avenue;
- Junction 3 - Roundabout – R139 / Belmayne Avenue / Clarehall; and
- Junction 4 - Priority Control – Parkside Boulevard / Malahide Road.

The percentage impact for each junction is shown below in Table 11.2 for the predicted Opening Year 2021 and the future horizon year 2036 for both the AM and PM peak hour.

Junction ID	Location	2021		2036	
		AM Peak	PM Peak	AM Peak	PM Peak
1	Site Access / Parkside Boulevard	25.5%	22.3%	22.9%	19.9%
2	Parkside Boulevard / Belmayne Avenue	5.5%	8.6%	4.7%	7.6%
3	R139 / Belmayne Avenue / Clarehall	1.0%	1.3%	0.9%	1.2%
4	Parkside Boulevard / Malahide Road	1.5%	1.5%	1.3%	1.3%

Table 11.2: Network Impact through Key off Site Junctions

The junctions were assessed based on the impact threshold of 10%. Results show that Junction 2, Junction 3 and Junction 4 are below the impact threshold and therefore are not required for further analysis. Junction 1, the Site Access/Parkside Boulevard junction displays percentages that exceeds the 10% impact threshold for all scenarios assessed.

In order to determine whether the proposed site access priority junction would cater for the predicted level of traffic generated from the proposed development, a PICADY model was developed and the junction was analysed for all design scenarios including Opening Year 2021 as well as subsequent Future Design Year of 2036. Results of the analysis show that the proposed site access junction will operate within capacity for all scenarios assessed.

11.9 'DO NOTHING' SCENARIO

No impacts on the road network are proposed if the development does not proceed.

11.10 'WORST CASE' SCENARIO

The analysis carried out represents a worst-case appraisal of a typical weekday as it is focused upon the two busiest periods of the day (i.e. AM and PM peak hours). During the remaining 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. Similarly, over the weekend periods both the site generated traffic and the external road network traffic flows are generally lower compared to the weekday peak hour periods that have been assessed.

11.11 MONITORING & REINSTATEMENT

During the construction stage, the following monitoring exercises are proposed;

- Compliance with construction vehicle routing practices;
- Compliance with construction vehicle parking practices;
- Internal and External road conditions; and
- Timings of construction activities.

With regard to the operational stage, no monitoring is proposed on completion of the construction phase.

11.12 DIFFICULTIES IN COMPILING INFORMATION

No particular difficulties were encountered in completing this section.

11.13 REFERENCES

Bus Connects website (www.busconnects.ie)

Department of Transport's Traffic Signs Manual "*Chapter 8 Temporary Traffic Measures and Signs for Roadworks*"

Department of Transport's "*Guidance for the Control and Management of Traffic at Roads Works – 2nd Edition*" (2010)

Dublin Bus website (www.dublinbus.ie)

Dublin City Council Development Plan (2016-2022)

Environmental Protection Agency Guidelines on the Information to be Contained in Environmental Impact Assessment Reports – Draft (August 2017)

Irish Rail website (www.irishrail.ie)

National Transport Authority; Greater Dublin Area Cycle Network Plan (2013)

NRA 'Traffic and Transport Assessment Guidelines' (2014)

The Institution of Highways and Transportation 'Guidelines for Traffic Impact Assessments' (1994)

Transport for Ireland (www.transportforireland.ie)

Transport Infrastructure Ireland (www.tii.ie)

12 MATERIAL ASSETS

12.1 INTRODUCTION

This section evaluates the impacts of the proposed development on the existing services and material assets of the subject site and its surrounding. Material assets discussed here are in relation to the built services and infrastructure belonging to the subject site. Traffic and transportation are assessed separately in this EIAR.

12.2 METHODOLOGY

A desktop study was conducted in relation to the material assets associated with the proposed development and their capacities. Projections of the resources where made for the construction and operational phase of the development. The Guidelines on information to be contained in an Environment Impact Statement (EPA 2002), the advice notes on current practice and Draft EPA guidelines published in 2017 requires assessment of 'economic assets of human origin' to be included in the impact study as a desktop study of material assets associated with the development.

The impacts are assessed in terms of their scale, duration and significance to the site context. During the construction phase assessments are undertaken on the impact of the proposal likelihood in incurring loss or disturbance to material assets due to construction activities. It is unlikely that there will be any major impacts during the operation phase of the development. Economic assets of natural origin that includes biodiversity, soil and water are addressed specifically in chapters 5, 6 and 7.

12.3 RECEIVING ENVIRONMENT

BUILT ENVIRONMENT/LAND

The subject site has a gross site area of c. 3.17Ha and is located in the 'North Fringe' area of Dublin City, c.9km north of the city centre.

The subject lands within Dublin City Council area are zoned Z14 with the following objective - *"To seek the social, economic and physical development and/or rejuvenation of an area with mixed use, of which residential and "Z6" would be the predominant uses."* Residential is a permitted in principle use. These lands are also subject to the Belmayne Clongriffin Local Area Plan 2012-18 (as extended) which specifically designates it for residential development.

A small portion of the site north of the Mayne river and located within the Fingal County Council area is zoned Open Space under the Fingal County Development Plan, 2017-23. That portion of the site is proposed to be landscaped as part of the public park.

ACCESS AND OWNERSHIP

The development site is in the private ownership of the applicant. Vehicular access to the site is via Parkside Boulevard to the south. The lands are also accessible on foot from the adjoining riverside park.

TRANSPORT INFRASTRUCTURE

There are a number of bus routes that serve the subject site. Numbers 42 and 43 run along the R107 Malahide Road are located approximately 1.1km to the west of the site. Route numbers 15, 27, & 27X travel along the R139 approximately 540m to the south of the subject site. Route number 29a travels along the R809 Grange Road approximately 1.1km to the south of the subject site. The majority of buses operate daily at frequent services (i.e. every 10 minutes at peak times).

Figure 12.1 Bus Service Route Stops

Under the Bus Connects proposal there will be a proposed Clongriffin to City Centre Core Bus Corridor CBC1 which will be accessible within approximately 700m walking distance of the subject site. Bus Route D3 will also be part of the overall network redesign and will run along Parkside Boulevard directly serving the development site.

Clongriffin Rail Station is located approximately 1.4km east of the subject site on Station Way. Dart services for Bray/Greystones and Malahide stop at Clongriffin station with regular daily services serving

the destinations: Greystones, Malahide, Dublin Pearse, Bray and Dun Laoghaire. The Dublin Pearse to Drogheda/Dundalk rail service also calls at this station.

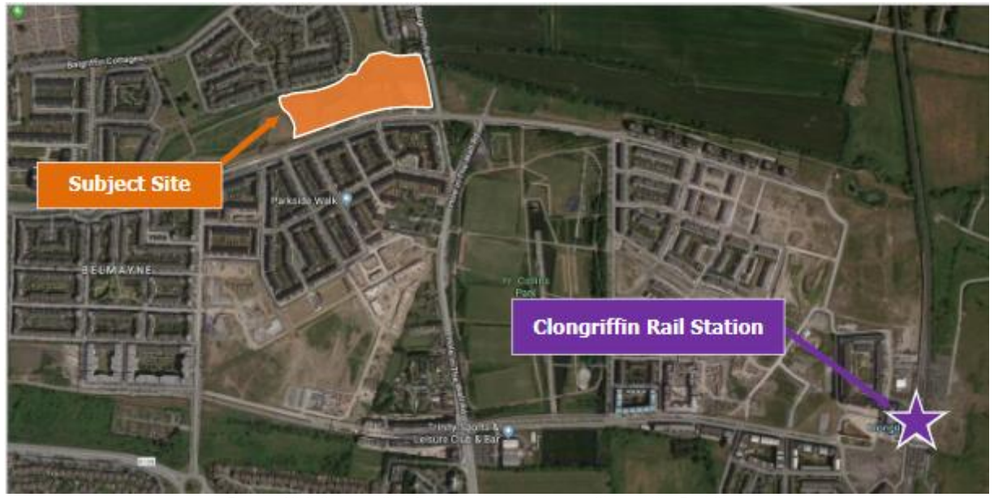

Figure 12.2 Subject Site Location in relation to Clongriffin Rail Station

There are high quality segregated pedestrian / cyclist paths in the vicinity of the development site on both sides of the roads. These segregated pedestrian / cycle routes continue west to the Parkside Boulevard/ R107 Malahide Road junction where there is a formal pedestrian crossing available on the Malahide Road and Parkside Boulevard of the aforementioned junction. Pedestrians also benefit from street lighting and a good quality pedestrian foot path on Belmayne Avenue on both sides between Parkside Boulevard and Parkside Place and on the western side between Parkside Place and the R139/Belmayne Avenue. These facilities provide a link to the pedestrian facilities on the R139 corridor to the south of the subject development site. There is also a controlled pedestrian crossing on the R139 to the west of the R139/ Belmayne Avenue roundabout junction which links to the pedestrian facilities and bus stops on the southern side of the carriageway.

There is also a green route connecting Belmayne Avenue to Hole in the Wall Road via the Parkside development. This green route is currently partially open from Hole in the Wall Road up to the construction site of the proposed relocated schools. The Green Route will open in its entirety following the completion of construction in the adjoining sites. Access from the subject development site to the green route can be achieved via the internal Parkside development road network. The green route provides a high quality, street lit pedestrian/cyclist direct connection between Fr. Collins Park, and Belmayne Avenue.

There are also a variety of other cycling facilities available on routes surrounding the wider area to the subject site as illustrated in the extract from the Greater Dublin Area (GDA) Existing Cycle Network Plan as shown in figure 12.3.

Figure 12.3 Existing Cycling facilities (GDA cycle network plan)

The Greater Dublin Area Cycle Network Plan (2013) includes proposals for the provision of four orbital routes in the north east sector of the city.

WATER SUPPLY

A pre connection enquiry with Irish Water confirmed that a connection to the existing network can be facilitated. It is proposed to provide a watermain connection for the proposed development from the existing 250mm diameter watermain constructed as part of the Parkside Development. This existing watermain runs parallel to Parkside Boulevard and connects to the 450mm diameter North Fringe Watermain at a PRV approximately 450m to the west of the proposed development.

FOUL DRAINAGE

The proposed foul drainage layout for the development will be constructed as slung drainage within the basement and connected to an external drainage manhole to the east of Block D. It is proposed to construct a manhole on the existing 300mm foul outfall from the Castlemoyne development to the north. Foul flows from the development will connect to this manhole before discharging to the North Fringe Sewer via the existing 300mm connection. No drainage works are required to the existing North Fringe Sewer or within the wayleave for the sewer.

Basement incidental car park drainage will be collected in the basement before passing through a Class 2 Light Liquid Separator and pumped to the foul network as required by GDSDS.

It is also proposed to divert the existing 300mm diameter foul outfall from the Castlemoyne Development outside the line of the proposed development. All manhole cover levels will be set above the 100 year flood level of the Mayne River.

SURFACE WATER DRAINAGE

There is an existing surface water sewer within the subject site running parallel to Parkside Boulevard. This sewer connects to the existing 900mm diameter surface water sewer from the recently constructed Parkside Development which outfalls to the existing attenuation system to the west of the development. The outfall from the above attenuation system traverses the subject site to the north of the proposed buildings. These sewers are not shown on the Dublin City Council record maps as they are not taken in charge at present.

TELECOMMUNICATIONS

There are existing telecommunication services along local public roads. It is proposed to connect to telecom services via chamber positions within the footpath. The development is unlikely to have any impact on the existing infrastructure.

NATURAL GAS

There is an existing gas infrastructure which services the area. A low-pressure gas pipe runs the length of Parkside Boulevard along the perimeter of the site. Should the proposed development connect to the gas network in the future the developer will have due regard to the provisions set within 'Safety advice for working in the vicinity of Natural Gas Pipes.'

ELECTRICITY SUPPLY

The existing substation kiosk positioned within the site boundary will be de-commissioned and removed. It is envisaged the existing ESB supply will extend to serve the new development and cater for the additional two sub-stations required. Additional power supplies will need to be routed below ground as part of the proposed development works. Currently there are no power lines running across the site. Prior to works commencing the contractor will co-ordinate with ESB engineers assigned to the site and adhere to ESB Networks National Code of Practice 4th edition 2008.

The scheme includes provisions for 2 no. ESB sub-stations complete with adjacent switch rooms at ground floor level within the 4 no. residential blocks.

WASTE MANAGEMENT

Dublin City Council is the local authority responsible for setting and administering waste management activities in this area. This is governed by the requirements set out in the *Eastern-Midlands Region (EMR) Waste Management Plan 2015-2021,* which sets out targets for waste management in the region.

Further details on waste management can be found in chapter 13.

EXTERNAL LIGHTING

There is an existing public lighting scheme along Belmayne Road. The current lighting scheme is modern and provides compliant lighting along Belmayne road. The proposed development has two new site entrances. Additions or modifications to the existing public lighting scheme is proposed as per the lighting plan and report submitted with the application.

12.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development will comprise a residential scheme of 282 residential units in 4 apartment blocks ranging in height from 3 to 7 storeys. The development will include 94 no. 1-bed apartments, 8 no. 2-bed (3 person) apartments, 167 no. 2-bed (4 person) apartments and 13 no. 3-bed apartments. Apartments will have north/south/east/west facing balconies/terraces. The proposed development also includes residential amenity facilities (530 sq.m) incorporating concierge, media centre, and gymnasium. 277 no. car parking and 289 no. cycle parking spaces will be provided in the basement along with basement stores, plant, waste management areas, motor bike spaces and EV charging points. There will be an additional 134 no. surface cycle parking spaces for visitors along with 9 no. surface car parking spaces. The proposed development provides for the continuation and completion of the Mayne River Linear Park as well as public open space and communal open spaces between the buildings. Vehicular access is from Parkside Boulevard. Pedestrian and cycle access are from Mayne River linear Park, Balgriffin Road and Parkside Boulevard. All associated site development works (including site re-profiling), landscaping, boundary treatments and services provision including ESB substations.

12.5 POTENTIAL IMPACTS

The potential impacts of the proposed development are assessed below with respect to the impacts of the development during the construction and operational phase. The analysis takes into consideration the Characteristics of the receiving baseline environment and Characteristics of the proposed development.

BUILT ENVIRONMENT/LAND

Construction Phase

Construction activities may cause some local impacts including increase in noise, traffic, dust etc. to the surrounding built environment. However, the site is set back from the adjacent residential estates in the area. The construction impacts will be localized and can be mitigated appropriately as per the measures outlined in chapters 8, 9, 11 and 17 of this EIAR.

In constructing the development, the existing land will be subject to topsoil removal and associated land works as outlined and mitigated for in Chapter 6 of this EIAR. Where possible an area will be left intact until construction is ready to begin. Stripping of existing surfaces will not be undertaken until absolutely necessary to avoid any uncontrolled surface water runoff.

Operational Phase

The change from agricultural to residential use is in accordance with the zoning objectives pertaining to the site as per the Dublin City Development Plan and Belmayne-Clongriffin LAP.

It is unlikely that the development in the operational phase will adversely affect the built environment in the local area. The development strikes an appropriate balance between respecting existing amenities/properties and providing a quantum and design quality that accords with local and national residential planning policy.

ACCESS AND OWNERSHIP

Construction Phase

The development site will remain in the ownership of the applicant/developer during the construction phase. A road opening licence will be utilised to carry out the road works and connections to public water services.

Construction access to the site will be via Parkside Boulevard. This access will be managed in accordance with the Construction & Environmental Management Plan (CEMP) as submitted with this application and will ensure minimal impact on access for the public along the public road and footpaths.

Operational Phase

The completed development will be accessed from the south of the site at Parkside Boulevard connecting to the existing public road and footpath network in the area and to the cycle network in the wider area. The proposed development is largely car free and will expand the existing and proposed network of cycle and pedestrian links designed in accordance with DMURS (Design Manual for Roads and Streets, 2013). The layout promotes permeability between the site and surrounding pedestrian and cyclist network. The link will operate as a shared space for pedestrians and cyclists to create a living/recreation space that promotes social interactions among residents.

It is proposed that the apartment scheme public realm will be retained be controlled by a management company. The riverside park will in time be taken in charge by the local authorities.

TRANSPORT INFRASTRUCTURE

Construction Phase
The construction activities on the site will contribute to increased construction traffic impact along Parkside Boulevard. However, these impacts will be short-term, and a series of mitigations are outlined in Chapter 11 of the EIAR and the Construction and Environmental Management Plan submitted with the application. The associated road works and connections to the water services network will also involve temporary impacts to traffic movements along the public road in the local area but which will be properly controlled and managed by Irish Water and DCC.

The construction phase may also positively impact on public transport in the area with increased usage of same by some of the construction workers coming to the site each day.

Operational Phase
The operation of the development will result in additional levels of traffic coming into and out of the development via Parkside Boulevard. The proposed design includes for improvements to the public road to facilitate this additional traffic. The traffic impact on the road network has also been assessed in Chapter 11 of the EIAR and found to be acceptable.

The future development will also create greater demand for, and usage of public transport and the footpath and cycle path network helping to sustain this infrastructure and promote further improvements by the local authority and other transport agent.

WATER SUPPLY, FOUL AND SURFACE WATER

Construction Phase
The proposed development will require connection to the public water services network. This will result in a temporary suspension of the network to facilitate the connection, but which will be controlled and managed by Irish Water and DCC. The associated road works to facilitate the connections will also be controlled by these agencies in accordance with standard protocols.

Temporary water services on site to facilitate the construction of the development (i.e. water supply and toilets) will be provided separately by the contractor and will not impact the public network. These services will also be properly managed in accordance with the OEMCP.

Operational Phase
The demand on water services from the proposed residential development has been detailed and agreed with Irish Water and DCC in advance of the lodgement of the application. Connection to the public network is agreed in principle subject to the additional works required as included in this application. As a result, there is no anticipated negative impact on the established infrastructure network.

The full implications and requirements for the water supply, foul and surface water infrastructure is outlined in Chapter 7 of the EIAR.

NATURAL GAS

Construction Phase

The proposed development may connect to the gas network in the wider area. Consultation with Gas Networks Ireland will occur post-planning to determine whether there is sufficient capacity in the area to serve the development. If the development is connected to the network, then this will be carried out by Gas Networks Ireland under its powers as a statutory undertaker.

Operation Phase

The completed development will not result in any negative impact to the gas network in the area.

ELECTRICAL SUPPLY

Construction Phase

The existing substation within the site boundary will be de-commissioned. New powerlines to serve the proposed substations within the site will be brought into the development via undergrounded ducts as part of the construction phase which may result in a temporary suspension of the network locally to facilitate the works. Additional temporary suspension will also occur when power is provided to the site. However, this will be controlled ESB Networks as the statutory undertaker and in accordance with standard protocols.

Operation Phase
The Operation Phase of the development will see an increase in demand and usage of electricity supply, but this can be facilitated by the local network.

WASTE MANAGEMENT

Construction Phase
The proposed development will generate a range of non-hazardous and hazardous waste materials during construction and demolition. Waste materials will be required to be temporarily stored on site pending collection by a waste contractor. If waste material is not managed and stored correctly, it is likely to lead to litter or pollution issues at the development and on adjacent developments. The use of non-permitted waste contractors or unauthorised waste facilities could give rise to inappropriate management of waste and result in negative environmental impacts or pollution. Recovery and recycling of C&D waste has a positive impact on sustainable resource consumption, for example where waste timber is mulched into a landscaping product or waste asphalt is recycled for use in new pavements. The potential effect of construction waste generated from the proposed development is considered to be short-term, and not significant.

Operation Phase
The potential impacts on the environment of improper, or a lack of, waste management during the operational phase would be a diversion from the priorities of the waste hierarchy. This would lead to volumes of waste being sent unnecessarily to landfill. The nature of the development means the generation of waste materials during the operational phase is unavoidable. If waste material is not managed and stored correctly, it is likely to lead to litter or pollution issues at the development and on adjacent developments. The knock-on effect of litter issues is the presence of vermin within the development and the surrounding areas. The use of non-permitted waste contractors or unauthorised facilities could give rise to inappropriate management of waste and result in negative environmental impacts or pollution. The potential impact of operational waste generation from the development is considered to be long-term and not significant.

12.6 POTENTIAL CUMULATIVE IMPACTS

The potential cumulative impacts from the development on the material assets of the subject site and its surroundings has been taken into consideration in the above assessment and those of related chapters of the EIAR and, subject to the range of mitigation measures proposed, are not considered significant.

12.7 MITIGATION MEASURES

Construction Phase
A range of construction related mitigation measures are outlined within other chapters of the EIAR with respect to various aspects of the built environment – Chapters 6, 7, 11 and 13.

As noted above, connections to the existing electricity, water services, gas and telecommunications networks will be coordinated with the relevant utility provider and carried out by approved contractors.

Operational Phase
No additional mitigation measures to those outlined in other chapters are considered necessary during the operational phase of the development as it is considered to have a neutral to positive effect on material assets including services and infrastructure.

12.8 PREDICTED IMPACTS

Construction Phase
On the basis that the specified mitigation measures are incorporated during the construction of the proposed development, the predicted impact will be neutral.

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

A 'Do nothing' scenario will result in the subject site remaining undeveloped and in green field state.

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

No monitoring is required in addition to those specifically noted in other chapters of the EIAR.

12.12 DIFFICULTIES IN COMPILING INFORMATION

There were no significant difficulties in compiling the information.

12.13 REFERENCES

Not applicable.

13 WASTE MANAGEMENT

13.1 INTRODUCTION

This section addresses the subject of waste management for the proposed new development at Parkside 4, Parkside, Dublin 13. Waste management is addressed for both the construction and operational phases of the project.

A site specific Construction Waste Management Plan (CWMP) has been prepared for the construction phase of the development in advance of the commencement of the construction works. A separate Operational Waste & Recycling Management Plan (OWRMP) has also been prepared for the operational phase of the development.

The CWMP has been prepared in accordance with the *'Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects'* document produced by the National Construction and Demolition Waste Council (NCDWC) in conjunction with the Department of the Environment, Heritage and Local Government in July 2006.

These documents will ensure the sustainable management of wastes arising at the development in accordance with legislative requirements and best practice standards.

Proposed Development Site Location and Brief Description

This is as described in chapters 1 (introduction) and 3 (Description of Development) of this EIAR and as set out in the statutory notices.

Statement of Competence

In accordance with Article 5(3)(a) of the EU Directive, by appointing Traynor Environmental, the applicant has ensured that this chapter has been prepared by "Competent experts".

13.2 METHODOLOGY

The assessment of the impacts of the proposed development arising from the consumption of resources and the generation of waste materials, was carried out taking into account the methodology specified in relevant guidance documents, along with an extensive document review to assist in identifying current and future requirements for waste management including national and regional waste policy, waste strategies, management plans, legislative requirements and relevant reports.

The primary legislative instruments that govern waste management in Ireland and applicable to the project are:

- Waste Management Act 1996 (No. 10 of 1996) as amended. Sub-ordinate legislation includes:
  - European Communities (Waste Directive) Regulations 2011 (SI 126 of 2011) as amended
  - Waste Management (Collection Permit) Regulations (S.I No. 820 of 2007) as amended
  - Waste Management (Facility Permit and Registration) Regulations 2007, (S.I No. 821 of 2007) as amended
  - Waste Management (Licensing) Regulations 2004 (S.I. No. 395 of 2004) as amended
  - Waste Management (Packaging) Regulations 2014 (S.I. 282 of 2014) as amended
  - Waste Management (Planning) Regulations 1997 (S.I. No. 137 of 1997)
  - Waste Management (Landfill Levy) Regulations 2015 (S.I. No. 189 of 2015)
  - European Union (Waste Electrical and Electronic Equipment) Regulations 2014 (S.I. No. 149 of 2014)
  - European Union (Batteries and Accumulators) Regulations 2014(S.I. No. 283 of 2014) as amended
  - Waste Management (Food Waste) Regulations 2009 (S.I. 508 of 2009), as amended
  - European Union (Household Food Waste and Bio-waste) Regulation 2015 (S.I. No. 191 of2015)
  - Waste Management (Hazardous Waste) Regulations, 1998 (S.I. No. 163 of 1998) as amended
  - Waste Management (Shipments of Waste) Regulations, 2007 (S.I. No. 419 of 2007) as amended
  - Waste Management (Movement of Hazardous Waste) Regulations, 1998 (S.I. No. 147 of 1998)
  - European Communities (Transfrontier Shipment of Waste) Regulations 1994 (SI 121 of 1994)
  - European Union (Properties of Waste which Render it Hazardous) Regulations 2015 (S.I. No. 233 of 2015)
- Environmental Protection Act 1992 (No. 7 of 1992) as amended.
- Litter Pollution Act 1997 (No. 12 of 1997) as amended.
- Planning and Development Act 2000 (No. 30 of 2000) as amended.

This Chapter is based on the proposed development and considers the following aspects:

- Legislative context;
- Construction phase (including site preparation, excavation and levelling); and,
- Operational phase.

A desk study was carried out which included the following:

- Review of applicable policy and legislation which creates the legal framework for resource and waste management in Ireland;
- Description of the typical waste materials that will be generated during the construction and operational phases; and
- Identification of mitigation measures to prevent waste generation and promote management of waste in accordance with the waste hierarchy.

Estimates of waste generation during the construction and operational phases of the proposed development have been calculated. The waste types and estimated quantities are based on published data by the EPA in *National Waste Reports*, data recorded from similar previous developments, Irish and US EPA waste generation research, other available research sources and waste collection data from the current facilities on site.

Mitigation measures are proposed to minimise the effect of the proposed development on the environment during the construction and operational phases, to promote efficient waste segregation and to reduce the quantity of waste requiring disposal.

Legislation and Guidance
Waste management in Ireland is subject to EU, national and regional waste legislation which defines how waste materials must be managed, transported and treated. The overarching EU legislation is the Waste Framework Directive (2008/98/EC) which is transposed into national legislation in Ireland. The cornerstone of Irish waste legislation is the Waste Management Act 1996 (as amended).

In addition, the Irish government issues policy documents which outline measures aimed to improve waste management practices in Ireland and help the country to achieve EU targets in respect of recycling and disposal of waste. The most recent policy document *A Resource Opportunity – Waste Management Policy in Ireland* was published in 2012 and stresses the environmental and economic benefits of better waste management, particularly in relation to waste prevention.

The strategy for the management of waste from the construction phase is in line with the requirements of the *Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects* published in 2006. The guidance document *Construction and Demolition Waste Management: A handbook for Contractors and Site Managers* was also consulted in the preparation of this assessment.

There are currently no Irish guidelines on the assessment of operational waste generation and guidance is taken from industry guidelines, plans and reports, British Standards and other relevant studies and reports including BS 5906:2005 Waste Management in Buildings – Code of Practice, the Eastern-Midland Region Waste Management Plan 2015 – 2021, the EPA National Waste Database Reports 1998 – 2012 and the EPA National Waste Statistics Web Resource.

13.3 RECEIVING ENVIRONMENT

The proposed development is located at Parkside "Phase 4", and as described in chapter 1 of this EIAR. In terms of waste management, the receiving environment is largely defined by Dublin City Council as the local authority responsible for setting and administering waste management activities in the area. This is governed by the requirements set out in the *Eastern-Midlands Region (EMR) Waste Management Plan 2015 – 2021.*

The waste management plan sets the following targets for waste management in the region:

- A 1% reduction per annum in the quantity of household waste generated per capita over the period of the plan;
- Achieve a recycling rate of 50% of managed municipal waste by 2020; and
- Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill (from 2016 onwards) in favour of higher value pre-treatment processes and indigenous recovery practices.

The Regional Plan sets out the strategic targets for waste management in the region and sets a specific target for C&D waste of *"70% preparing for reuse, recycling and other recovery of construction and demolition waste"* (excluding natural soils and stones and hazardous wastes) to be achieved by 2020.

The National Waste Statistics update published by the EPA in December 2017 identifies that Ireland's current progress against this C&D waste target is at 68% and our progress against 'Preparing for reuse and recycling of 50% by weight of household derived paper, metal, plastic & glass (includes metal and plast 13.2
estimates from household WEEE)' is at 45%. Both of these targets are required to be met by 12 Decemb
2020 in accordance with the requirements of the Waste Framework Directive. The Dublin City Counci
Development Plan 2016 – 2022 also sets policies and objectives for the area which reflect those set out in the regional waste management plan.

Dublin City Council no longer operates any municipal waste landfill in the area. There are numerous waste permitted and licensed facilities located in the Eastern-Midlands Waste Region for management of waste from the construction industry as well as municipal sources. These include soil recovery facilities, inert construction waste facilities, hazardous waste treatment facilities, municipal waste landfills, material recovery facilities, waste transfer stations and two waste-to-energy facilities.

Demolition Phase
The proposed development site is a green field site, therefore no demolition works at the site will be required.

Construction Phase
During the construction phase, waste will be produced from surplus materials such as broken or off-cuts of timber, plasterboard, concrete, tiles, bricks, etc. Waste from packaging (cardboard, plastic, timber) and oversupply of materials may also be generated. The construction contractor will be required to ensure that oversupply of materials is kept to a minimum and opportunities for reuse of suitable materials is maximised.

In addition, excavation of subsoil layers will be required in order to allow basement construction, drainage and utility installation and provision of underground attenuation of surface water. The project engineers, DBFL Consulting Engineers, have estimated that the total volume of material to be excavated will be c. 38,900m^3. It is expected a fill quantity of 500m^3 will be required. Approximately 38,350m^3 will be removed to an approved landfill. Surplus material that requires removal from site is deemed to be a waste, removal and reuse/recycling/recovery/disposal of the material will be carried out in accordance with the *Waste Management Act 1996* (as amended), the *Waste Management (Collection Permit) Regulations 2007* (as amended) and the *Waste Management (Facility Permit & Registration) Regulations 2007* (as amended). The volume of waste requiring recovery/disposal will dictate whether a Certificate of Registration (COR), permit or license is required by the receiving facility.

In order to establish the appropriate reuse, recovery and/or disposal route for the material to be removed off-site, it will first need to be classified. Waste material will initially need to be classified as hazardous or non-hazardous in accordance with the EPA publication *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous*. Environmental soil analysis will be carried out prior to construction on a number of the soil samples in accordance with the requirements for acceptance of

waste at landfills (Council Decision 2003/33/EC Waste Acceptance Criteria). This legislation sets limit values on landfills for acceptance of waste material based on properties of the waste including potential pollutant concentrations and leachability.

In the event of hazardous material being encountered, it will be transported for treatment/recovery or exported abroad for disposal in suitable facilities.
Waste will be generated from construction workers e.g. organic/food waste, dry mixed recyclables (waste paper, newspaper, plastic bottles, packaging, aluminium cans, tins and Tetra Pak cartons), mixed non-recyclables and potentially sewage sludge from temporary welfare facilities provided onsite during the construction phase. Waste printer/toner cartridges, waste electrical and electronic equipment (WEEE) and waste batteries may also be generated infrequently from site offices.

Further detail on the waste materials likely to be generated during the excavation and construction works are presented in the project-specific CWMP. The CWMP provides an estimate of the main waste types likely to be generated during the construction phase of the proposed development and these are summarised in Table 13.1.

Waste Types	Tonnes	Reuse		Recycle/Recover		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed Construction	14257.98	10	1425.80	80	11406.38	10	1425.80
Timber	12097.68	40	4839.07	55	6653.72	5	604.88
Plasterboard	4320.6	30	1296.18	60	2592.36	10	432.06
Metals	3456.48	5	172.82	90	3110.83	5	172.82
Concrete	2592.36	30	777.71	65	1685.03	5	129.62
Other	6480.9	20	1296.18	60	3888.54	20	1296.18
Total	**43206**		**10080.76**		**30153.47**		**4174.41**

Table 13.1 Estimated on and off-site reuse, recycle and disposal rates for construction waste

It should be noted that until final materials and detailed construction methodologies have been confirmed it is difficult to predict with a high level of accuracy the construction waste that will be generated. The exact materials and quantities may be subject to some degree of change and variation during the construction process. However, the above estimates are considered to be the worst-case scenario. The site specific CWMP will be updated as required and deemed as a live document.

Operational Phase
An Operational Waste & Recycling Management Plan (OWRMP) has been prepared for the development. The plan will seek to ensure the development contributes to the targets outlined in the Eastern Midlands Regional (EMR) Waste Management Plan 2015 – 2021. Mitigation measures proposed to manage impacts arising from wastes generated during the operation of the proposed development are summarised below.

All waste materials will be segregated into appropriate categories and will be stored in appropriate bins or other suitable receptacles in a designated, easily accessible areas of the site in accordance with the *Dublin City Council Development Plan 2016 – 2022.*

	Waste Volume (L/week)					
Waste type	**Block A (Core 1)**	**Block B (Core 2)**	**Block C (Core 3)**	**Block D (Core 4)**	**Block D (Core 5)**	**Totals (L)**
Organic Waste	345	315	345	210	175	**1390**
Mixed Dry Recyclables	5060	4585	5025	3700	2940	**21310**
Glass	345	315	345	210	175	**1390**
Mixed Municipal Waste	5060	4585	5025	3700	2940	**21310**
Total	**10810**	**9800**	**10740**	**7820**	**6230**	**45400**

Table 13.2: Residential Waste Prediction (L/per week)

Non-Residential Floor Areas	Location	Area (sq.)	Area (NIA)	DMR (Recycling)	Food Waste	MNR (Residual)	Glass	Total (L)
Communal Amenity A	Area A	850	654.5	1636.25	-	1636.25	-	**3272.5**
Communal Amenity B	Area B	1100	847	2117.50	-	2117.50	-	**4235.0**
Total		**1950**	**1501.5**	**3753.75**	**-**	**3753.75**	**-**	**7507.5**

Table 13.3: Commercial Waste Prediction (L/per week)

All waste leaving the site will be recycled or recovered, with the exception of those waste streams where appropriate recycling/recovery facilities are currently not available. All waste leaving the site will be transported by suitable permitted contractors and taken to suitably permitted or licenced facilities. All waste leaving the site will be recorded and copies of relevant documentation maintained.

Hazardous Waste
Hazardous waste may be generated from WEEE, batteries, fluorescent tubes, and cleaning products. Any waste classed as hazardous will be required to be taken to a specialised waste company e.g. Rilta.

13.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development consists of 282 no. apartments comprised of:

- 94 no. 1 bedroom apartments
- 175 no. 2 bedroom apartments
- 13 no. 3 bedroom apartments

The development also includes residential amenity facility, basement and surface car parking, bicycle parking; surface water attenuation, green roof, landscaping and all associated site development works on lands measuring approximately 3.17 hectares.

The project will involve the development of the proposed Parkside site over a construction period 2-4 years. When considering a development of this nature, the potential waste management impact on the surroundings must be considered for each of two distinct stages:

- construction phase;
- operational phase.

As stated, the construction phase will involve extensive excavation over the development site and the erection of a new development over a phased construction period. These issues are discussed in detail in the following sections. Waste activities relating to the construction and operation of the development in terms of waste management are discussed.

13.5 POTENTIAL IMPACTS

This section details the potential waste impacts associated with the proposed development.

Construction Phase

The proposed development will generate a range of non-hazardous and hazardous waste materials during construction. General housekeeping and packaging will also generate waste materials as well as typical municipal wastes generated by construction employees including food waste.

Waste materials will be required to be temporarily stored on site pending collection by a waste contractor. Dedicated areas for waste skips and bins will need to be identified across the site. These areas will need to be easily accessible to waste collection vehicles.

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

The use of non-permitted waste contractors or unauthorised waste facilities could give rise to inappropriate management of waste and result in negative environmental impacts or pollution. It is essential that all waste materials are dealt with in accordance with regional and national legislation, as outlined previously, and that time and resources are dedicated to ensuring efficient waste management practices.

Wastes arising will need to be taken to suitably registered/permitted/licenced waste facilities for processing and segregation, reuse, recycling, recovery and/or disposal as appropriate. There are numerous licensed waste facilities in the Eastern Midlands region which can accept hazardous and non-hazardous waste materials. Acceptance of waste from the proposed development would be in line with daily activities at these facilities. At present, there is sufficient capacity for the acceptance of the likely construction waste arising at facilities in the region. Where possible, waste will be segregated into reusable, recyclable and recoverable materials. The majority of construction materials are either recyclable or recoverable.

Recovery and recycling of construction waste has a positive impact on sustainable resource consumption, for example where waste timber is mulched into a landscaping product or waste asphalt is recycled for use in new pavements. The use of recycled materials, where suitable, reduces the consumption of natural resources.

There is a quantity of top soil and sub soil which will need to be excavated to facilitate the proposed development. The project engineers DBFL Engineering have advised that not all of this material will be reused onsite. However, if there is surplus excavated material it will need to be removed off-site. Correct classification and segregation of the excavated material is required to ensure that any potentially contaminated materials are identified and handled in a way that will not impact negatively on workers as well as on water and soil environments, both on and off-site.

The opportunities for waste materials to be reused off-site will provide positive impacts in the resourcing of materials for other developments and reduce the requirement for raw material extraction.
The potential effect of construction waste generated from the proposed development is considered to be ***short-term,*** and ***not significant.***

Operational Phase

The potential impacts on the environment of improper, or a lack of, waste management during the operational phase would be a diversion from the priorities of the waste hierarchy. This would lead to volumes of waste being sent unnecessarily to landfill.

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

The waste materials generated on a daily basis will be stored in dedicated waste storage areas.

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

Waste collection vehicles will be required to service the development on a regular basis to remove waste. The use of non-permitted waste contractors or unauthorised facilities could give rise to inappropriate management of waste and result in negative environmental impacts or pollution. It is essential that all waste materials are dealt with in accordance with regional and national legislation, as outlined previously. Time and resources should be dedicated to ensuring efficient waste management practices. An operational waste & recycling management plan has been submitted with the application.

The potential impact of operational waste generation from the development is considered to be ***long-term*** and ***not significant***.

13.6 POTENTIAL CUMULATIVE IMPACTS

The cumulative impact of the additional wastes generated by the proposed development has been considered. The existing waste management infrastructure and procedures for management of waste are sufficient and as such there will be no significant cumulative impact in terms of waste from the proposed development.

13.7 MITIGATION MEASURES

This section outlines the measures that will be employed in order to reduce the amount of waste produced, manage the wastes generated responsibly and handle the waste in such a manner as to minimise the effects on the environment.

Construction phase

A project specific CWMP has been prepared in line with the requirements of the guidance document issued by the DoEHLG. Adherence to the high-level strategy presented in this CWMP will ensure effective waste management and minimisation, reuse, recycling, recovery and disposal of waste material generated during the construction phase of the proposed development.

The project engineers, DBFL Consulting Engineers, have estimated that the **total volume of material to be excavated** will be c. 38,900m^3. It is expected a fill quantity of 550m^3 will be required. It will be expected that approximately 38,350m^3 will be removed to an approved landfill. The contractor(s) will endeavour to ensure that excavated material to be taken offsite is reused or recovered off-site or disposed of at authorized facility.

In addition, the following mitigation measures will be implemented:

- Building materials will be chosen with an aim to 'design out waste';
- On-site segregation of waste materials will be carried out to increase opportunities for off-site reuse, recycling and recovery – it is anticipated that the following waste types, at a minimum, will be segregated:
  - Concrete rubble (including ceramics, tiles and bricks);
  - Plasterboard;
  - Metals;
  - Glass; and
  - Timber.
- Left over materials (e.g. timber off-cuts, broken concrete blocks/bricks) and any suitable construction materials shall be re-used on-site, where possible;
- All waste materials will be stored in skips or other suitable receptacles in designated areas of the site;
- Any hazardous wastes generated (such as chemicals, solvents, glues, fuels, oils) will also be segregated and will be stored in appropriate receptacles (in suitably bunded areas, where required);
- A waste manager will be appointed by the main contractor(s) to ensure effective management of waste during the excavation and construction works;
- All construction staff will be provided with training regarding the waste management procedures;
- All waste leaving site will be reused, recycled or recovered where possible to avoid material designated for disposal;
- All waste leaving the site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licenced facilities; and
- All waste leaving the site will be recorded and copies of relevant documentation maintained.

These mitigation measures will ensure that the waste arising from the construction phase of the development is dealt with in compliance with the provisions of the *Waste Management Act 1996*, as amended, associated Regulations, the *Litter Pollution Act 1997* and the *EMR Waste Management Plan (2015 - 2021)*. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved and will encourage sustainable consumption of resources.

Operational Phase

All waste materials will be segregated into appropriate categories and will be stored in appropriate bins or other suitable receptacles in a designated, easily accessible areas of the site in accordance with the *Dublin City Council Development Plan 2016 – 2022*.

In addition, the following mitigation measures will be implemented:

- On-site segregation of all waste materials into appropriate categories including (but not limited to):
  - Organic/catering waste (including garden waste from landscaping activities).
  - Dry Mixed Recyclables;
  - Mixed Non-Recyclable Waste;
  - Glass;
  - Waste electrical and electronic equipment (WEEE) including computers, printers and other ICT equipment;
  - Batteries (non-hazardous and hazardous)
  - Fluorescent bulb tubes and other mercury containing waste (if arising).
  - Cleaning chemicals (pesticides, paints, adhesives, resins, detergents, etc.); and
- All waste materials will be stored in colour coded bins or other suitable receptacles in designated, easily accessible locations. Bins will be clearly identified with the approved waste type to ensure there is no cross contamination of waste materials;
- All waste collected from the development will be reused, recycled or recovered where possible, with the exception of those waste streams where appropriate facilities are currently not available;
- All waste leaving the site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licensed facilities; and

These mitigation measures will ensure the waste arising from the development is dealt with in compliance with the provisions of the *Waste Management Act 1996*, as amended, and all associated Regulations. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved.

13.8 PREDICTED IMPACTS

The implementation of the mitigation measures outlined in Section 13.7 will ensure that a high rate of reuse, recovery and recycling is achieved at the development during the construction phases as well as during the operational phase. It will also ensure that European, National and Regional legislative waste

requirements with regard to waste are met and that associated targets for the management of waste are achieved.

Construction Phase
A carefully planned approach to waste management as set out in Section 13.7 and adherence to the CWMP during the construction phase will ensure that the impact on the environment will be *short-term, neutral* and *imperceptible.*

Operational Phase
During the operational phase, a structured approach to waste management as set out in Section 13.7 will promote resource efficiency and waste minimisation. Provided the mitigation measures are implemented and a high rate of reuse, recycling and recovery is achieved, the predicted impact of the operational phase on the environment will be *long-term, neutral* and *imperceptible*.

13.9 'DO NOTHING' SCENARIO

If the proposed development did not go ahead there would be no waste generated at this site and operational waste generated from this site would stay at its current level.

13.10 WORST CASE SCENARIO

The 'worst-case' scenario, is that, should a CWMP not be implemented, the target recycling rates outlined in the Waste Management Plan for the Dublin City Region and all relevant waste guidance targets will not be achieved. In addition, if waste is not managed and stored correctly on site, this may lead to litter or pollution issues on the site or adjacent sites. However, this is thought to be unlikely having taken into consideration the mitigation measures outlined above.

13.11 MONITORING & REINSTATEMENT

Construction Phase
The objective of setting targets for waste management is only achieved if the actual waste generation volumes are calculated and compared. This is particularly important during the construction phases where there is a potential for waste management to become secondary to progress and meeting construction schedule targets. The CWMP will specify the need for a waste manager to be appointed who will have responsibility to monitor the actual waste volumes being generated and to ensure that contractors and sub-contractors are segregating waste as required. Where targets are not being met, the waste manager should identify the reasons for targets not being achieved and work to resolve any issues. Recording of waste generation during the project will enable better management of waste contractor requirements and identify trends. The data should be maintained to advise on future projects.

Operational Phase
During the operational phase, waste generation volumes should be monitored against the predicted waste volumes outlined in the OWRMP. There may be opportunities to reduce the number of bins required in the communal Waste Storage Areas (WSAs) where estimates have been too conservative. Reductions in bin requirements will improve efficiency and reduce waste contractor costs. Waste legislation should also be consulted on a regular basis in case of any changes which may impact on waste management procedures.

13.12 DIFFICULTIES IN COMPILING INFORMATION

There were no difficulties encountered during the production of this chapter of the EIAR.

14 ARCHAEOLOGICAL AND CULTURAL HERITAGE

14.1INTRODUCTION

Irish Archaeological Consultancy Ltd has prepared this chapter on behalf of Cairn Homes Properties Ltd. to assess the impact, if any, on the archaeological and cultural heritage resource of a proposed development at Parkside 4, Parkside Boulevard, Dublin 13. The report was undertaken by Jacqui Anderson and Grace Corbett of IAC Ltd.

This study determines, as far as reasonably possible from existing records, the nature of the archaeological 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 2014). This leads to the following:

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

The study involved detailed interrogation of the archaeological and historical background of the proposed development area. This included information from the Record of Monuments and Places of County Dublin, the City Development Plan, the topographical files of the National Museum of Ireland, and cartographic and documentary records. Inspection of the aerial photographic coverage of the proposed development area 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 proposed development area.

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

14.1.1 Definitions

In order to assess, distil and present the findings of this study, the following definitions apply:
'Cultural Heritage' where used generically, is an over-arching term applied to describe any combination of archaeological, architectural and cultural heritage features, where –

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

14.1.2 Impact Definitions

Imperceptible Impact
An impact capable of measurement but without noticeable consequences

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

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

Moderate Impact
An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends. A moderate effect arises where a change to the site is proposed, which although noticeable, is not such that the archaeological integrity of the site is compromised and which is reversible. This arises where an archaeological feature can be incorporated into modern day development without damage and that all procedures used to facilitate this are reversible.

Significant Impact
An impact which, by its magnitude, duration or intensity, alters an important aspect of the environment. An impact like this would be where part of a site would be permanently impacted upon, leading to a loss of character, integrity and data about the archaeological feature/site.

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

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

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

14.1.3 Consultation

During scoping and research for the assessment and EIAR a number of statutory and voluntary bodies were consulted to gain further insight into the cultural background of the receiving environment, as follows:

- Department of Arts, Heritage and the Gaeltacht – the Heritage Service and Policy Unit, National Monuments Section: Record of Monuments and Places; Sites and Monuments Record; Monuments in State Care Database; Preservation Orders and Register of Historic Monuments;
- National Museum of Ireland, Irish Antiquities Division: topographical files of Ireland; and
- Dublin City Council: Planning Section.

14.2METHODOLOGY

Research for this report was undertaken in two phases. The first phase comprised a paper survey of all available archaeological, historical and cartographic sources. The second phase involved a field inspection of the site.

14.2.1 Paper Survey

- Record of Monuments and Places for County Dublin;
- Sites and Monuments Record for County Dublin;
- National Monuments in State Care Database;
- Preservation Orders List;
- Topographical files of the National Museum of Ireland;
- Cartographic and written sources relating to the study area;
- Dublin City Development Plan 2016–2022;
- Aerial photographs;
- Excavations Bulletin (1970–2018).

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

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

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 Coolock, 1656
- Rocque's Map of County Dublin, 1760
- Taylor's Map of the Environs of Dublin, 1816
- Ordnance Survey maps of County Dublin, 1843, 1872, 1906–9

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

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

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

Excavations Bulletin is a summary publication that has been produced every year since 1970. This summarises every archaeological excavation that has taken place in Ireland during that year up until 2010

and since 1987 has been edited by Isabel Bennett. This information is vital when examining the archaeological content of any area, which may not have been recorded under the SMR and RMP files. This information is also available online (www.excavations.ie) from 1970–2018.

14.2.2 Field Inspection

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

The archaeological field inspection entailed -

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

14.3RECEIVING ENVIRONMENT

14.3.1 Archaeological and Historical Background

There are six recorded monuments and one site listed in the SMR within 500m of the proposed development area (Figure 14.1). The closest of these is a building (DU015-062003) and the site of a 16th/17th century house (DU015-062002) located c. 124m and c. 129m west of the site respectively. A castle (DU015-062001), listed in the SMR, is reputed to have been located within Balgriffin Park, though no trace of the castle remains and the exact location of the site is unknown. A medieval church (DU015-012001) is recorded c. 161m west-northwest of the proposed development area and an associated graveslab (DU015-012002) is recorded c. 158m west-northwest. The graveslab has been removed to the National Museum of Ireland. An enclosure (DU015-123) is recorded c. 422m north of the proposed development area, along with an associated field system (DU015-124).

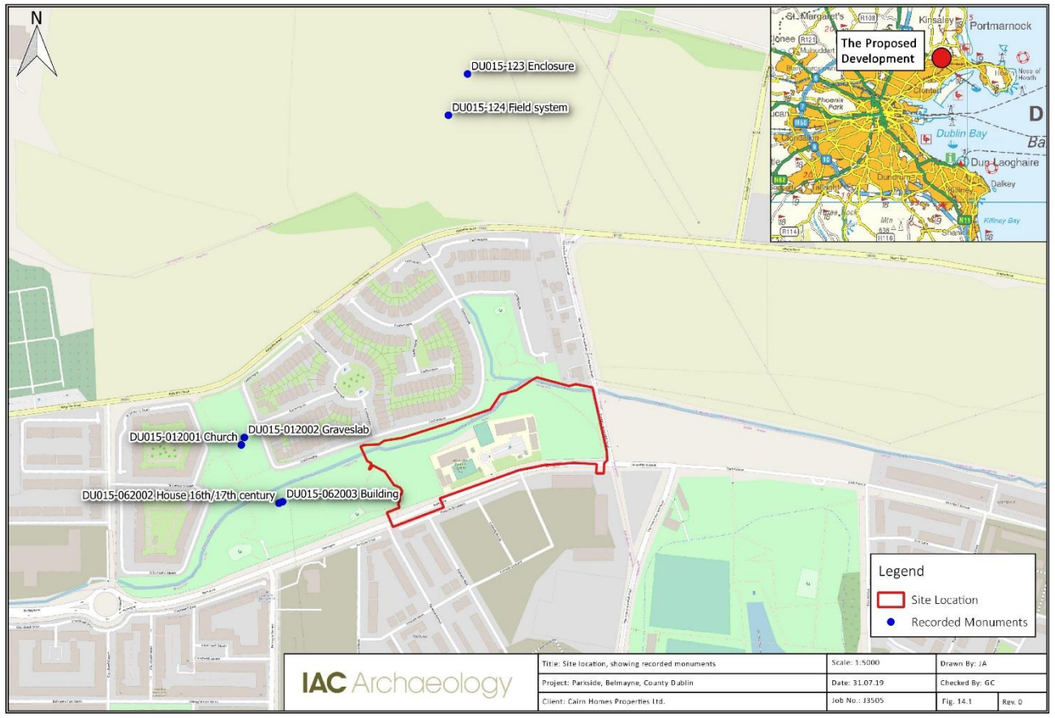

Figure 14.1 Site location, showing recorded monuments

14.3.1.1 Prehistoric Period

Mesolithic Period (6000–4000 BC)

Although recent evidence suggests there may have been a human presence in the southwest of Ireland as early as the Upper Palaeolithic (Dowd and Carden 2016), the earliest evidence for widespread settlement in Ireland dates to the Mesolithic period. These communities subsisted on hunting, fishing and foraging with seasonal natural resources being of key importance. The most common evidence found to show the presence of Mesolithic communities at a site is scatters of worked flint, a by-product from the production of flint implements. The coastal areas of North County Dublin have produced large quantities of flints dating to the Mesolithic; and seasonal habitation sites have been interpreted through the discovery of shell middens along this coastline. Although the topography of the area and proximity to the sea indicate a favourable and attractive environment for settlement there is no evidence to suggest Mesolithic activity in proximity to the proposed development area to date.

Neolithic Period (4000–2500 BC)

During the Neolithic period communities became less mobile and their economy became based on agriculture. This transition was accompanied by major social change. Agriculture demanded an altering of the physical landscape, which meant forests were rapidly cleared and field boundaries constructed.

There was a greater concern for territory, which contributed to the construction of large communal ritual monuments called megalithic tombs, which are characteristic of the period. Judging by the large number of prehistoric items that have been found c. 4–5km south in Clontarf, Dollymount and Sutton, prehistoric occupation within this area was desirable due to its location close to the coastal resource. However, there are no recorded sites dating to the Neolithic within the vicinity of the proposed development area.

Bronze Age (2500–800 BC)
The Bronze Age was marked by the widespread use and production of metal for the first time in Ireland. As with the transition from Mesolithic to Neolithic, the transition into the Early Bronze Age was accompanied by changes in society. The megalithic tomb tradition declined and ended in favour of individual, subterranean cist or pit burials that occur either in isolation or in small cemeteries. These burials contained inhumed or cremated remains and were often accompanied by a pottery vessel. A significant amount of Bronze Age activity has been discovered in the townland of Grange, the northwest corner of which is c. 357m to the southeast of the proposed development area. A number of sites were excavated in 2004, when fulacht fia or burnt mound activity was recorded along with possible funerary and industrial activity (Bennett 2004:445, 446, Licence Ref.: 04E1024, 03E1535).

Fulachtaí fia or burnt mound sites typically date to the Bronze Age and are amongst the most commonly found sites within the prehistoric landscape, with thousands recorded across the country. Such sites are often characterised by a horseshoe-shaped mound of heat-affected stone and charcoal, often associated with a trough and pits, and are located in close proximity to a water source or in areas where the water table is particularly high. They are often affected by agricultural activities such as ploughing and often survive only as irregular spreads of heat-affected stones and charcoal-rich material. Fulachtaí fia have traditionally been interpreted as cooking sites, however, alternative interpretations have been presented including brewing, tanning, dyeing and bathing.

Iron Age (800 BC–AD 500)
The Iron Age was traditionally seen as a period for which there was little evidence in comparison to the preceding Bronze Age and the succeeding early medieval period. However, development-led excavation in recent decades and projects such as the Late Iron Age and Roman Ireland Project have added significantly to our knowledge of the Irish Iron Age. In Europe, there are two stages to the Iron Age, the earlier Hallstatt and the later La Tène. While in Ireland, evidence of a Hallstatt phase is rare, and the La Tène phase is reflected strongly in the style of metalwork of this period. It is clear there was significant contact and interaction between the Continental Europe, Britain and Ireland at this time. There are no recorded sites of Iron Age date in the vicinity of the proposed development area.

14.3.1.2 Early Medieval Period (AD 500–1100)
The early medieval period is portrayed in the surviving literary sources as entirely rural, characterised by the basic territorial unit known as a túath. Byrne estimates that there were probably at least 150 kings in Ireland at any given time during this period, each ruling over his own túath (1973). It has been estimated that each túath comprised between 1,700 and 3,300 subjects, according to the most recent estimates placing the population of Ireland in the early medieval period between a quarter and a half a million people (Stout 2017). During this turbulent period, defensive enclosures known as ringforts were constructed to protect farmsteads. The extant dating evidence suggests they were primarily built between the 7th and 9th centuries AD (Stout 1997, 22-31). Often sites recorded as enclosures represent denuded ringforts or similar sites. An enclosure (DU015-123) is recorded c. 422m north of the proposed development area, along with features visible in the aerial photography which may represent an associated field system (DU015-124). Several enclosure sites have been recorded in the general area of the proposed development, such as at Grange (DU015-06401, DU015-06402) c. 900m to the east-southeast. Testing at DU015-063 and 064 in 2004 did not reveal any evidence for enclosure at these sites, although crop marks visible in aerial photography of the sites suggested the presence of such features. However, further excavation work in 2004, the northwest corner of which is c. 357m to the southeast of the proposed development area, revealed a substantial enclosure that has been interpreted as a levelled ringfort. Evidence for a gatehouse was also discovered along with a metalled entrance track.

The author Appleyard (1985, 132) states that previous to the arrival of the Anglo-Normans, the area now known as Balgriffin was previously known as Baile Hamund. This name suggests that the area was known as the place or townland of Hamund, a name which has a Viking or Norse connection. The name Hamund can be found in the Nordic Saga of the Volsungs. Hamund was the son in law of Helgi the Lean who was a main character within this saga. The name is more commonly associated with Hamund MacThorkil, the last Danish king, who was dispossessed and had to leave Denmark. During the 12th century, he arrived in Dublin and was granted lands by Richard de Clare (better known as Strongbow), who was King Henry II's representative in Ireland. It is therefore possible that the Danish king was granted land in the Balgriffin area at this time, or that other Nordic invaders from the previous centuries claimed land in this area. The latter would equate with the discovery of a possible 10th century inscribed grave slab (DU015-012002) found at the site of the church in Balgriffin (DU015-012001), c. 161m west-northwest of the proposed development area.

Archaeological investigations in 2004 identified the remains of a large ditch to the immediate east of the zone of archaeological notification that surrounds the church (DU015-012001), c. 82m northwest of the proposed development area (Bennett 2004:0513, Licence Ref.: 04E1371). This was aligned northwest–southeast and curved towards the River Mayne. It is possible that this ditch represents the remains of an early medieval enclosure surrounding the church. However, it was associated with two slightly smaller ditches aligned east–west, one of which produced a fragment of medieval pottery. Therefore, the remains may have an association with medieval activity in the area, possibly representing the remains of a horizontal mill running down to the River Mayne.

14.3.1.3 Medieval Period (AD 1100–1600)

After the invasion of the Anglo-Norman forces, the prosperous agricultural land surrounding Dublin was distributed amongst loyal followers of the king and was subject to the manorial system of landholding. These Manors were preferably located near, or close to, rivers and often based on established sites such as ecclesiastical centres. Portmarnock, located to the northeast of the proposed development area was one such pre-Norman religious site adapted into a manorial village during the 12th to 15th centuries by the Anglo-Normans. Additionally, the coastal village of Baldoyle, located c. 1.5km to the east of site was of secular origin but was also assimilated into the manorial system.

The name of Balgriffin or Baile Ghrifin is translated as the place or townland of Griffin, a name with Welsh origins. It comes from the old Welsh name Grippiud, which later became Gruffudd. It is not clear when the renaming of the land took place from Baile Hamund to Baile Ghrifin. It may have occurred after a

Welsh settler arrived during the medieval period, possibly as a result of the Anglo-Norman invasion. The name may indicate someone of status and indeed it is thought that a castle was once located within the townland of Balgriffin Park, although no trace survives today (DU015-062001). The assumed most likely location for this castle is on the site of the 16th/17th century country house (DU015-062002) located c. 129m west of the proposed development area, which was demolished during the late 20th century. A small castle is recorded as being present on the site during The Civil Survey of 1654–5, although this may represent a small tower house or fortified house. Lewis states of Balgriffin Park, 'the mansion is built with the materials of the ancient castle, of which there are now no remains' (1837). There was also a slated stable recorded as being on site as well as other thatched outbuildings. Gardens and an orchard are referred to as being situated within the walls of the old chapel (DU015-012001).

The old chapel refers to the medieval church of St. Samson (DU015-012001), c. 161m west-northwest of the proposed development area, which was first mentioned in the texts in 1178, when Archbishop O'Toole confirmed its titles. The dedication of St. Samson refers to a Welsh saint who was born in Glamorgan in 490 AD. He became Abbot of the Monastery of St. Peiros at Ynis Echni, which over looked the Bristol Channel. Irish pilgrims who were returning from Rome often stopped at this monastery for food and rest on their journey. As a result, St. Samson decided to come and visit Ireland, as he had been impressed with the Irish pilgrims learning. He apparently arrived in the area of Balgriffin and stayed for several months before returning to Wales. The church appeared to go out of use by the 13th and 14th century as the nearby church of St. Doolagh, located within the next townland north of Balgriffin Park, became more important. St. Samson's church is recorded as being present, but in ruins during the Regal Visitation of 1615. Although the church is documented in 12th century texts, it is possible it pre-dates the Anglo-Norman invasion, which is supported by the discovery of a probable 10th century grave slab (DU015-012002) at the site. The church therefore may possess early medieval origins, although it is unknown whether the dedication to the Welsh saint was a medieval undertaking or something that occurred at an earlier date.

14.3.1.4 Post-medieval Period (AD 1600–1800)

From the mid-19th century, the Anglo-Irish landowning classes began to slowly lose their grip on the thousands of acres of Irish landscape that formed a large part of their estates. The large country house and demesne were often only a small part of the visible wealth possessed by such families and their demise was brought about by a number of factors including the Famine; the loss of a younger generation to the first world war and the fight for independence by the Republicans. The 19th century cartographic resource shows that the landscape surrounding the proposed development area was characterised by large demesnes associated with the landowning classes, who enjoyed the rural coastal location, whilst being within easy reach of Dublin city. The site itself is shown as being located within the demesne estate associated with Balgriffin Park, which was located c. 132m to the west of the development area, as early as Rocque's map of 1760.

The lower classes resented the amount of land that was owned by the Anglo-Irish gentry and in 1922 the Land Commission was established. The purpose of the Commission was to purchase these estates (often for a greatly reduced price) so they could be re-distributed amongst the lower classes. As a result of this, many families became little more than upper class farmers and as a result many left Ireland to return to England. The large houses and demesnes were often left to decay with the houses often demolished for building materials and the demesnes subsumed back into the landscape. Very little of the former demesnes within the surrounding landscape of the proposed development survive today. A number of large houses have been demolished and replaced by housing estates, including Balgriffin House, Airfield Lodge, Newgrove House, Donaghmede House, Newbrook House, Grange Lodge and Kilbarrack House.

14.3.2 Previous Archaeological Investigations

A programme of archaeological testing was previously carried out within part of the proposed development area prior to the construction of the former school on the site (Figure 14.2). While nothing of archaeological significance was uncovered, imported material was common across the area tested, particularly in the location of the former pond depicted in the first edition OS mapping of 1843 (Kyle and Bailey 2008). In addition, there was evidence that the site had been periodically subjected to inundation by the River Mayne to the immediate north. The natural geology was encountered at 1.28m – 1.51 below ground level (bgl) at the eastern side of the site, above which was imported material. The trenches excavated across the former pond revealed natural geology from 1.17-1.4m bgl, above which was a rich brown humic layer representing the base of the pond, with imported material above.

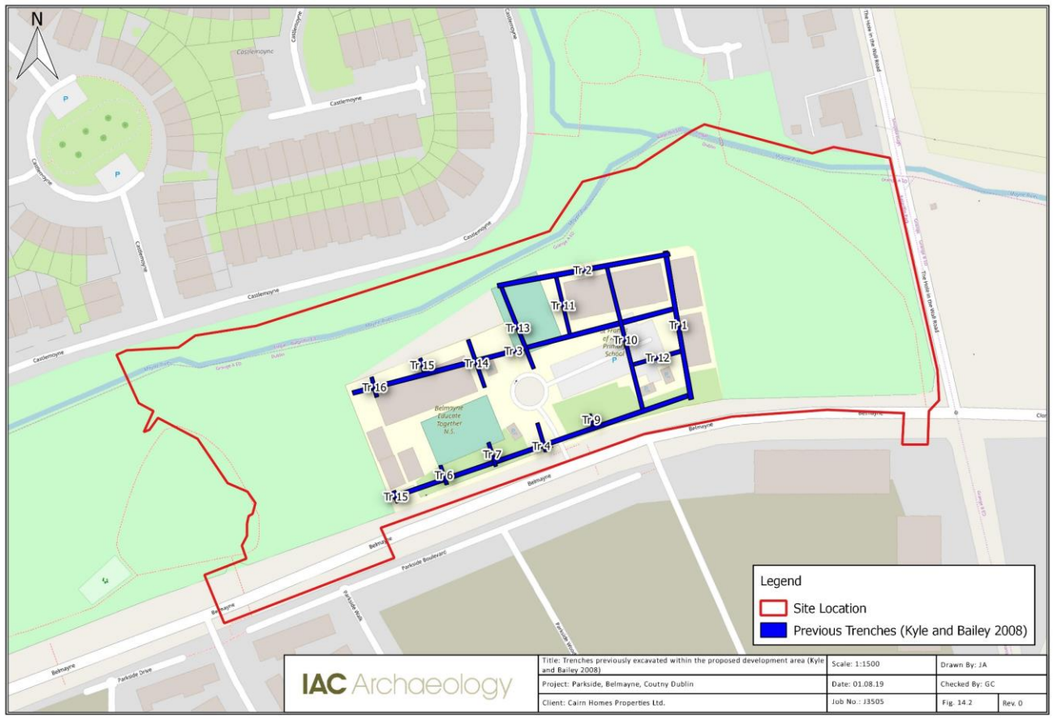

Figure 14.2 Trenches previously excavated within the proposed development area (Kyle and Bailey 2008)

A review of the Excavations Bulletin (1970–2018) revealed a number of previous archaeological investigations have taken place in the wider environs of the proposed development area. These are summarised below.

Geophysical survey was carried out to the north of the River Mayne, situated c. 82m northwest of the proposed development area. This indicated a number of anomalies of archaeological potential Subsequent testing at this site revealed the presence of a large curving ditch aligned northwest–southeast to the immediate south of the RMP constraint surrounding the medieval church (DU015-012001, Bennett 2004:0513, Licence Ref.: 04E1371). Two smaller ditches, aligned east–west, were also identified. Further excavation was undertaken in 2005, with sections of the ditches to be impacted on by the proposed development excavated, with the remainder preserved *in-situ*. Although no dating evidence was discovered within the larger of the ditches, a fragment of medieval pottery was recovered from one of the smaller ditches, which appear to have a relationship with the larger ditch. The curving ditch feature may represent an early medieval enclosing ditch of an ecclesiastical site which occupied the site before the medieval church (DU015-012001).

Geophysical survey (Licence Ref.: 05E166) and subsequent archaeological testing was carried out in Father Collins Park, c. 120m east-southeast of the proposed development area (Bennett 2005:382, Licence Ref.: 05E1372). A group of features with evidence of in-situ burning were identified in the northern extent of the area subject to testing. These have been interpreted as possible 17th/18th century kilns.

Further archaeological testing was undertaken as part of the large development within Balgriffin Park in the area to the immediate south of the proposed school and in a larger area c. 200m to the southwest (Bennett 2005:384, Licence Ref.: 05E0212). Testing was carried out over two phases however nothing of archaeological significance was discovered during this work. Monitoring of topsoil stripping was then undertaken and three areas of archaeological potential were identified. Area A was located 560m south-southwest of the proposed school and consisted of a number of features including a series of ditches, drains and pits. Some of the more substantial ditches appear to relate to each other and may have functioned as field boundaries or drains. No datable finds were recovered from any of the ditches. Area B was located 560m southwest and Area C was located 520m southwest. Isolated pits were discovered in Areas B and C. The pits located in Areas A, B and C are evidence of burning and dumping of burnt material at some stage in the past, but no datable finds were recovered from any of the pits. It is likely that the archaeological remains represent post medieval agricultural activity in the area.

Test excavation was carried out prior to the North Fringe Sewer construction (Bennett 2000:426/2001:364, Licence Ref.: 00E0714). Six test trenches were excavated 200m to the south of the proposed development area but nothing of archaeological significance uncovered. Further test excavation in a previously inaccessible area of the site was carried out in early February 2001. Two trenches were excavated but again nothing of archaeological significance was uncovered.

As part of preliminary archaeological investigations on a proposed residential development of 133 acres, the northwest corner of which is c. 357m to the southeast of the development area, testing was undertaken in three areas (Bennett2003:485, 486, Licence Ref.: 03E1496, 03E1495). Nine test trenches were excavated at DU015-063 and DU015-064, which are 744m and 913m to the southeast of the proposed development area respectively. No trace of enclosures was identified as shown on aerial photography of the site, but a small burnt mound or fulacht fia was discovered.

Further archaeological investigations at Grange were carried out in 2004 (Bennett 2004:445, 446, Licence Ref.: 04E1024, 03E1535). A total of 70 trenches were excavated across the area, which resulted in the discovery of 18 potential archaeological sites, of which 10 produced archaeologically significant remains, all within c. 357m–1km southeast of the proposed development area. These were subsequently excavated under licence and are listed below:

- Site 2:1 Grange, Licence Ref.: 04E0352 – Remains of a Bronze Age, ploughed out burnt mound or fulacht fia.
- Site 3:2 Grange, Licence Ref.: 04E0349 – Isolated cremation pit with possible prehistoric pottery found in close association.
- Site 4:2 Grange, Licence Ref.: 04E0697 – Two relatively large pits containing charcoal, but no datable artefacts.
- Site 4:3 Grange, Licence Ref.: 04E0589 – A complex of features including seven post-holes and a figure-of-eight cut. Some of the features displayed in-situ burning and it is thought some industrial activity took place at this site, which is possibly prehistoric in date.
- Site 4:4 Grange, Licence Ref.: 04E0342 – A sub-circular ditch along with an entrance track into the enclosure representing a levelled ringfort of early medieval date and substantial postholes indicating a gated entrance. The enclosure ditch had a diameter of c. 30m and was 3m wide and 2.3m deep..
- Site 5:2 Grange, Licence Ref.: 04E0698 – A large pit possibly representing a hearth provisionally dated to the Bronze Age.
- Site 5:4 Grange, Licence Ref.: 04E0699 – An oval, charcoal rich pit with later re-cut, containing burnt bone and single piece of flint. Possibly funerary activity connected to ring ditch – site 6:4.
- Site 6:1 Grange, Licence Ref.: 04E0701 – Five pit features and a spread of burnt mound material likely to represent a burnt mound or fulacht fia dating to the Bronze Age.
- Site 6:3 Grange, Licence Ref.: 04E0703 – A shallow pit containing charcoal and burnt bone along with a small piece of flint, interpreted as a hearth.
- Site 6:4, Grange, Licence Ref.: 04E0704 – A single curvilinear ditch with a length of c. 12m containing charcoal rich fills, burnt bone, pottery fragments and two amber beads. May represent prehistoric funerary activity.
- Site 9:1 Grange, Licence Ref.: 04E0367 – Four pits, seventeen stakeholes and a burnt mound likely to represent a burnt mound site or fulacht fia dating to the Bronze Age.
- Site 10:1 Grange, Licence Ref.: 04E0705 – Four pits in a rectangular setting, one of which produced a piece of burnt bone. Undated but may represent possible prehistoric domestic activity.
- Site 10:2 Grange, Licence Ref.: 04E0706 – An isolated pit showing signs of intense in-situ burning, and likely to represent a Bronze Age kiln type of feature.

14.3.3 Cartographic Analysis

14.3.3.1 Down Survey Map of the Barony of Coolock, 1656

The townland of Balgriffin, within which the proposed development site is not marked on this map as it is located within the lands belonging to the Lord of Howth. Rocque's Map of County Dublin, 1757 (Figure 14.3) Although not a truly accurate representation of the landscape, this is the first county map of Dublin that provides a good level of detail. The proposed development area is marked within the demesne associated with Balgriffin House, although in error the house has been annotated as Stopolin. Stopolin House is supposed to be located further to the east. The demesne is marked as being enclosed by a wall, and a planted entrance avenue and drive are also present. There are four buildings marked within the demesne, along with gardens. Subrectangular features are shown which may represent the ponds or ornamental pools that are located partially within the proposed development area. The River Mayne is also shown. There is no indication as to whether any of the marked buildings represent the remains of the church (DU015-012001) or castle (DU015-062001).

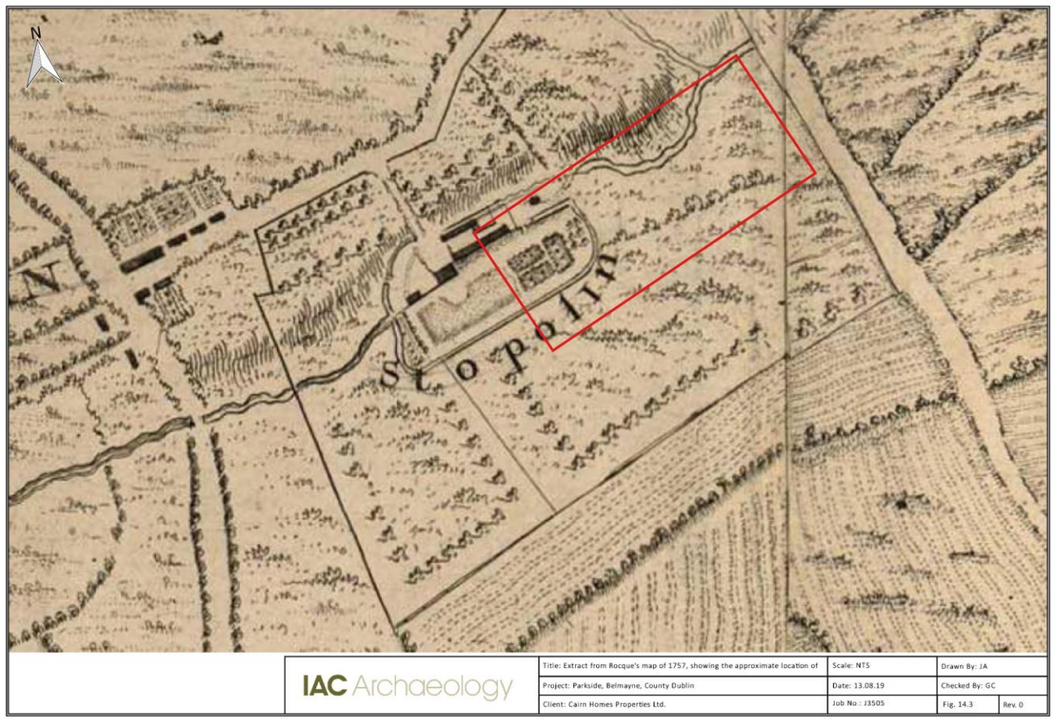

Figure 14.3 Extract from Rocque's map of 1757, showing the approximate location of the proposed development area

14.3.3.2 Taylor's Map of the Environs of Dublin, 1816

Taylor's map of the county shows all the main demesnes as well as the position of significant buildings. This map shows Balgriffin House is present with the demesne surrounded by a wall. However, there is little demesne planting shown within the estate. The River Mayne is still marked as flowing through Balgriffin House demesne, although there is no indication of the ponds or pools to the east of the house.

14.3.3.3 First Edition Ordnance Survey Map, 1843, Scale 1:10560 (Figure 14.4)

This map shows the first accurate detail of the proposed development area. By the mid-19th century the functioning demesne associated with Balgriffin House had reduced in size to just a small portion surrounding the house. The tree planted avenue entrance to the house is still marked, but the original extent of the demesne as marked by the townland boundary has lost much of its original demesne characteristics and was likely being used as agricultural land at the time. The proposed development area is partially occupied by two rectangular ponds or ornamental pools.

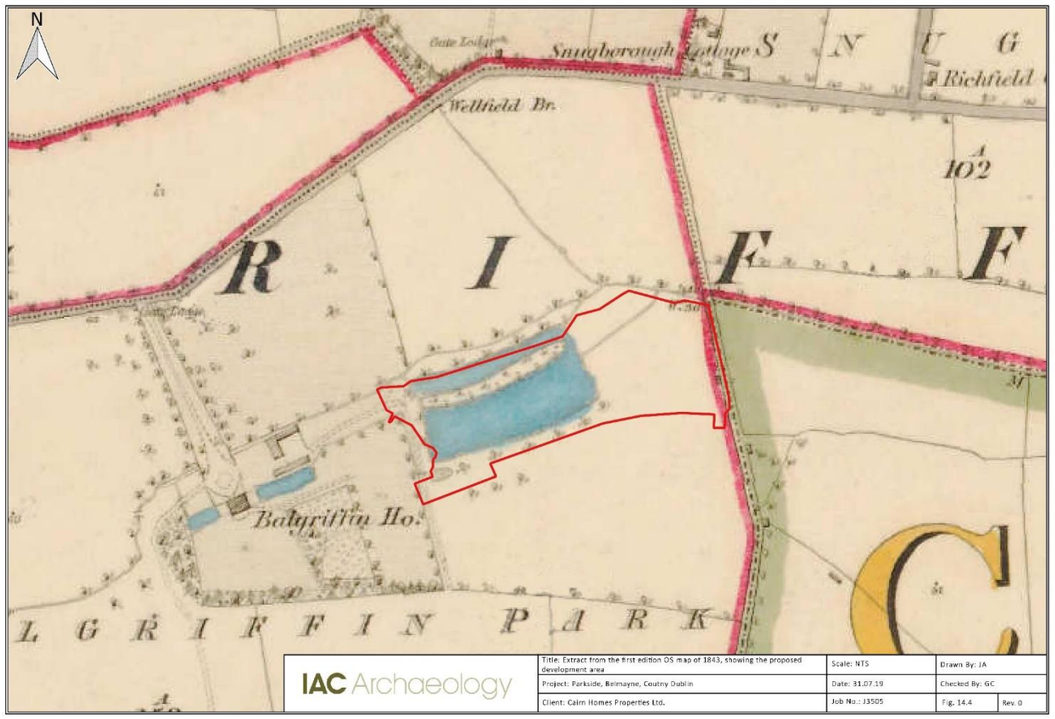

Figure 14.4 Extract from the first edition OS map of 1843, showing the proposed development area

14.3.3.4 Second Edition Ordnance Survey Map, 1872, scale 1:10560

By the time of this edition the lakes or ponds in which the area of proposed development is located at Balgriffin House are no longer marked but are shaded indicating the area was still included within a functioning demesne. A walled garden is shown to the southeast of the house, which is still present along

with its associated out buildings. A large number of demesnes are also still indicated within the surrounding landscape.

14.3.3.5 25-inch Ordnance Survey Map, 1906–9, scale 1:2500 (Figure 14.5)

A field boundary marking the approximate position of the lakes is the only feature within this map that indicates their former presence. Balgriffin House is now known as Balgriffin Park. To the immediate north of the former location of the lakes, the River Mayne splits into two channels over a short distance. The area surrounding the house is no longer marked as a demesne landscape, although the house and its buildings are still present. The avenue leading north from the buildings remains intact, appearing to cross a small bridge over the River Mayne. Part of an access track from the road to the east, leading to the house passes through the western end of the site.

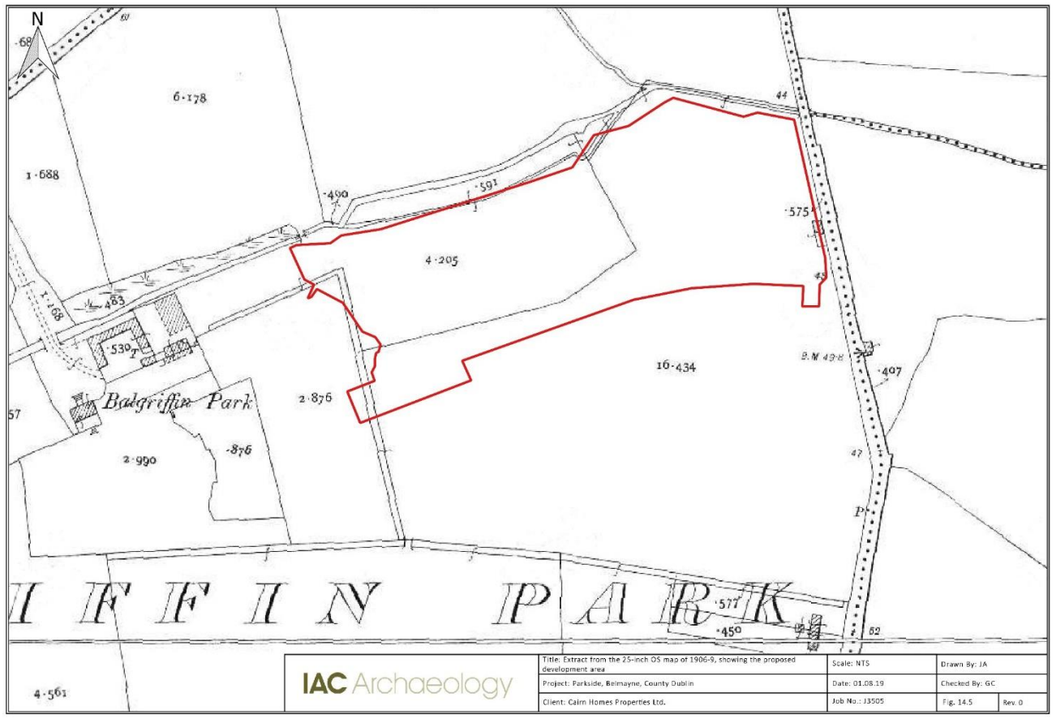

Figure 14.5 Extract from the 25-inch OS map of 1906-9, showing the proposed development area

14.3.4 Dublin City Development Plan 2016–2022

The Dublin City 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 a policy of the Development Plan to promote the in-situ preservation of archaeology as the preferred option where development would have an impact on buried artefacts. Where other alternatives are acceptable or exceptional circumstances are determined by the relevant statutory agencies. Where preservation in-situ is not feasible, sites of archaeological interest shall be subject to archaeological investigations and recording according to best practice, in advance of redevelopment.

There are six recorded monuments and one site listed in the SMR within 500m of the proposed development area. These are listed below in Table 14.1. Further information on these sites can be found in Appendix 14.1.

RMP/SMR NO.	LOCATION	CLASSIFICATION	DISTANCE FROM DEVELOPMENT
DU015-062003	Balgriffin Park	Building	c. 124m west
DU015-062002	Balgriffin Park	House- 16th/17th century	c. 129m west
DU015-062001	Balgriffin Park	Castle-unclassified	Location unknown, reputedly Balgriffin Park
DU015-012002	Balgriffin Park	Graveslab	c. 158m west-northwest
DU015-012001	Balgriffin Park	Church	c. 161m west-northwest
DU015-123	Saintdoolaghs	Enclosure	c. 422m north
DU015-124	Saintdoolaghs	Field system	c. 422m north

Table 14.1 Recorded Archaeological Sites in the vicinity of the Proposed Development Area

14.3.5 Aerial Photography

Aerial photography imagery held by the Ordnance Survey of Ireland (1995, 2000, 2005) Google Maps (2003–2019) and Bing Maps were examined in order to identify any unrecorded features of archaeological potential. The earliest aerial photography available for the site, which dates to 1995, shows the proposed development area occupied by agricultural fields, with a wooded area associated with the complex of agricultural buildings to the west (OSI). There is little change to the proposed development area until 2005, when the road which runs to the immediate south of the site was constructed (Google Earth 2005, Plate 14.1). Google Earth imagery from 2008 shows the school which formerly occupied the site under construction. In 2015, the area to the immediate west of the school appears to have been landscaped, while in 2017, a gravel temporary car-parking area was established to the east of the school (Google Earth 2017, Plate 14.2). No features of archaeological potential were identified from the aerial photography.

Plate 14.1 Proposed development area, 2005

Plate 14.2 Proposed development area, 2017

14.3.6 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.

Only one stray find is recorded from the vicinity of the proposed development area, which relates to the discovery of the graveslab (NMI 1958:50) which is now recorded in the RMP (DU015-012002) c. 158m west-northwest. The graveslab is no longer present on the site, having been removed to the National Museum of Ireland.

14.3.7 Townlands

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

Gaelic land ownership required a clear definition of the territories held by each sept and a need for strong, permanent fences around their territories. It is possible that boundaries following ridge tops, streams or bog are more likely to be older in date than those composed of straight lines (ibid. 179). The vast majority of townlands are referred to in the 17th century, when land documentation records begin. Many of the townlands are mapped within the Down Survey of the 1650s, so called as all measurements were carefully 'laid downe' on paper at a scale of forty perches to one inch. Therefore, most are in the context of pre-17th century landscape organisation (McErlean 1983, 315).

In the 19th century, some demesnes, deer parks or large farms were given townland status during the Ordnance Survey and some imprecise townland boundaries in areas such as bogs or lakes, were given more precise definition (ibid.). Larger 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.

The proposed development area is located within Balgriffin Park townland, County Dublin. The road to the immediate east of the proposed development area forms a townland boundary between the townlands of Balgriffin Park and Grange.

14.3.8 Place name Analysis

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

The author Appleyard (1985: 132) claims that prior to the arrival of the Anglo-Normans, the area now known as Balgriffin, within which the proposed development are lies, was known as Baile Hamund. This

name suggests that the area was known as the place or townland of Hamund, which has a Viking or Norse connection, possibly relating to Viking settlers arriving in Ireland in the early medieval period.

The name of Balgriffin or Baile Ghrifin is translated as the place or townland of Griffin, a Welsh name. It is not clear when the change in place name took place from Baile Hamund to Baile Ghrifin. It may have occurred after a Welsh settler arrived during the medieval period, possibly as a result of the Anglo-Norman invasion. The name may indicate someone of status and indeed, it is thought that a castle (DU015-062001) was once located within the townland of Balgriffin Park, although no trace survives today.

14.3.9 Field Inspection

The proposed development area is currently divided into three sections. The western section of the site is currently fenced and consists of a level area of rough pasture (Plate 14.3). The central area is occupied by the site of the former school which has recently been demolished to ground level (Plates 14.4 and 14.5). A number of portacabins still occupy the west and east extents of the school site. This area of the site is littered with demolition debris (Plate 14.6). The eastern section of the proposed development area is primarily in use as a temporary car park surfaced with gravel (Plate 14.7). It is clear that during construction of the car park the ground was disturbed as a bank of overgrown earth surrounds the parking area (Plate 14.8). A path accessible to the public runs north–south through this eastern section. The north of the proposed development site, adjacent to the River Mayne, is overgrown with vegetation (Plate 14.9). The level of both the former school site and the temporary car park are above that of the banks of the river, this may have resulted from the deposition of material during previous construction works.

No features of archaeological potential were identified during the field inspection which was carried out on the 2nd of August 2019.

Plate 14.3 Western section of the proposed development area, facing north

Plate 14.4 Former school site, facing northwest

Plate 14.56 Former school site, facing northeast

Plate 14.6 Demolition debris within central section of the proposed development area, facing north-northwest

Plate 14.7 Temporary car park, facing north-northeast

Plate 14.87 Bank of redeposited material surrounding car park, facing south

Plate 14.98 North of the proposed development area, facing northwest

14.4CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development, as set out in the statutory planning notices, will see site clearance and a construction phase to include access roads, a new basement car park, new homes, and all associated infrastructure. Post construction the land will be landscaped. This will include reprofiling of a portion of the river's floodplain although no works are proposed to the river itself.

14.5POTENTIAL IMPACTS

Construction Phase
It remains possible that previously unknown archaeological features survive outside of the footprint of the previously excavated trenches. Any archaeological features that have the potential to survive would be impacted as a result of the development going ahead. This will be caused by groundworks associated with the construction of the proposed development.

Operational Phase
No impacts upon the archaeological resource have been identified as a result of the operation of the proposed development.

14.6POTENTIAL CUMULATIVE IMPACTS

All impacts to archaeological features identified during previous developments in the surrounding area have been mitigated through preservation by record. As it is proposed to monitor construction activity and preserve any identified archaeological features by record, no cumulative impacts are predicted upon the archaeological or cultural heritage resource.

14.7MITIGATION MEASURES

Construction Phase
It is recommended that groundworks associated with the proposed development outside of those areas previously subject to archaeological testing be monitored by a suitably qualified archaeologist. If features of archaeological potential are discovered, further mitigation may be required such as preservation in-situ or by record. Any further mitigation will require approval from the National Monuments Service of the DoCHG.

Operational Phase
No mitigation is deemed necessary as a result of the operation of the proposed development.

14.8PREDICTED IMPACTS

Construction Phase
Following the implementation of the above mitigation measures, there will be no predicted residual impacts to the archaeological resource.

Operational Phase

No impacts upon the archaeological resource have been identified as a result of the operation of the proposed development.

14.9‘DO NOTHING’ SCENARIO

If the development were not to proceed, there would be no impact upon the archaeological or cultural heritage resource.

14.10 ‘WORST CASE’ SCENARIO

If the development were to proceed and no archaeological mitigation undertaken, archaeological features may be permanently lost.

14.11 MONITORING & REINSTATEMENT

The mitigation measures recommended above would also function as a monitoring system to allow the further assessment of the scale of the predicted impacts and the effectiveness of the recommended mitigation measures. Reinstatement will not be required.

14.12 DIFFICULTIES IN COMPILING INFORMATION

No difficulties were encountered during the compilation of this chapter.

14.13 REFERENCES

Appleyard, D.S 1985 Green Fields Gone Forever – The Story of the Coolock and Artane Area Coolock Select Vestry,1985
Bennett, I. (ed.) 1987–2010 Excavations: Summary Accounts of Archaeological Excavations in Ireland. Bray. Wordwell.
Byrne, F. J 1973 Irish Kings and High Kings. London: Batsford.
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, 158–63.
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).
Environmental Protection Agency. 2017 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.
Kyle, J. and Bailey, F. 2008 Archaeological Assessment at the Proposed Belmayne School, Balgriffin Park, County Dublin Licence Ref.: 08E0291. Unpublished Report prepared by IAC Ltd.
Lewis, S. 1837 (online edition) Topographical Dictionary of Ireland.
National Monuments Service, Department of Culture, Heritage and the Gaeltacht. Sites and Monuments Record, County Dublin.
National Museum of Ireland. Topographical Files, County Dublin.
Stout, M. 1997. The Irish Ringfort. Dublin: Four Courts Press.
Stout, M. 2017 Early Medieval Ireland 431-1169. Bray. Wordwell.

CARTOGRAPHIC SOURCES
Down Survey Map of the Barony of Coolock, 1656
Rocque’s Map of County Dublin, 1760
Taylor’s Map of the Environs of Dublin, 1816
Ordnance Survey maps of County Dublin, 1843, 1872, 1906–9

ELECTRONIC SOURCES
www.excavations.ie – Summary of archaeological excavation from 1970–2018.
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.logainm.ie –Placenames Database of Ireland launched by Fiontar agus Scoil na Gaelige and the DoCHG.

15 INTERACTIONS

15.1INTRODUCTION

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	*Biodiversity*	*Soils/ Geology*	*Water*	*Noise*	*Air Climate*	*Landscape*	*Cultural Heritage*
Population								
Biodiversity								
Soils	**1**	**7**						
Water	**2**	**8**	**11**					
Noise	**3**	**9**						
Air Climate	**4**		**12**					
Landscape	**5**	**10**	**13**					
Material Assets	**6**							
Cultural Heritage							**14**	

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. 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 Parkside area and the existing Mayne River Park will interact with the landscape, such that they will be aware of a significant change at this site from fenced off, vacant brownfield site to a new residential development with multi-storey blocks, open spaces, etc. Such a transformation, whilst significant, is designated for under the City Development Plan and the Local Area Plan. It is expected that the design of the proposed scheme will over time integrate with the adjoining apartment developments along the River Mayne to the east and with the other residential developments in the 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 Natura Impact Statement submitted with the application there are no elements of the proposed development that are likely to give rise to significant effects on the local Natura 2000 sites once proper mitigation measures are carried out.

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

New boundary planting is planned, and the riverside zone is to become an improved amenity space for the area. This will include a walking track and play area for children. There will be additional planting of native trees and other flora, which will aid the growth of biodiversity along the riverside park.

Otherwise the successful implementation of the mitigation measures as outlined in this EIAR and accompanying documents, together with the landscape masterplan will minimise the potential impacts of the proposed development on local biodiversity such that its residual impact on other habitats, flora and fauna will be imperceptible neutral overall.

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 space 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

16.1INTRODUCTION

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 STAGE

Population & Human Health	Construction and Environmental Management Plan (CEMP) 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 CEMP will be agreed in writing with the planning authority in writing prior to the commencement of the development.
Biodiversity	***Disturbance of birds' nests:*** If possible, site clearance works should proceed outside the nesting season, i.e. from September to February inclusive. If this is not possible, vegetation must first be inspected by a suitably qualified ecologist. If a nest is encountered then works must stop, until such time as nesting has ceased. Otherwise, a derogation licence must be sought from the NPWS to allow the destruction of the nest. ***Construction Pollution:*** A Construction Management Plan (CMP) should be prepared in accordance with guidelines from Inland Fisheries Ireland (2016). This should include a suitable silt fence or similar barrier which will ensure that the riparian zone of the River Mayne is protected from diffuse surface run-off which may be laden with sediment. Any run-off must pass through a suitably-designed settlement pond or similar so that only silt-free water enters the river. Dangerous substances such as oils, fuels etc. should be stored in a bunded area only. The site manager will be responsible for ensure that pollution prevention measures are fully implemented and monitored. A written record of at least daily checks should be maintained. Pollution incidents should be recorded and reported to the IFI in a timely manner. The CMP should detail how these measures are to be implemented on the site as well as the construction methods for construction activities and works to the floodplain. Were the site to flood during construction this could result in pollutants being lost to the river. This should be addressed by ensuring that dangerous substances are never stored in the flood zone and that reprofiling works are carried out during spring/summer months when the risk of flooding and soil saturation are lower. ***Japanese Knotweed:*** A management plan has been prepared to ensure that Japanese Knotweed is eradicated and is not allowed to spread.
Soils & Geology	- The stripping of topsoil will be carried out in a controlled way and will be limited to the immediate vicinity of the active work areas. Topsoil stockpiles will be protected during the construction works and not located in areas where sediment laden runoff may enter existing watercourse and surface water drains. Topsoil stockpiles will also be located so as note to necessitate double handling. - The design of the apartment blocks have been set as high as possible to reduce the excavation depth required for the basement. Drainage levels have also been set as high as possible to reduce the excavation depths for drainage and services. The duration of subsoil exposure to the effects of the weather will be minimised. Disturbed subsoil layers will be stabilized as soon as practicable. Stockpiles of excavated subsoil will also be protected for the duration of works and will be located separately from topsoil stockpiles. Measures will be implemented to capture and treat sediment laden surface water runoff. - Earthworks plant and vehicles delivering construction materials to site will be confined to predetermined haul routes around the site. Vehicles wheel wash facilities will be installed and refuelling and servicing of construction machinery will take place in a designated hardstand remote from any surface water inlets when not possible to carry out such activities off site. - All oils, fuels, paints and other chemicals will be stored in a secure bunded hardstand area to mitigate against spillages. - Where bedrock is encountered, it will be crushed, screened and tested for the use within the designed works to reduce the volume of material leaving the site and imported to the site.

Water Services	- A Site-specific Construction Management Plan will be developed. - Measures will be taken to capture and treat sediment laden runoff from rain water pumped from excavations and surface water runoff from areas stripped of topsoil, prior to discharge of surface water. - Weather conditions will be taken into account when stripping topsoil and excavations, in order to minimise soil erosion. - All oils, fuels, paints and other chemicals will be stored in a secure bunded hardstand area to mitigate against spillages. - Concrete batching will take place off site and wash out of concrete trucks will take place off site. - Discharge from any vehicle wheel wash areas is to be directed to on-site settlement ponds - Groundwater pumped from excavations is to be directed to on-site settlement ponds. - Foul drainage discharge from the construction compound will be tankered off site to a licensed facility until a connection to the public foul drainage network has been established. - The construction compound's potable water supply shall be located where it is protected from contamination by any construction activities or materials.
Noise & Vibration	- With regard to construction activities, reference will be made to BS5228: *Noise control on construction and open sites*, which offers detailed guidance on the control of noise and vibration from demolition and construction activities. Various mitigation measures will be considered and applied during the construction of the proposed development including, but not limited to: o Selection of Quiet Plant: The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. The least noisy item should be selected wherever possible o Noise Control at Source: If replacing a noisy item of plant is not practical, a modification or application of improved sound reduction method will be employed. o Screening: Construction: Site hoarding will be constructed around the site boundaries as standard. In addition, careful planning of the site layout will also be considered. o Liaison with the Public: A designated environmental liaison officer will be appointed to site during construction works. Any noise complaints will be logged by the liaison officer and in addition, where particularly noisy activity is planner, the liaison officer will inform the nearest noise sensitive locations of the time and expected duration of the noisy works. o Monitoring: Where required, construction noise monitoring will be undertaken at periodic sample periods at the nearest noise sensitive locations to the development. o Project Programme: When high noise generating works are in progress on a site at the same time as other works of construction that may generate significant noise and vibration, the working programme will be phased so as to prevent unacceptable disturbance at any time. o Vibration: The vibration from construction activities will be limited to the values set out in Section 8.2 (methodology) of chapter 8.
Air Quality & Climate	- Procedures within the Dust Management Plan will be strictly monitored and assessed. - 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 unsurfaced roads will be restricted to essential site traffic only. - Re-suspension in the air of spillages material from trucks entering or leaving the site will be prevented by limiting the speed of vehicles within the site to 10kmh and by use of a mechanical road sweeper. - The overloading of tipper trucks exiting the site shall not be permitted. - Aggregates will be transported to and from the site in covered trucks. - Where the likelihood of windblown fugitive dust emissions is high and during dry weather conditions, dusty site surfaces will be sprayed by a mobile tanker bowser. - Wetting agents shall be utilised to provide a more effective surface wetting procedure. - Exhaust emissions from vehicles operating within the construction site, including trucks, excavators, diesel generators or other plant equipment, will be controlled by the contractor by ensuring that emissions from vehicles are minimised by routine servicing of vehicles and plant, rather than just following breakdowns; the positioning of exhausts at a height to ensure adequate local dispersal of emissions, the avoidance of engines running unnecessarily and the use of low emission fuels. - All plant not in operation shall be turned off and idling engines shall not be permitted for excessive periods. - Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.

	- Material stockpiles containing fine or dusty elements including top soils shall be covered with tarpaulins. - Where drilling or pavement cutting, grinding or similar types of stone finishing operations are taking place, measures to control dust emissions will be used to prevent unnecessary dust emissions by the erection of wind breaks or barriers. All concrete cutting equipment shall be fitted with a water dampening system. - A programme of air quality monitoring shall be implemented at the site boundaries for the duration of construction phase activities to ensure that the air quality standards relating to dust deposition and PM_{10} are not exceeded. Where levels exceed specified air quality limit values, dust generating activities shall immediately cease and alternative working methods shall be implemented. - A complaints log shall be maintained by the construction site manager and in the event of a complaint relating to dust nuisance, an investigation shall be initiated.
Landscape & Visual	No mitigation is proposed other than standard best practice construction site management.
Traffic &Transportation	All construction related parking will be provided on site. Construction traffic will consist of the following two principal categories: - Private vehicles owned and driven by site construction staff and by full time supervisory staff; - Excavation plant 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. It is anticipated that the generation of HGV's during the construction period will be evenly spread throughout the day and as such will not impact significantly during the peak traffic periods.
Waste Management	A project specific C&DWMP has been prepared in line with the requirements of the guidance document issued by the DoEHLG and will be adhered to and will ensure effective waste management and minimisation, reuse, recycling, recovery and disposal of waste material generated during the construction phase of the proposed development. The contractor(s) will endeavor to ensure that excavated material to be taken offsite is reused or recovered off-site or disposed of at authorized facility. In addition the following mitigation measures will be implemented: - Building materials will be chosen with an aim to 'design out waste'; - On-site segregation of waste materials will be carried out to increase opportunities for off-site reuse, recycling and recovery – it is anticipated that, Concrete rubble; Plasterboard; Metals; Glass; and Timber, at a minimum, will be segregated: - Left over materials (e.g. timber off-cuts, broken concrete blocks/bricks) and any suitable construction materials shall be re-used on-site, where possible; - All waste materials will be stored in skips or other suitable receptacles in designated areas of the site; - Any hazardous wastes generated (such as chemicals, solvents, glues, fuels, oils) will also be segregated and will be stored in appropriate receptacles (in suitably bunded areas, where required); - A waste manager will be appointed by the main contractor(s) to ensure effective management of waste during the excavation and construction works; - All construction staff will be provided with training regarding the waste management procedures; - All waste leaving site will be reused, recycled or recovered where possible to avoid material designated for disposal; - All waste leaving the site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licenced facilities; and - All waste leaving the site will be recorded and copies of relevant documentation maintained.
Cultural Heritage	It is recommended that groundworks associated with the proposed development outside of those areas previously subject to archaeological testing be monitored by a suitably qualified archaeologist. If features of archaeological potential are discovered, further mitigation may be required such as preservation in-situ or by record. Any further mitigation will require approval from the National Monuments Service of the DoCHG.
Material Assets	A range of construction related mitigation measures are outlined within other chapters of the EIAR with respect to various aspects of the built environment – chapters 6, 7, 11 and 13.The existing electricity, water services, gas and telecommunications networks will be coordinated with the relevant utility provider and carried out by approved contractors.

16.3 OPERATION STAGE

Population & Human Health	No addition mitigations measures are considered necessary.
Biodiversity	*Artificial Lighting:* - 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. This is particularly important for the northern boundary along the Mayne River. There is no lighting proposed to the rear of the proposed development site and the following principals will be followed in relation to the overall lighting plan for the proposed development site: - Lighting design will be flexible and be able to fully take into account the presence of protected species. Therefore, appropriate lighting should be used within a proposed development and adjacent areas with more sensitive lighting regimes deployed in wildlife sensitive areas. - Dark buffer zones will be used as a good way to separate habitats or features from lighting by forming a dark perimeter around them. This could be used for habitat features noted as foraging areas for bats. - Buffer zones will be used to protect Dark buffer zones and rely on ensuring light levels (levels of illuminance measured in lux) within a certain distance of a feature do not exceed certain defined limits. The buffer zone can be further subdivided in to zones of increasing illuminance limit radiating away from the feature or habitat that requires to be protected. - Luminaire design 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 will 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 is recommended to reduce the blue light component of the LED spectrum). o Luminaires should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats. o The use of specialist bollard or low-level downward directional luminaires should be considered in bat sensitive areas to retain darkness above. o Column heights will be carefully considered to minimise light spill. The shortest column height allowed should be used where possible. o Only luminaires with an upward light ratio of 0% and with good optical control will be used. o Luminaires will always 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. 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.
Soils & Geology	On completion of the construction phase no further mitigation measures are proposed as there will be no further impact on soils and the geological environment.
Water Services	- Slight modification of the Mayne River floodplain ensures the proposed residential blocks will be located in Flood Zone C. - Surface water discharge rates will be controlled by a Hydrobrake type vortex control device in conjunction with attenuation storage. In addition, the installation of a 'smart manhole' upstream to the outfall to Mayne River will ensure that no backflow takes place from the Mayne River into the attenuation tank. - No specific mitigation measures are proposed in relation to water supply, however water conservation measures such as dual flush water cisterns and low flow taps will be included in the design.
Noise & Vibration	- During operation, noise mitigation measures with respect to the outward impact of traffic from the development are not deemed necessary. - The facades highlighted in Chapter 8, figure 8.6 will be provided with upgraded glazing that achieves the minimum sound insulation (set out in table 8.28 of Chapter 8)
Air Quality & Climate	The operational phase mitigation by design measures to minimise the impact of the development on air quality and climate are as follows: - Thermally efficient glazing systems on all units - Mechanical Ventilation and Heat Recovery (MVHR) systems or equivalent installed in all apartments - Thermal insulation of walls and roof voids of all units - Natural Gas heating in all units - Inclusion of electric car charging points to encourage electric vehicle ownership
Landscape & Visual	The potential townscape and visual impacts have been assessed as positive. No operational phase mitigation measures are recommended.
Traffic &Transportation	A number of walking and cycling access points are proposed within the development. Good pedestrian and cycle connections and facilities will provide attractive, convenient and safe routes for residents.

	A Mobility Management Plan (MMP) has been prepared for residents within the development in order to guide the delivery and management of coordinated initiatives post construction. The MMP ultimately seeks to encourage sustainable travel practices for all journeys to and from the proposed development.
Waste Management	All waste materials will be segregated into appropriate categories and will be stored in appropriate bins or other suitable receptacles in a designated, easily accessible areas of the site in accordance with the *Dublin City Council Development Plan 2016 – 2022*. In addition, the following mitigation measures will be implemented: - On-site segregation of all waste materials into appropriate categories; - All waste materials will be stored in colour coded bins or other suitable receptacles in designated, easily accessible locations. Bins will be clearly identified with the approved waste type to ensure there is no cross contamination of waste materials; - All waste collected from the development will be reused, recycled or recovered where possible, with the exception of those waste streams where appropriate facilities are currently not available; and - All waste leaving the site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licensed facilities.
Cultural Heritage	No mitigation is deemed necessary as a result of the operation of the proposed development.
Material Assets	No additional mitigation measures to those outlined in other chapters are considered necessary during the operational phase of the development as it is considered to have a neutral to positive effect on material assets including services and infrastructure.