Environmental Impact Assessment Report (EIAR)

Volume 1 Main Statement

Strategic Housing Development at
'Barrington Tower', Brennanstown Road, Dublin 18

April 2022

Prepared by McGill Planning

In association with

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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 'Barrington Tower', Brennanstown Road, Dublin 18.

The subject site is located within Dublin 18, on zoned Residential lands and in close proximity to existing employment, community facilities, retail and public transport. As such, this is a high-quality development, in a highly sustainable location which accords with all of the National, Regional and Local Planning Policy.

The development will comprise 534 no. residential units within 8 blocks ranging in height up to 10 storeys (including lower ground floor). The development will also include residential amenity facilities, car and cycle parking, private, communal and public open spaces, all associated site development, landscape and boundary works, and services provision. The proposed development is described in the statutory notices as follows:

The development will include the demolition of an existing habitable dwelling "Winterbrook", and the derelict, former dwelling attached to Barrington Tower protected structure. 'Barrington Tower' itself will be retained and restored. It is also proposed to demolish the existing boundary wall to the north of the site along Brennanstown Road.

The development will provide a 'Build to Rent' (BTR) apartment development consisting of 8 no. blocks ranging in height up to 10 storeys (including lower ground floor) providing a total of 534 no. apartments. This will comprise of:

- **30 no. studio, 135 no. 1 -beds, 318 no. 2-beds & 51 no. 3-beds. All residential units provided with associated private balconies/terraces to the north/south/east/west elevations.**
- **Resident Support Facilities & Resident Services & Amenities (total floor area c.1,496 sq.m) including flexible spaces including entertainment rooms, meeting rooms, parcel rooms, media rooms, lounge and workspaces, gyms and studio, chef's kitchen and dining area.**
- **A creche (c.356.5 sq.m), and a retail unit (c.336.8 sq.m).**
- **Car and cycle parking at basement (2 levels) and at ground level. This will provide 419 no. car parking spaces, 1,266 no. cycle parking spaces and 17 no. motorcycle spaces.**
- **All associated site development works, open spaces and landscaping, boundary treatments, plant areas, waste management areas, cycle parking areas, and services provision (including ESB substations).**

Vehicular/pedestrian/cyclist access from Brennanstown Road will be provided along with improvement works to the Brennanstown Road including a new junction and pedestrian crossing facilities. Pedestrian/cyclist access through the site to the Brennanstown Luas Stop will also be provided.

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

1.2 LEGISLATIVE CONTEXT

Pursuant to Directive 2011/92/EU, as amended by Directive 2014/52/E (together, the EIA Directive) certain public and private projects that are likely to have significant effects on the environment are subject to the requirement to carry out Environmental Impact Assessment (EIA).

The EIA Directive has been transposed into the Irish land use planning consent system by way of the Planning & Development Acts 2000 (as amended) (the "**Act**"), and the Planning & Development Regulations 2001 (as amended) (the "**Planning Regulations**").

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

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

1.3 DEFINITION OF EIA

Article 1(1)(g) of the EIA Directive , defines *"Environmental Impact Assessment"* (EIA) as a *"process"* consisting of:

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

Article 171A of the Planning 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 176A 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:

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

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

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

- *10(b)(i) Construction of more than 500 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 gross area of the application site is c. 3.81ha, which is below the 10ha threshold for a built-up area.

The proposed development for 534 no. residential units, which is above the 500 no. unit's threshold and therefore an EIA is required in respect of the project.

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.

The number of proposed residential units within this application is above the threshold set out in Development Class 10 of Part 2 of Schedule 5 of the Planning & Development Regulations.

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

According to the Environmental Impact Assessment of Projects – Guidance on Screening (European Commission 2017) 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.	Introduction & Methodology	McGill Planning Ltd.
2.	Alternatives	McGill Planning Ltd.
3.	Description of Development	McGill Planning Ltd.
4.	Population & Human Health	McGill Planning Ltd.
5.	Biodiversity	Altemar Ltd.
6.	Lands, Soils & Geology	Enviroguide Consulting
7.	Hydrology & Hydrogeology	Enviorguide Consulting
8.	Noise & Vibration	AWN Consulting Ltd.
9.	Air & Climate	AWN Consulting Ltd.
10.	Landscape & Visual	Model works
11.	Traffic & Transportation	Waterman Moylan Consulting Engineers
12.	Material Assets	Waterman Moylan Consulting Engineers
13.	Waste Management	AWN Consulting Ltd.
14.	Cultural Heritage - Archaeology	IAC Archaeology
15.	Cultural Heritage – Architectural Heritage	Howley Hayes Cooney
16.	Interactions	McGill Planning Ltd.
17.	Summary of Mitigations Measure	McGill Planning Ltd.

Table 1.1 List 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 this EIAR is listed below with a brief outline of each specific stage.

Methodology

The specific approach or techniques used to analyse impacts or describe environments. The terminology set out in Table 3.3 of the Draft EPA 2017 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' will be used where appropriate. This terminology is set out in the table below. The Draft EPA 2017 Guidelines note '*all categories of terms do not need to be used for every effect*'.

Quality of Effects It is important to inform the nonspecialist reader whether an effect is positive, negative or neutral	**Positive Effects** A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).
	Neutral Effects No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
	Negative/adverse Effects A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).
	Imperceptible

Describing the Significance of Effects ''Significance' is a concept that can have different meanings for different topics – in the absence of specific definitions for different topics the following definitions may be useful (also see Determining Significance below.).	An effect capable of measurement but without significant consequences.
	Not significant An effect which causes noticeable changes in the character of the environment but without significant consequences.
	Slight Effects An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
	Moderate Effects An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
	Significant Effects An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
	Very Significant An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
	Profound Effects An effect which obliterates sensitive characteristics
Describing the Extent and Context of Effects Context can affect the perception of significance. It is important to establish if the effect is unique or, perhaps, commonly or increasingly experienced.	**Extent** Describe the size of the area, the number of sites, and the proportion of a population affected by an effect.
	Context Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)
Describing the Probability of Effects Descriptions of effects should establish how likely it is that the predicted effects will occur – so that the CA can take a view of the balance of risk over advantage when making a decision.	**Likely Effects** The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
	Unlikely Effects The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
Describing the Duration and Frequency of Effects 'Duration' is a concept that can have different meanings for different topics – in the absence of specific definitions for different topics the following definitions may be useful.	**Momentary Effects** Effects lasting from seconds to minutes
	Brief Effects Effects lasting less than a day
	Temporary Effects Effects lasting less than a year
	Short-term Effects Effects lasting one to seven years.
	Medium-term Effects Effects lasting seven to fifteen years.
	Long-term Effects Effects lasting fifteen to sixty years.
	Permanent Effects Effects lasting over sixty years
	Reversible Effects Effects that can be undone, for example through remediation or restoration
	Frequency of Effects Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually

Table 1.2 Description of Effects (Table 3.3 of the Draft EPA 2017 Guidance)

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.

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
Examination of Alternatives			
Description of Development			
Populations & Human Health			
Interactions			
Summary of Mitigations Measures			
Biodiversity	Altemar Ltd.	Bryan Deegan	MCIEEM
Lands, Soils & Geology	Enviroguide Consulting	Claire Clifford	BSc., MSc., PGeo, EurGeol Technical Director
Hydrology & Hydrogeology			
Traffic & Transportation	Waterman Moylan Engineering Consultants	Emma Caulwell	BEng (Hons) CEng MIEI
Material Assets		Joe Gibbons	BEng (Hons) CEng MIEI
Noise & Vibration	AWN Consulting	Chonaill Bradley	BSc in Environmental Science and AssocCIWM
Air & Climate			
Waste Management			
Landscape and Visual	Model Works	Richard Butler	BL Arch, MSc Sp Planning, MILI, MIPI)
Cultural Heritage – Archaeology	IAC Archaeologists	Faith Bailey & Jacqui Anderson	MA, BA (Hons), MIAI, MCIfA
Cultural Heritage – Architectural Heritage	Howley Hayes	Lucy O'Connor	MRIAI, AABC

Table 1.3 Competencies of Consultants

Trevor Sadler, the managing director of McGill Planning Limited, is a professional Town Planner with 20 years' experience of the Irish Planning System. He has a Masters in Urban and Regional Planning (MRUP) and a Master of Arts (MA) from University College Dublin. McGill Planning Ltd has managed numerous EIARs (EISs) & EIA Screening Assessments since the firm was established in 2005.

Bryan Deegan is the managing director of Altemar, is an environmental scientist and marine biologist with 20 years' experience working in Irish terrestrial and aquatic environments, providing services to the State, Semi- State and industry. He is currently contracted to Inland Fisheries Ireland as the sole "External Expert" to environmentally assess internal and external projects. Bryan Deegan (MCIEEM) holds a MSc in Environmental Science, BSc (Hons.) in Applied Marine Biology, NCEA National Diploma in Applied Aquatic Science and a NCEA National Certificate in Science (Aquaculture).

Joyce, BSc., MSc., is a Hydrogeologist with Enviroguide Consulting and Claire Clifford BSc., MSc., PGeo., EurGeol. is Technical Director of Contaminated Land and Hydrogeology Division with Enviroguide Consulting. Claire is a Professional Geologist with the Institute of Geologists of Ireland and has extensive experience in preparing environmental assessments for a range of project types and geological and hydrogeological site settings.

Emma Caulwell is a Chartered Engineer with a wealth of industry experience, Emma's extensive portfolio includes major office, residential and mixed-use developments in Dublin city centre, in addition to numerous major greenfield schemes. Highly skilled in drainage and SuDS design, Emma's expertise encompasses flood risk assessment, water supply design, utilities coordination and all aspects of civil engineering for development works.

Joe Gibbons is a Chartered Civil Engineer with over 30 years' experience. Joe's expertise encompasses project management together with the lead roles in Civil/Structural and traffic teams on a wide range of projects throughout Ireland. This includes traffic/transportation, roads, access, and parking design, drainage design, SUDs and infrastructure works. Joe currently manages the Civil Engineering division of Waterman Moylan. He provides invaluable input at planning and pre-planning stage of projects and has been instrumental in successfully achieving planning permission for a vast variety of building projects in Ireland.

Chonaill Bradley is a Principal Environmental Consultant with AWN Consulting with ongoing roles in waste management, waste design, environmental licensing, site investigation and environmental impact assessment. Chonaill has a BSc in Environmental Science and is an Associate member of the Charted Institute of Waste Management (AssocCIWM). Chonaill has completed numerous waste management strategies and construction environmental management plans for residential, commercial and industrial developments across Ireland and has experience in developing waste strategies, detailed waste design and conducting waste audits.

Richard Butler (BL Arch, MSc Sp Planning, MILI, MIPI) of Model Works Ltd. Richard has degrees in Landscape Architecture and Spatial Planning and is a member of the Irish Landscape Institute and Irish Planning Institute. He has 25 years' experience in development and environmental planning, specialising in Landscape/ Townscape and Visual Impact Assessment (LVIA/TVIA). In recent years Richard carried out LVIA/ TVIA for the following projects among others:

- O'Devaney Gardens SHD, Dublin;
- Pembroke Quarter Phase 1 (former Glass Bottle site);
- Mount St. Mary's SHD, Dundrum Road;
- Newtownpark Avenue SHD, Blackrock;
- Augustine Hill, Galway S.34 application for new mixed use urban quarter including high rise cluster;
- Concorde SHD, Naas Road, Dublin;
- Connolly Quarter SHD, Dublin;
- Connolly Quarter commercial buildings;

- E3 Learning Foundry, Trinity College Dublin (new building within highly sensitive historic campus context, involving the removal of existing buildings);
- Griffith Demesne SHD, Dublin;
- Hampton Wood SHD, Dublin;
- Monastery Lands SHD, Dublin;

Faith is an Associate Director and Senior Archaeologist and Cultural Heritage Consultant with IAC Archaeology. She holds an MA in Cultural Landscape Management (archaeology and built heritage) and a BA in single honours archaeology from the University of Wales, Lampeter. She is a licence eligible archaeologist, a member of the Chartered Institute of for Archaeologists, a member of the Institute of Archaeologists of Ireland and has over 18 years' experience working in the commercial archaeological and cultural heritage sector. Jacqui works as an Archaeological Consultant with IAC Archaeology. She holds an MA in Archaeology from University College Dublin and a BA in Archaeology and Classical Studies also from University College Dublin. She is a member of the Institute of Archaeologists of Ireland and has seven years' experience in the commercial archaeological sector in Ireland. Jacqui specialises in the production of archaeological assessments and EIAR across all sectors of development.

The 'Cultural Heritage – Architectural Heritage' Chapter has been prepared by James Howley and Lucy O'Connor, of Howley Hayes Cooney Architects, based in Blackrock, Co. Dublin. James Howley, FRIAI, SCA, Director of Howley Hayes Architects, has over thirty years of experience in architectural practice and is a RIAI Conservation Architect Grade I Architect. Lucy O'Connor, MRIAI, AABC, is an accredited Conservation Architect in the UK, with a master's in architectural Conservation and over fourteen years of experience in architectural practice.

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.

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

1.11 AVAILABILITY OF THE EIAR

A copy of this EIAR document and Non-Technical Summary of the EIAR document is available for purchase at the offices of Dun Laoghaire Rathdown County Council at a fee not exceeding the reasonable cost of reproducing the document.

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

2 ALTERNATIVES

2.1 TERMS OF REFERENCE

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

It is a requirement of the EIA Directive (as amended) to present a description of the reasonable alternatives considered, a justification of the final proposed development, including an indication of the main reasons for the option chosen and taking into account the effects of the project on the environment.

2.2 INTRODUCTION

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

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

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

- Alternative Locations
- Alternative Designs and Layouts
- Alternative Processes

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

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

2.3 ALTERNATIVE LOCATIONS

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

This point is also stated in the Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2017), which states that in some instances alternative locations may not be applicable or available for a specific project which is identified for a specific location. Regarding locations, the consideration of alternatives in many cases have been addressed and decided at strategic planning level during the adoption of the Dun Laoghaire Rathdown Development Plan 2016-2022.

In this regard, we note that the subject site is located within Dun Laoghaire Rathdown Council administrative area and is zoned *'Objective A' - To protect and/or improve residential amenity* in the Dun Laoghaire Rathdown County Development Plan 2016-2022. Residential, childcare facility, and shop (neighbourhood) are all permissible uses on this land use zoning.

The proposed development is therefore considered in accordance with the zoning and other relevant policies and objectives of the Development Plan. It is also noted that several other residential developments have been granted in the area under the current Development Plan on lands subject to the same zoning. As this site is zoned for development within an emerging residential area, it was not considered necessary to consider other sites.

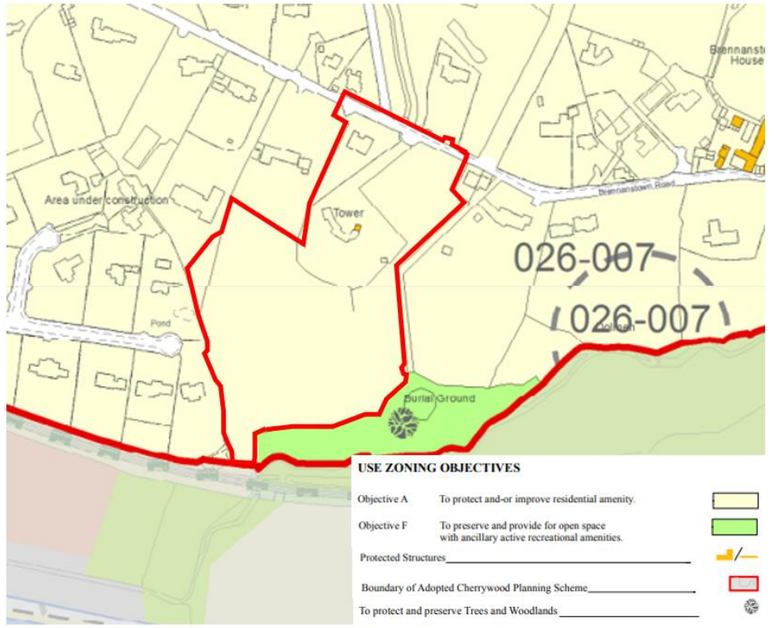

Figure 2.1 Site location on Dun Laoghaire Rathdown County Development Plan 2016-2022

2.4 ALTERNATIVE USES

The proposed development is zoned 'Objective A' in the current county Development Plan *(Dun Laoghaire Rathdown County Development Plan 2016-2022)*. This zoning permits a range of uses, as listed in the table below. The proposed residential development with a retail unit, creche and open space is considered the most appropriate land use for the subject site to ensure it is developed in line with the County Development Plan.

'Objective A' Permitted in principle
Assisted Living Accommodation, Open Space, Public Services, Residential, Residential Institution, Travellers Accommodation.
'Objective A' Open for Consideration
Allotments, Bring Banks/Bring Centres, Carpark, Caravan Park-Holiday, Caravan Park-Residential, Cemetery, Community Facility, Childcare Service, Cultural Use, Doctor/Dentist etc., Education, Embassy, Enterprise Centre, Funeral Home, Garden Centre/Plant Nursery, Guest House, Health Centre / Healthcare Facility, Home Based Economic Activities, Hotel/Motel, Household Fuel Depot, Industry-Light, Part Off-License, Office Based Industry , Offices less than 200sq.m.b , Petrol Station, Place of Public Worship, Public House, Restaurant, Service Garage, Shop Neighbourhood, Sports Facility, Tea Room/Café, Veterinary Surgery.

Table 2.1 Uses Permitted in Principle and Open for Consideration in Objective A zoning

2.5 DO-NOTHING ALTERNATIVE

The subject site has been zoned Objective A since the adoption of the previous *Dun Laoghaire Rathdown County Development Plan 2010 – 2016.* Although this zoning permits several uses, as listed in the table above, no other proposals for the subject site other than residential uses have come forward in the time that the site has been zoned Objective A and the site has remained vacant and undeveloped. We note that permission was granted for residential development on the subject site in 2008 and although the site was not developed in line with this permission, there has been no other proposal for the subject site.

Therefore, a 'do-nothing' alternative would likely result in the subject site remaining vacant and undeveloped. This would mean that these zoned lands would not be developed in accordance with the objectives of the County Development Plan. This in turn would have the knock-on impact of the development plan not being implemented in an appropriate planned manner, creating pressures to develop unzoned, unserviced or remote sites, that would not support sustainable development and would continue an unsustainable dispersed development pattern. This is not in line with National, Regional or Local plan policies which require the efficient use of zoned land such as these. Furthermore, these lands are considered highly sustainable and suitable for development due to its proximity to a wide range of existing public transport facilities, services and community facilities within the area which are key considerations for the development of any site. The proposal will also enable the restoration of a protected structure, Barrington Tower, which is currently falling into decline.

Furthermore, if the site is left undeveloped this could further delay the opening of the Brennanstown Luas Stop which will serve not only the future population of the proposed scheme but also the wider catchment area. Therefore, in terms of environmental effects, the 'do-nothing' alternative may have a negative impact on traffic and transport with a continued dependency on the private car as a main mode of transport.

The 'do-nothing' alternative would also have a negative cultural heritage and landscape and visual environmental impact due Barrington Tower entering into a state of disrepair. This would likely lead to anti-social behaviour causing a negative population and human health environmental effect.

2.6 ALTERNATIVE DESIGNS AND LAYOUTS

This is a greenfield site in an established but expanding residential area. Seven different layouts and designs were considered during the design process for the application site. The proposals were subject to discussions with the Planning Authority and An Bord Pleanála prior to the current site layout being finalised.

Each of the alternative layouts discussed below are assessed against significant environmental effects which have formed the current finalised layout. These environmental effects include population and human health, transportation, biodiversity, landscape and visual impact, soils and geology, air quality and climate, cultural heritage, and archaeology. Other factors which were fundamental in informing the final scheme include the land use objectives of the site under the County Development Plan and relevant regional and national policy. In particular, the design of the finalised layout has been directly informed by national planning policy including the National Planning Framework and ministerial guidance including the Sustainable Urban Housing: Design Standards for New Apartments (2020), Sustainable Residential Development in Urban Areas Guidelines (2009), the Urban Development and Building Heights Guidelines for Planning Authorities (2018).

In this respect, the compact form and density of the development are a result of national and regional policies and objectives which encourage efficient use of land in well serviced sites in a lead towards a lower carbon society while also providing a high quality of life for the future residents of the scheme.

In developing the finalised layout, it is noted that the key site constraints and opportunities that informed the layout the proposal:

- The significant level changes throughout the site
- The existing trees on site to be retained
- 'Barrington Tower' protected structure and the 12-meter radius surrounding the protected structure.
- Appropriate distances between the proposed apartment blocks and the boundary of neighbouring dwellings
- The single vehicle access point into the site

ALTERNATIVE LAYOUT A - DLRCC Reg. Ref.: D07A/0161

The original design concept for the site created a lower density scheme. The proposal consisted of 158 no. residential units (115 no. apartments and 43 no. houses). A 4-6 storey apartment building curved along the eastern and southern boundary of the site forming 4 interconnecting blocks. A 3 storey apartment containing 6 duplex units is located at the south of the site. The remainder of the site is comprised of detached, semi-detached and terraced houses of 3 storeys in height.

This alternative provided a basement with 146 no. car parking spaces. The site plan is a more car dominant scheme with more traditional street proposals. The open space was located in the centre of the site surrounding Barrington Tower.

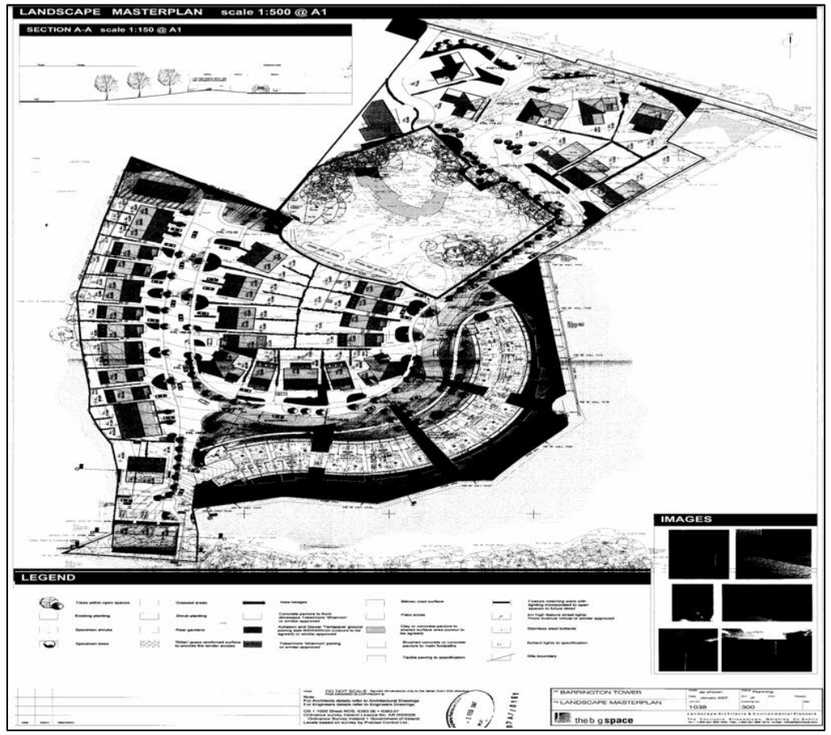

Figure 2.2 Alternative Layout A

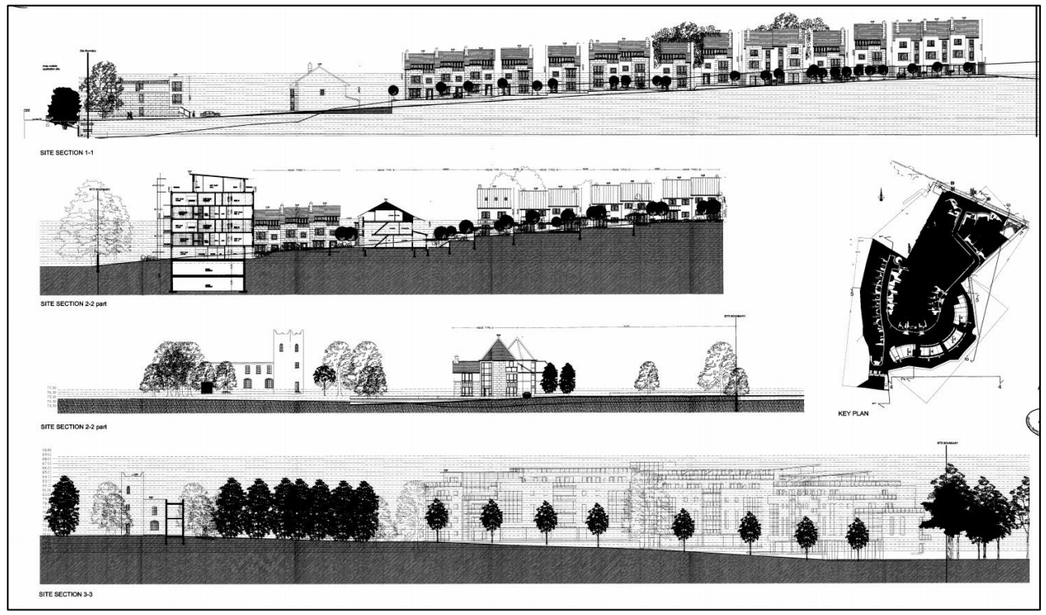

Figure 2.3 Alternative Layout A Elevations

Environmental Effects

This traditionally suburban layout with detached, semi-detached and terraced houses results in layout with a large proportion of the open space at ground level is dedicated to private gardens where it is difficult to ensure native planting and pollinator friendly plants are provided. In addition, residents may pave over parts of their private gardens resulting in less permeable space and reduced drainage capacity on the overall site. This layout would therefore have a slight-moderate negative impact on hydrology and water services and biodiversity.

This low-density layout would result in a car dependent development with unnecessary long walking routes through the site. The car dominant layout would create an environment where pedestrians and cyclists are not welcome in the space and reduce the sense of safety in the space. This would result in an increased dependency on the private car as a main mode of transport, despite the site's sustainable location with high-quality public transport options a short distance away. Car dependency is linked to increasingly sedentary lifestyles, with active travel designed out of people's day to day lives, and increased levels of loneliness for those unable to drive, negatively impacting human health. In addition, the use of the private car as a main mode of transport negatively impacts on the noise environment, and air quality and climate.

The low-density nature of this layout would result in a lower density than could be optimally achieved on this site. This is not considered in accordance with national policies for compact growth and would result in a continued unsustainable pattern of sprawling development using greenfield sites which are less accessible and have less services. This has associated negative environmental impacts continued and increasing car dependency, lack of services for the future community, reduced space for wild flora and fauna and detrimental impact on the environment in terms of air pollution and noise generated by unsustainable modes of transport.

Environmental Effect	Significance of Effect
Population and Human Health	Moderate Negative
Biodiversity	Moderate Negative
Soils and Geology	Not Significant
Hydrology	Slight Negative
Air and Climate	Slight Negative
Noise and Vibration	Slight Negative
Traffic & Transport	Slight Negative
Waste	Slight Neutral
Material Assets	Not Significant
Cultural Heritage	Not Significant
Archaeology	Not Significant
Landscape & Visual	Slight Negative

Table 2.2 Environmental Effects of Alternative A

ALTERNATIVE LAYOUT B, C AND D - LAYOUTS

Alternative Layouts B, C and D are grouped together as there are only minor changes between their layouts and designs. Alternative B was an early design proposal by Reddy Architecture and Urbanism. Layout's C and D are later design proposals. These layouts have developed from Alternative Layout A by removing the housing element and providing a higher density apartment scheme. A visual relationship between 'Barrington Tower' and the mountains to the south of the site has also been established here. In these layouts, a vehicular access road is provided from Brennanstown Road to the northeast of the site and a pedestrian access is provided from Brennanstown road to the northwest of the site which follows the western boundary toward the Brennanstown LUAS stop.

Alternative layout B provides 10 no. blocks. They key elements are as follows:

- The building blocks have been rotated to create a linear geometry throughout the entire site running perpendicular to Brennanstown Road aside from blocks D and E

Alternative layout C provides 10 no. blocks. They key elements are as follows:

- Apartment blocks J, I and H have been rotated along the western boundary

Alternative layout D provides 12 no. blocks. They key elements are as follows:

- Apartment Block C has been divided into two apartment blocks
- An additional block has been added to the scheme along the western boundary
- The reposition of the apartment blocks has created a more defined area of public open space

Figure 2.4 Alternative Layouts B, C and D Site Plans

Environmental Effects

The omission of the low-density housing typologies from Alternative Layout A in each of these alternatives has increased the density of the scheme, in line with national policies for compact growth, which will help to support increased public transport capacities, reduce urban sprawl and its associated negative impact on the environment, and support existing facilities in the area.

The grid like layout shown in Alternative B would have created a 'car friendly scheme' with traditional street layouts and reduced space for pedestrians. This would result in residents using private cars for their journeys when walking could be a viable option, in turn increasing greenhouse gas emissions and noise, and removing activity from people's lives.

The open spaces in Alternative Layout B appears to be fragmented, with no apparent large area of public open space shown. This would reduce opportunities for recreation and leisure for residents on the site, with a negative impact on human health. It would also reduce available space on the site for landscaping and planting and therefore would have a negative impact on biodiversity.

The orientation of the blocks in Alternative C and D creates a more people friendly environment by providing a car free layout, which in turn would encourage residents to walk or cycle within the development and wider area, reducing greenhouse gas emissions and noise and increasing activity in resident's day to day lives.

The orientation of the blocks in Alternative C and D are more defined with internal courtyard spaces between the blocks. However, the rotation of the blocks, hugging the western boundary, has a negative impact on the residential amenity of the neighbouring dwellings. Alternative D also includes a pedestrian access along the western boundary which goes behind Block K and therefore has a reduced level of passive surveillance.

Although Alternatives C and D include more defined open spaces, they would both still provide limited open space for biodiversity and landscaping measures and would have an overall negative impact on biodiversity. Both alternatives would also likely result in residents relying on private cars unnecessarily.

Each of these alternatives have included a focus on Barrington Tower. However, Blocks A-C in Alternatives B and C, and Blocks A-D in Alternative D are located in close proximity to the tower and would therefore have a negative impact on the cultural heritage and visual amenity of this protected structure.

Environmental Effect	Significance of Effect
Population and Human Health	Slight Negative
Biodiversity	Slight Negative
Soils and Geology	Not Significant
Hydrology	Not Significant
Air and Climate	Slight Negative
Noise and Vibration	Slight Negative
Traffic & Transport	Slight Negative
Waste	Slight Neutral
Material Assets	Not Significant
Cultural Heritage	Slight Negative
Archaeology	Not Significant
Landscape & Visual	Slight Negative

Table 2.3 Environmental Effects of Alternative B, C & D

ALTERNATIVE LAYOUT E– S247 APPLICATION TO DUN LAOGHAIRE RATHDOWN COUNTY COUNCIL

Alternative Layout E was submitted to Dun Laoghaire Rathdown County Council at a S247 consultation in September 2020. At this stage in the process, the site 'Appledoor' to the north was included in this pre- application consultation with the council. It provides an apartment and housing scheme of no. 675 units. 438 no. car parking spaces. Alternative E has evolved from Alternative B, C and D by:

- Increasing the distance between the neighbouring properties along the western boundary and apartment Blocks K, J and I.
- The pedestrian access from Brennanstown Road now runs to the east of Block K
- Creating a more defined open space strategy along with communal courtyard areas between the apartment blocks
- The creche is located directly south of Protected Structure 'Barrington Tower'
- An amenity building is located directly west of Protected Structure 'Barrington Tower'

Figure 2.5 Alternative Layouts E Site Plans

Environmental Effects

The provision of a creche in this alternative would provide childcare facilities within the development, allowing future residents to walk to the creche and therefore reducing the number of journeys that would need to be made by car and also helping to incorporate active travel into people's day to day lives. The provision of a creche in the development is therefore considered to have a positive impact on human health and a slight positive impact on traffic, and air quality.

However, the location of the creche directly south of Barrington Tower and an Amenity Building directly west of Barrington Tower has a negative impact on the visual amenity of the protected structure.

Increasing the distance of Blocks K, J and I from the western boundary of the subject site has improved the residential amenity of dwellings to the west of the site, thus having a positive impact on the population and human health of the surrounding area.

The pedestrian access being incorporated into the open space of the scheme has increased the passive surveillance of the site, however the route from block K to the Brennanstown Road is unsurveilled and could be an unattractive space for pedestrians in the winter, impacting on human health.

The more defined public open space and internal courtyards of communal open space has increased the scheme's useability in terms of open space in general and will also have a positive impact on the future resident's health. The consolidated open space will also allow biodiversity and pollinator measures to be incorporated into a landscaping plan and therefore having a reducing the negative impact on biodiversity. The use of Barrington Tower as a central focal point within the open space provides for an attractive feature within this space and enables its restoration and conservation for future generations to come.

Environmental Effect	Significance of Effect
Population and Human Health	Slight Positive
Biodiversity	Slight Neutral
Soils and Geology	Not Significant
Hydrology	Slight Positive
Air and Climate	Slight Positive
Noise and Vibration	Slight Neutral
Traffic & Transport	Slight Neutral
Waste	Slight Neutral
Material Assets	Not Significant
Cultural Heritage	Slight Negative
Archaeology	Not Significant
Landscape & Visual	Slight Negative

Table 2.4 Environmental Effects of Alternative E

ALTERNATIVE LAYOUT F – PRE-APP TO AN BORD PLEANALA

Alternative E was submitted to An Bord Pleanála for an SHD pre-planning consultation in September 2021. It provided 567 no. apartments within 9 blocks ranging in height from 3 to 9 storeys (over lower ground floor). The layout has development from alternative D with the following key changes:

- The Creche has been incorporated into block CD and the amenity spaces has been incorporated into blocks E and I.
- Addition of a retail unit
- Blocks E, F,G,H,I and J have been re-designed to create 'L' shaped Blocks to ensure sufficient levels of daylight can reach the apartments.
- Blocks J, I, E and F have been pulled north and G and H have been pulled south
- Blocks A and B and C and D have been amalgamated
- The open space throughout the site has been redistributed to create a larger area of public open space.

Figure 2.6 Alternative Layouts F Site Plans

Environmental Effects

This alternative includes a creche and therefore maintains the positive impacts of a creche as outlined in Alternative E. In addition to a creche, this alternative also includes a retail unit which will provide further facilities on the site to cater for the increased population generated by the development. This will provide a shop within walking distance of all proposed apartments and therefore reducing the need for residents to travel longer distances, and potentially taking a private car.

The increased permeability in this alternative will also help encourage residents to walk and cycle. This will have a positive impact on human health by incorporating active travel into people's day-to-day lives. It is also likely to have a positive impact on traffic and air quality as journeys that may otherwise have been taken by car are replaced by walking/cycling.

The removal of the creche and amenity space buildings directly adjacent to Barrington Tower will help protect the cultural heritage of the Tower by reducing the visual impact of the proposed development on Barrington Tower.

The redesign of the apartment blocks to create an 'L' shaped building and reposition of the buildings on the site has increased daylight levels entering into the apartments which has a positive impact on the overall residential amenity of the apartment units and as such will have a positive impact on human health.

The increase in open space throughout the scheme will benefit the health of future residents by providing large areas of space for recreation and leisure within the site, allowing residents easy access to nature and amenity spaces.

Environmental Effect	Significance of Effect
Population and Human Health	Slight Positive
Biodiversity	Slight Positive
Soils and Geology	Not Significant
Hydrology	Not Significant
Air and Climate	Slight Positive
Noise and Vibration	Slight Positive
Traffic & Transport	Slight Positive
Waste	Slight Neutral
Material Assets	Not Significant
Cultural Heritage	Slight Positive
Archaeology	Not Significant
Landscape & Visual	Slight Positive

Table 2.5 Environmental Effects of Alternative F

ALTERNATIVE LAYOUT G – CHOSEN LAYOUT

Alternative F (The chosen Layout) provides 534 no. residential units, a creche, a retail unit ranging in height from 1-9 storeys. It also includes 419 no. car parking spaces and 1,266 no. bicycle parking spaces. Following on the Pre-Application to An Bord Pleanála, the applicant made the decision to remove Block K due to site specific constraints and Cairn are considering a number of options for the future use of this land. The current proposal includes the realignment of the southern boundary and retention as a standalone dwelling. The red line boundary has been amended to reflected this. Aside from this alteration, this layout has development from alternative E with the following key changes:

- Material changes to the apartment blocks to improve the visual relationship with protected structure 'Barrington Tower'
- Increase in Bicycle parking spaces to comply with national standards

Figure 2.7 Alternative Layouts F Site Plans

Environmental Effects

Alternative F benefits from the following positive impacts of the previous alternatives:

- The provision of a creche and retail and the associated positive impacts on human health, traffic, air quality and noise.
- The permeability of the site and the associated positive impacts on human health, traffic, air quality and noise.
- The provision of a large consolidation open space, as shown in Alternative F, and the associated positive impact on human health and biodiversity.

In addition, the chosen layout will also provide the following positive environmental impacts:

- Increased provision of bicycle parking spaces which will encourage the use of sustainable transport and help to further reduce the need to rely on private cars as a mode of transport.
- A high-quality landscaping scheme with a plaza, cascading garden, and amphitheatre. This will have a positive impact on human health by providing a variety of open spaces for a variety of users. It will also have a positive impact on biodiversity with native planting throughout.
- The change to the proposed materials of the apartment blocks will further protect the cultural heritage and ensure the proposed development is sympathetic to the protected structure.

Environmental Effect	Significance of Effect
Population and Human Health	Moderate Positive
Biodiversity	Slight Positive
Soils and Geology	Not Significant
Hydrology	Slight Positive
Air and Climate	Slight Positive
Noise and Vibration	Slight Positive
Traffic & Transport	Slight Positive
Waste	Slight Neutral
Material Assets	Not Significant
Cultural Heritage	Slight Positive
Archaeology	Not Significant
Landscape & Visual	Slight Positive

Table 2.6 Environmental Effects of Alternative G

2.7 ALTERNATIVE PROCESSES

The subject site is zoned *'Objective A' - To protect and/or improve residential amenity* in the County Development Plan which outlines that the majority of uses permitted in principle are related to residential development. Objective A also includes for uses such as open Space and public services which are also proposed as part of the development. Therefore, the proposed uses of residential with retail and childcare are considered the most appropriate for the subject site. It is not considered appropriate to assess other processes in the context of the EIAR.

2.8 SUMMARY TABLE OF ALTERNATIVE DESIGNS AND ENVIRONMENTAL IMPACTS

A summary of the environmental effects of the each of the above alternative layouts is shown in table 2-2 below.

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

	A	B, C and D	E	F	G (Chosen Layout)
Population and Human Health	Moderate Negative	Slight Negative	Slight Positive	Slight Positive	Moderate Positive
Biodiversity	Moderate Negative	Slight Negative	Slight Neutral	Slight Positive	Slight Positive
Soils and Geology	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant
Hydrology	Slight Negative	Not Significant	Slight Positive	Not Significant	Slight Positive
Air and Climate	Slight Negative	Slight Negative	Slight Positive	Slight Positive	Slight Positive
Noise and Vibration	Slight Negative	Slight Negative	Slight Neutral	Slight Positive	Slight Positive
Traffic & Transport	Slight Negative	Slight Negative	Slight Neutral	Slight Positive	Slight Positive
Waste	Slight Neutral	Slight Neutral	Slight Neutral	Slight Neutral	Slight Neutral
Material Assets	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant
Cultural Heritage	Not Significant	Slight Negative	Slight Negative	Slight Positive	Slight Positive
Archaeology	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant
Landscape & Visual	Slight Negative	Slight Negative	Slight Negative	Slight Positive	Slight Positive

Table 2.7 Comparison of Effects

The subject site and the proposed development have been subject to a comprehensive design process that has evolved from the initial proposal in 2007 to the current proposal. The alternative layouts examined here have had regard to the county development plan and the site constraints on the site including the protected structure Barrington tower, the sites topography and the neighbouring dwellings.

This has resulted in a relatively similar environmental impacts from each of the alternative layouts. However, the overall environmental impact of each alternative is positive. Each alternative would result in the development of this zoned, serviced site, within close proximity to existing public transport options, services, and amenity areas.

This chosen layout will create a strong sense of place, improve legibility and permeability, and create a new landmark public open space surrounding Barrington Tower at this key site in the area. The higher density achieved in the chosen layout ensures that the proposed development is in accordance with the most recent national and regional policies for compact growth.

In terms of traffic, noise and vibration, air and climate, it is noted that the key benefit of the chosen layout is the reduced car parking ratio proposed when compared to the previously permitted scheme. This will have a positive knock-on impact with reduced emissions, noise pollution, and vehicular traffic when compared to the permitted scheme with a higher car parking ratio.

In terms of population and human health, it is noted that the key benefit is the increased recreational spaces which will help contribute to the creation of a community within the development, and the reduced emissions and pollutions associated with the reduced car parking ratio. This will have a positive impact on population and human health.

In terms of biodiversity, it is noted that the key benefit of the chosen layout is the increased areas of soft landscaping with reduced areas of hard landscaping. Measures to enhance biodiversity and create wildlife corridors also include the site's existing mature boundary being protected and enhanced, the creation of Dark Corridors through tree planting and controlling to protect and maintain areas for commuting bats.

3 DESCRIPTION OF DEVELOPMENT

3.1 INTRODUCTION

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

3.2 CHARACTERITICS OF THE SITE

The subject site is located within the suburban built-up residential area of Brennanstown. It is a residential site that has largely remained undeveloped and comprises an existing habitable dwelling Winterbrook, and the derelict, former dwelling attached Barrington Tower (RPS No. 1729).

The application site is located south of Brennanstown Road, a long-established low density residential area, comprising mainly detached houses on generous sites. Such development occurs to the west, southwest, and northern side of Brennanstown Road and to the northeast of the site. To the southeast is a burial ground and the LUAS track directly south of the site. Vehicular access to the site is available off Brennanstown Road. The site slopes steeply from north to south. The site measures c. 3.81 hectares and is irregular in shape.

The site is not located within a Conservation Area or an Architectural Conservation Area. The site is also not within a Special Area of Conservation (SAC) or a Special Protection Area (SPA). The site is not designated for any nature conservation purposes and there are no habitats of conservation importance recorded within the site.

The site is zoned 'Objective A' (To protect and/or improve residential amenity) in the DLRCC County Development Plan 2016-22 and in the DLRCC County Development Plan 2022-2028.

Figure 3.1 Site Location

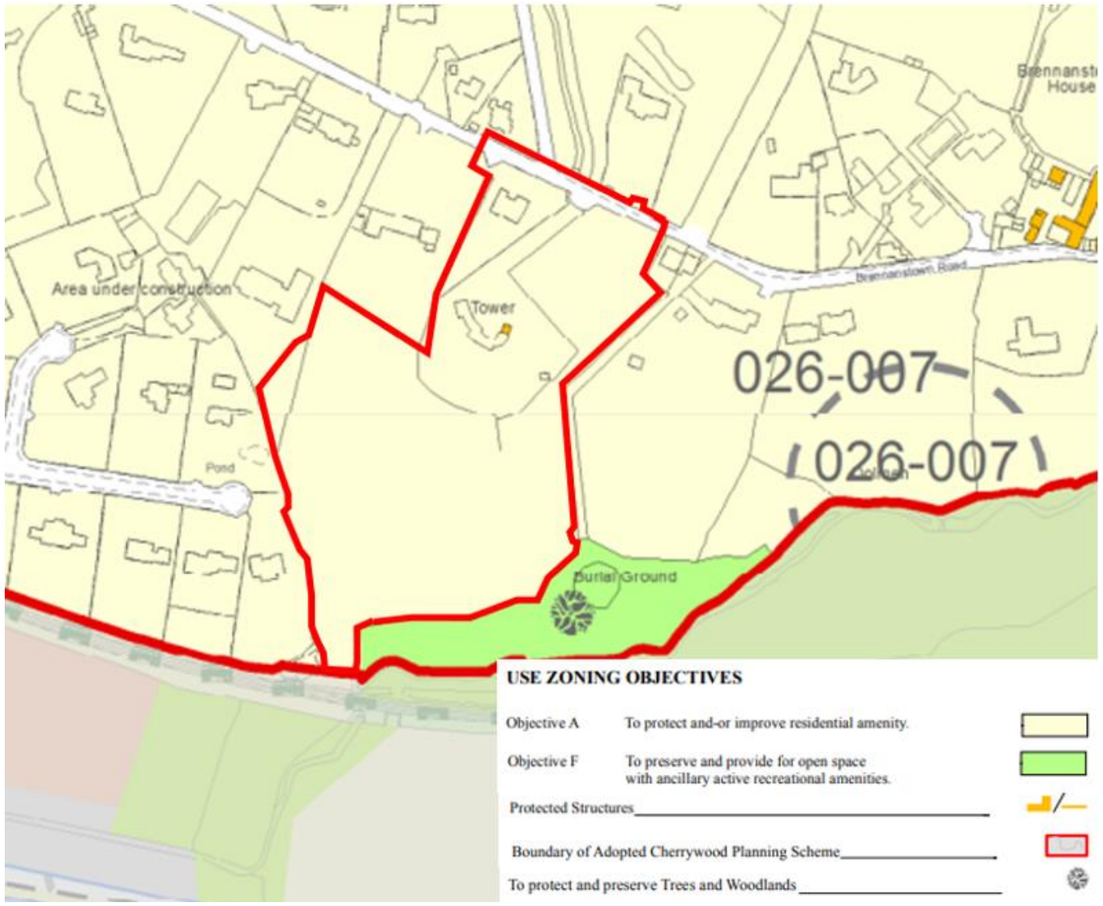

Figure 3.2 Zoning

3.3 PROPOSED DEVELOPMENT

The proposed development consists of a strategic housing development and planning permission is sought for a period of five years.

Residential

The proposed development is for a Build to Rent development which provides 534 no. residential units as follows:

1 30 no. studios (5.6%)
2 135 no. 1 beds (25.3%)
3 318 no. 2 beds (59.6%)
4 51 no. 3 beds (9.5%)

The 534 no. units provide a residential density of 140 uph.

The units will be provided in 8 blocks ranging up to 10 storeys in height. All these units have associated private space in the form of terraces or balconies which will look east/west/ north/ south. 50.7% of the proposed units are dual aspect.

- Block AB provides 40 no. units and is 5 storeys.
- Block CD provides 32 no. units and is 5 storeys in height.
- Block E provides 68 no. units and ranges in height from 5 – 8 storeys (including the lower ground floor).
- Block F provides 96 no. units and ranges in height from 9 – 10 storeys (including the lower ground floor).
- Block G provides 89 no. units and ranges in height from 7 -8 storeys (including the lower ground floor).
- Block H provides 99 no. units and is 9 storeys in height.
- Block I provides 48 no. units and ranges in height from 5 to 6 storeys (including lower ground floor).
- Block J provides 62 no. units and ranges in height from 5 to 6 storeys (including lower ground floor).

Additional Facilities

In addition to residential units, the proposed development also provides a retail unit and a creche. The convenience retail unit, measuring 366.8sqm, and the creche, measuring 356.5 sqm, is located on the ground floor of Block CD.

A double basement is also provided for parking and services.

Communal Facilities

Two residential amenity spaces will be provided. One on the ground floor of Block E, measuring 646sqm, and the second on the ground floor of Block I, measuring 850sqm. The residential amenities will include flexible spaces including entertainment rooms, meeting rooms, parcel rooms, media rooms, lounge and workspaces, gyms and studio, chef's kitchen and dining area.

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

Site Development Works

As part of the planning application, it is proposed to demolish the existing habitable dwelling "Winterbrook", and the derelict, former dwelling attached to Barrington Tower along with the wall along the Brennanstown Road on the site.

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

Layout and Design

Figure 3.3 Site Layout Plan

The proposed development is set out in 8 residential blocks. The materials and finishes of the proposed blocks will be designed to a high architectural standard. The materials and finishes have also been considered with regard to the surrounding existing pattern of development and in the context of the protected structure Barrington Tower.

Blocks AB and CD are located at the northern portion of the site along the Brennanstown Road. Blocks E – J are consolidated to the south of the site.

The existing Barrington Tower will be preserved, restored and made a focal point within the heart of the new development.

Blocks AB and Blocks CD are located to the north of the site along the Brennanstown Road. These blocks are both 5 storeys in height and their positioning on the site will exploit views into the site and its main focal point of the development, Barrington Tower. The creche and retail space located at the ground floor of Blocks CD will create an active use at the schemes entrance.

Block E is located to the east of the site and to the southeast of Barrington Tower. This Block steps from 5 – 8 storeys in height (including the lower ground floor). The northern part of Block E steps down in height, enhancing the protected structure and the main area of public open space. Block E also contains c.646 sqm of communal amenity space at ground and first floor levels which will contribute to the public plaza surrounding their protected structure with their active uses.

Block F is located to the southeast of the site and steps down from 10 storeys (including the lower ground floor) to 9 storeys in height towards the north of the site. This Block takes advantage of the site's rising topography from south to the north of the site.

Block G is located at the centre of the site and steps down in height from 8 (including the lower ground floor) to 7 storeys. This Blocks also takes advantage of the site's rising topography from south to the north of the site.

Block H is the most southern Block and is 9 storeys in height (including the lower ground floor).

Block I is located to the southwest of the site and is 5 – 6 storeys in height (including the lower ground floor). This block contains c.850 sqm of communal amenity space.

Block J is located to the west of the site and is 5- 6 storeys in height (including the lower ground floor).

The buildings have been located to sensitively reflect the existing neighbouring properties and Barrington Tower. The buildings have been consolidated, to ensure that the built site coverage is minimised. The building footprints enable the provision of open space between the blocks within this predominantly car free development. These gaps between the buildings enables visibility throughout the development, while also ensure that the impact in terms of scale and visual impact is minimised. This provides positive views both from within the scheme to Barrington Tower and when viewed from outside the boundaries of the development site.

The basement is over 2 levels and is located at the southern part of the site. The split-level structure steps down the hill towards the southern boundary and accommodates the site's falling topography. The vehicular access into the basement is located from Block E. The upper levels of the basement are only located beneath blocks E, G and J. The lower levels of the basement are located beneath blocks E, G, J, F, H, and I. See figure 3-4 below.

Upper Basement Level

Lower Basement Level

Figure 3.4 Site Layout Plan

Access and Parking

The site is a highly accessible site, which, as set out in Chapter 11 of this EIAR ' Traffic and Transportation' can accommodate a reduced level of car parking in favour of increased levels of cycle parking and pedestrian mobility. The landscaping plan, along with various residential amenities have been located to ensure ease of pedestrian movement through the site following desire lines and enabling clear legibility within the site.

The proposed development includes a total of 419 no car parking spaces Car parking spaces for the residential units is provided at an average rate of 1.3 no. spaces per unit. These are provided within the basement which is over 2 levels in the southern part of the site and some surface level spaces. The proposal includes a total of 1,266 no. cycle parking spaces. There are 1058 for the residents in the basement, a ratio of 2 cycle spaces per unit. In addition to this, there is a further 208no. cycle parking space at surface level for residential visitors, the creche and other users.

3.4 CONSTRUCTION STAGE

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

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

The contractor shall be responsible for overall management of the site for the duration of the proposed works and will progress their works with reasonable skill, care, diligence and to proactively manage the works in a manner most likely to ensure the safety and welfare of those carrying out construction works. The first activity to be carried out at the site will be the establishment of site facilities and security. It is anticipated that site establishment works will take approximately four weeks. The site office and welfare facilities will be confirmed in advance of the commencement of site works and agreed with DLRCC.

All areas of construction will be fenced / hoarded off to prevent unauthorized access. This fencing shall remain closed at all times during construction works and closed and locked after construction work hours / break times. This fencing shall be erected in accordance with good practice and the Construction Regulations 2013. Fencing arrangements shall be reviewed as the life of the project progresses.

Access/Egress to site for site operatives and visitors shall be via biometric gates. Site security fencing/ Hoarding up to a height of 2.4 M will be erected in line with the Construction Regulations 2013 that will clearly separate the work site from the surrounding public. It is not envisaged that the fencing will impinge upon the safe passage of pedestrians during the construction phase

Site Clearance

The development will include the demolition of Winterbrook, an existing dwelling and partial demolition of the modern extension dwelling to Barrington Tower. The existing wall along Brennanstown Road will also be demolished, with stone from the wall to be reused in the landscape proposal at the front of the proposed development. The protected structure 'Barrington Tower' will be retained, restored and reused.

The demolition will commence with the removal of any hazardous materials by an appropriately qualified contractor for disposal at an appropriate licensed waste collection facility. All non-structural items will then be removed and segregated for re-use or re-cycling where possible. The remainder of the building structure will be removed in an approved sequence outlined in a Method Statement prepared by the yet to be selected demolition contractor's structural engineer.

Construction Traffic and Site Access

The proposed construction vehicle routes for the site will require a traffic management plan to be agreed upon with DLRCC and TII prior to site workings beginning. Two-way traffic will be maintained throughout the project. Advanced warning signs will be placed at sufficient distances to taper off the entry and exit points. Pedestrian marshals will be used as and when required. Traffic management will be undertaken for the site works in accordance with the principles outlined below and shall comply at all times with the requirements of:

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

Construction traffic operation would be limited to 0800 to 1800 from Monday to Friday and 0800 to 1400 on Saturday for the off-road construction. These times may vary to facilitate specific site requirements and/or construction activities associated with the site. Any variation will be discussed and agreed in advance with DLRCC.

Working Hours & Staff

Site development and building works will only be carried out between the hours of 0800 to 1800 Mondays to Fridays inclusive and between 0800 and 1400 hours on Saturdays There will be no construction works carried out on Sundays or public holidays. Deviation from these times will only take place when written approval is granted by DLRCC in exceptional circumstances.

Lighting

Construction work will generally be confined to daylight hours and lighting will generally not be required for the construction phase. There will however be occasions where the provision of portable lighting will be required (works on roadways and power floating floors as examples). Where possible and without jeopardising site safety lights will be pointed down at a 45-degree angle and away from sensitive receptors. The site compound will have external lights for safety and security. These lights will be pointed down at a 45-degree angle and away from sensitive receptors where possible.

Deliveries

Material deliveries and collections from site will be planned, scheduled and staggered to avoid any unnecessary build-up of construction works related traffic.

Deliveries to site shall be booked in advance using a delivery schedule, so as to prevent lorry congestion on the road networks surrounding the site. Alternative safe routeways shall be established for traffic and pedestrians where existing routeways have to be altered, removed or worked on during the project.

Disposal of water, wastewater and sewage

Run-off into excavations/earthworks cannot be prevented entirely and is largely a function of prevailing weather conditions. Care will be taken to ensure that exposed soil surfaces are stable to minimise erosion. All exposed soil surfaces will be within the main excavation site which limits the potential for any offsite impacts. All run-off will be prevented from directly entering into any water courses as no construction will be undertaken directly adjacent to open water.

No significant dewatering will be required during the construction phase which would result in the localised lowering of the water table. There may be localised pumping of surface run-off from the excavations during and after heavy rainfall events to ensure that the excavation is kept relatively dry.

Air Quality

This section describes the site policy with regard to dust management and the specific mitigation measures which will be put in place during construction works. The objective of dust control at the site is to ensure that no significant nuisance occurs at nearby sensitive receptors. In order to develop a workable and transparent dust control strategy, the measures set out below have been formulated by drawing on best practice guidance from Ireland, the UK and the US, such as:

- Department of Environment, Heritage and Local Government (DOEHLG), *Quarries and Ancillary Activities, Guidelines for Planning Authorities* (2004) [4];
- US Environment Protection Agency (USEPA), *Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition* (periodically updated) (1986) [5];
- The Scottish Office – Development Department, *Planning Advice Note PAN50 Controlling the Environmental Effects Of Surface Mineral Workings Annex B: The Control of Dust at Surface Mineral Workings* (1996) [6]; and
- Institute of Air Quality Management (IAQM), *Guidance on the Assessment of Dust from Demolition and Construction* (2014) [7].

The site activities will be undertaken with due consideration of the surrounding environment and the close proximity of sensitive receptors such as residents and pedestrians. Dust management during the construction phase will be the most important aspect in terms of minimising the impacts of the project on the surrounding air quality. The following measures will also be implemented to ensure impacts are minimised:

- Complaint registers will be kept detailing all telephone calls and letters of complaint received in connection with construction activities, together with details of any remedial actions carried out;
- Equipment and vehicles used on site will be in good condition such that emissions from diesel engines etc. are not excessive; and
- Pre-start checks will be carried out on equipment to ensure they are operating efficiently and that emission controls installed as part of the equipment are functional.

Dust deposition levels will be monitored on a regular basis in order to assess the impact that site activities may have on the local ambient air quality. The following procedure will be implemented:

- The dust deposition rate will be measured by positioning Bergerhoff Dust Deposit Gauges at strategic locations near the boundaries of the site for a period of 30 (+/- 2) days if required. Monitoring should be conducted as required during periods when the highest levels of dust are expected to be generated i.e., during site preparation works and soil stripping activities.
- The exact locations will be determined after consideration of the requirements of Method VDI 2119 with respect to the location of the samplers relative to obstructions, height above ground and sample collection and analysis procedures.
- After each 30 (+/- 2 days) exposure period, the gauges will be removed from the sampling location, sealed and the dust deposits in each gauge will be determined gravimetrically by an accredited laboratory and expressed as a dust deposition rate in mg/m^2/day in accordance with the relevant standards.
- Technical monitoring reports detailing all measurement results, methodologies and assessment of results shall be subsequently prepared and maintained by the Site Manager.

A limit value of 350 mg/m^2/day will be used in comparison with recorded values.

4.1.1 Dust Control Measures

The aim is to ensure good site management by avoiding dust becoming airborne at source. This will be done through good design, planning and effective control strategies. The siting of construction activities and the limiting of stockpiling will take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance. In addition, good site management will include the ability to respond to adverse weather conditions by either restricting operations on-site or using effective control measures quickly before the potential for nuisance occurs.

- During working hours, technical staff will be available to monitor dust levels as appropriate; and
- At all times, the dust management procedures put in place will be strictly monitored and assessed.

The dust minimisation measures should 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 generation. In the event of dust nuisance occurring outside the site boundary, site activities should be reviewed, and procedures implemented to rectify the problem. Specific dust control measures to be employed are presented below.

3.5OPERATIONAL STAGE

It is anticipated that the primary direct significant environmental effects will arise during the construction stage. Once the development is completed, and mitigation measures employed, it is expected to operate without creating any significant additional environmental impacts. The range of anticipated activities, materials/natural resources used, effects/emissions are not expected to result in a significant impact on the constituent environmental factors. The primary likely and significant environmental impacts of the operation of the proposed development are fully addressed in the EIAR document; and relate to Population and Human Health, Landscape and Visual Impact and Noise and Air impacts associated with the traffic generated. There is 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.

3.6CUMULATIVE IMPACTS

There are no planned expansions or increases to the proposed development and given the confines of the site and scale of the development, the potential for future expansion is limited. The potential for the apartments to expand or increase in scale is limited to the confines of the permission sought and new planning permission will be required for further extensions to the blocks. The potential for increased retail, commercial or community uses within the blocks would be subject to further planning permissions.

There are two further areas which are within the applicant's ownership. 'Aras Eibhear' to the west of the subject site may be developed in the future once issues relating to access have been resolved and would be subject to a separate planning application.

'Appledor' is located to the north of the subject site and is also within the applicant's ownership. Again, this may be the subject of a future planning application.

Any future development on either of these sites or the wider area would be subject to the requirement to obtain planning and the requirement to comply with the EIA and Habitats Directives.

Committed Developments within the Wider Area

To assess the cumulative impact of development within the wider area, a cut-off point of grants of permission within the last 5 years and a radius of a 500m (diameter 1km) has been included. The assessment also only includes new built development and does not include extensions to existing buildings. These have been identified from a desk-top review of the Dun Laoghaire Rathdown planning history portal. The below review includes approved developments and also considers developments which are currently going through the planning process but are not yet approved.

There are two application sites along the Brennanstown Road that have been approved by An Bord Pleanála which are the most significant recent applications which will have the greatest cumulative impact when considered with the subject site. Both of these have been considered in each chapter of the EIAR where appropriate.

<u>Brennanstown Wood Residential Development</u>
ABP reference: ABP-30161418
Decision: Granted 31st August 2018

Viscount Securities were granted planning permission for a strategic housing development at Brennanstown Road, Dublin 18 for 136 number residential units, comprising of 98 number apartments and 38 number houses. A 195 square metre creche facility and play area is proposed on the lower ground floor of Block 1. The development includes 227 number car parking spaces at basement / lower ground floor and surface level.

<u>Doyle's Nursery</u>
ABP reference: ABP-305859-20
Decision: Granted 25th June 2020

Atlas GP limited were granted planning permission for the Demolition of 'Benoni' and extant single storage buildings, construction of 234 no. apartments, creche and associated site works.

Within the wider area there are several grants of permissions or sites which are currently going through the planning process. These sites, due to their distance from the subject site are noted but are not considered to have a significant cumulative impact when taken together with the subject site, due to the physical separation of the site from the applications sites in the case of the Cherrywood SDZ permissions or do to the smaller size of the other applications, which are below 10 units in each instance. As a result, only the two SHD's along Brennanstown Road are considered in full within the later EIAR chapters. Figure 3-4 demonstrates the 500m (1km diameter) catchment area in which this review has been conducted.

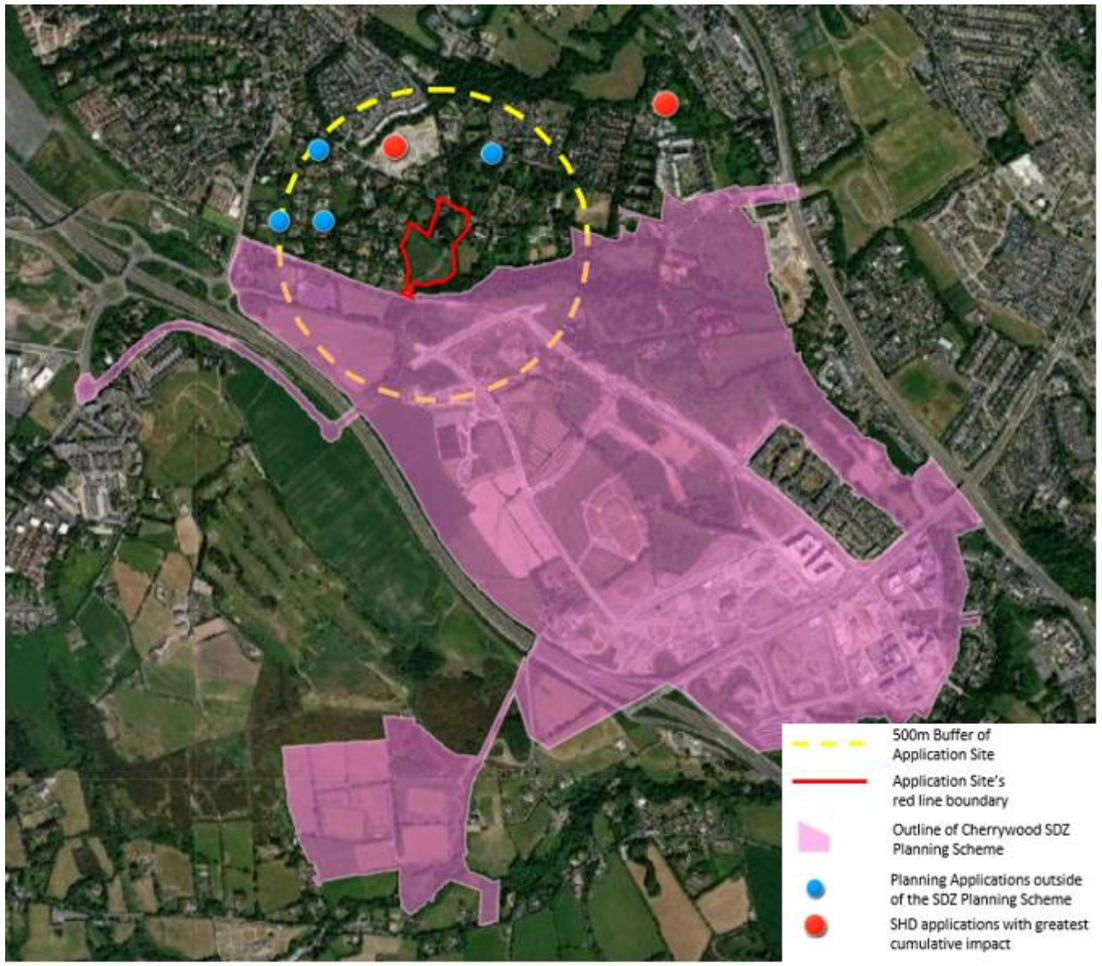

Figure 3.5 500m of Application Site

<u>Cherrywood SDZ</u>
Development including approx. 8,700 homes including a minimum of 10% social housing units, spread over the new Town Centre and 3 smaller Village Centres with superior transport links including an enhanced bus service and 5 Luas stops throughout.

Following on from this creation of the SDZ area, multiple planning permissions have been granted permission within the area. This was subject of an independent SEA Environmental Report along with an AA Screening Report and includes a Cherrywood Biodiversity Plan for the area as a whole.

DLR reference: DZ19A/0863
Decision: Granted 14th Jan 2020

Permission for a residential development consisting of the construction of 342 new residential dwellings, comprising 189 no. apartments arranged in 4 blocks; 28 No. duplex units; 60 No. triplex units and 65 No. 4 bedroom houses together with a Childcare Facility and ancillary open space. The proposed development includes for all associated infrastructural works to include the part delivery of the Cherrywood SDZ Planning Scheme's Druid's Glen Distributor Road. The development will also include the construction of: ancillary waste storage facilities; The application site is located within the Cherrywood Strategic Development Zone.

DLR reference: DZ18A/0208
Decision: Granted 4th Feb 2020

Permission sought for a residential development consisting of the construction of 367 no. new residential dwellings, comprising 190 no. apartments arranged in 4 blocks, ranging in height between 4- to 5-storeys in height, 24 no. duplex units, 60 no. triplex units and 93 no. 4 bedroom houses, together with a Childcare Facility and ancillary open space. The proposed development includes for all associated infrastructural works to include the part delivery of the Cherrywood SDZ Planning Scheme`s Druid`s Glen Distributor Road.

DLR reference: DZ20A/0399
Decision: Granted 22nd Jan 2021

Residential development comprising of 136 no. dwellings (total gross floor area of c.15,910 sqm) in a mixture of houses, duplexes, and apartments.

DLR reference: DZ20A/0552
Decision: Granted 11th Mar 2021
The development proposed consists of 163no. Dwellings (total gross floor area of c.17,645 sqm) in a mixture of houses, duplexes and apartments. 97no. Houses accommodated in buildings ranging from 2 to 3 floors consisting, 36no. Apartments in a single 3 storey building. The provision of c.1616sqm of open space, including green infrastructure in the form of an ecological buffer zone at boundary with Lehaunstown Lane.

DLR reference: DZ21A/0334
Decision: At the time of writing this application had not been determined. (Decision due 7th April 2022)

Residential development comprising of 482 no. dwellings in a mixture of houses, duplexes, and apartments.

DLR reference: DZ21A/0664
Decision: Granted 9th Sep 2021

The proposed residential development comprises 47 no. apartments in 1 no. 4 storey over basement apartment block. The provision of c. 110 sqm of communal amenity space provided adjacent to the proposed apartment block

DLR reference: DZ21A/1042
Decision: Granted 27th Jan 2022

The development proposed consists of 122no. residential dwellings in a mixture of houses, duplexes and apartments, in a range of buildings 2 to 3 storeys. Private communal amenity open space a 10m wide ecological buffer alongside Lehaunstown Lane; provision of internal road network including new road carriageways.

DLR reference: DZ21A/0699
Decision: Granted 23rd Sep 2021

The proposal is a minor amendment to development already permitted under Planning Permission Reg. Ref. DZ20A/0552.

DLR reference: DZ21A/1069
Decision: Granted 2nd Feb 2022

The proposed development consists of minor amendments to the development granted permission under Reg. Ref. DZ20A/0399.

DLR reference: DZ19A/0597
Decision: Granted 11th Mar 2020

The proposed development will comprise 184 dwellings and associated site and development works

DLR reference: DZ18A/1129
Decision: Granted 4th Feb 2019
Construction of an attenuation pond (detention basin) with associated outfall to Ticknick stream. Infilling of the existing temporary attenuation pond (north of Mercer Link Road, constructed as part of the Phase 1 Roads and Infrastructure works permitted under Reg. Ref. DZ15A/0758). Construction of a new stormwater outfall pipe from Beckett Park attenuation system to Ticknick stream

DLR reference: DZ15A/0758
Decision: Granted 16th Aug 2016

The proposed development will consist of Roads and infrastructure (phase 1) to form part of public road network providing access and services for the future development of the adjoining SDZ lands. The total road length proposed is c.5.4kms, of which c.4.1kms is new road and c.1.3kms relates to works to existing roads.

DLR reference: DZ16A/0585

Decision: Granted 26th Sep 2016

Permission for retention (temporary for 3 years) for park and ride facility previously granted permission under Reg. Ref. D10A/0164.

DLR reference: DZ17A/0114
Decision: Granted 8th Feb 2018

Permanent park and ride facility.

DLR reference: DZ19A/0683
Decision: 8th Nov 2019

Permission for retention (temporary for 3 years) for park and ride facility previously granted permission under Reg. Ref. D10A/0164.

Non SDZ applications
The Apple House, Holmwood
DLR reference: D18A/0508
Decision: 13th Feb 2019

Permission for the erection of a two storey four bedroom detached dwelling and associated on site works, including shared access with existing house and connections to existing services, together with a Childcare Facility.

Carricáil, Glenamuck Road North
DLR reference: D18A/1187
ABP reference: ABP-304995-19
Decision: Granted 8th Nov 2019

The development shall provide for the demolition of a two-storey dwelling on site and the construction of 30 no. residential units in the form of 1 no. 4 storey residential block.

5 Brennanstown Vale
DLR reference: D21A/1021
Decision: Granted 24th Feb 2022

Permission is sought for development of a single detached dwelling over 3 storeys including roof accommodation.

Glenheather
DLR reference: D17A/0859
ABP reference: ABP-301581-18
Decision: Granted 7th Dec 2018

Demolition of existing outhouses and domestic garage and site clearance. Removal of existing vehicular entrance and construction of new. Construction of 1 no. two-storey dwelling house with pitched roofs.

However, it is considered that any cumulative impact resulting from the proposed development with the above listed developments will be imperceptible. It is also noted that any future planning applications relating to the proposed development, the sites to the north or west, or the surrounding area will be assessed separately and are outside the scope of this EIAR.

4 POPULATION AND HUMAN HEALTH

4.1 INTRODUCTION

This chapter addresses the impacts of the proposed strategic housing development on population and human health. This chapter has been prepared by Trevor Sadler, who is the director of McGill Planning Limited, has worked for 20 years as a Town Planner in Ireland. He has a Master's in Urban and Regional Planning from University College Dublin. McGill Planning Limited, has carried out numerous EIAR's, EIA Screenings and S299B and C assessments. They have also been involved multiple Strategic Housing Developments as well as Strategic Development Zones and regular planning applications in recent years.

The following guidance was used in the preparation of this chapter:

- Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment (European Union, 2017).
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, Draft August 2017).
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2002)
- United States (US) EPA Health Impact Assessment Resource and Tool Compilation (US EPA 2016);
- Institute of Public Health in Ireland (IPHI) Health Impact Assessment Guidance (IPHI 2009).
- IEMA's Health in Environmental Impact Assessment: a primer for a proportionate approach

4.2 METHODOLOGY

Population

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

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

Human Health

To establish an existing baseline of the human health of the area, desk-based study including an analysis of the Central Statistics Office Census (CSO) data was undertaken. As referenced in the Department of Housing, Planning and Local Government (2018) Guidelines for Planning Authorities and An Bord Pleanála, (taken from the European Commission's Environmental Impact Assessment of Projects: Guidance on the Preparation of the Environmental Impact Assessment Report (2017)), human health is;

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

The WHO (World Health Organization) also define health as *"a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."*

4.3 RECEIVING ENVIRONMENT

Population

For the purpose of this population analysis, a local catchment area was selected to include the Electoral Divisions (Eds) within 2km of the subject site. This area is shown in figure 1 and will be referred to as the *Local area.* The Eds were chosen as a basis of analysis as, unlike the Small Area Boundaries, the ED boundaries have remained unchanged and therefore can be used to compare population changes over time.

The subject site is located within the Cabinteely-Loughlinstown ED. There are a further seven ED's located within a 2km radius of the subject site – Foxrock-Beechpark, Cabinteely-Kilbogget, Ballybrack, Cabinteely-Granitefield, Foxrock-Carrickmines, Cabinteely-Pottery and Glencullen. It should be noted that the Glencullen ED is not included in the population analysis due to the large nature of the ED and its outlier location. By removing Glencullen from the Local Area study, the risk of a skewed analysis has been reduced. This brings the total study area to seven Eds, which will be referred to throughout this chapter as the Local Area.

Combined, these seven Eds have a total population of c.25,258 in the year 2016, an increase of c. 3.4% on the 2011 population. This is a marginally lower populational increase compared to the national average. The census data shows that the population of Ireland increased by 3.8% from 2011 and 2016 to a total population of 4,761,865. Leinster and Dublin both experienced a higher population grown than the national average (5.2% and 5.8% respectively).

These statistics are somewhat outdated, and a new census is due to take place this year on the 3rd of April 2022. The CSO provided an estimation of the population in April 2021. This indicated that the country's total population was likely c. 5,010,000 and that the Dublin population was c. 1,430,000. The 2016 population for the local area was 1.9% of the total Dublin population. Assuming this proportion remained the same in 2021, the local area's population in 2021 was likely c. 27,170. These estimations indicate that the state, county and local area populations are continuing to increase.

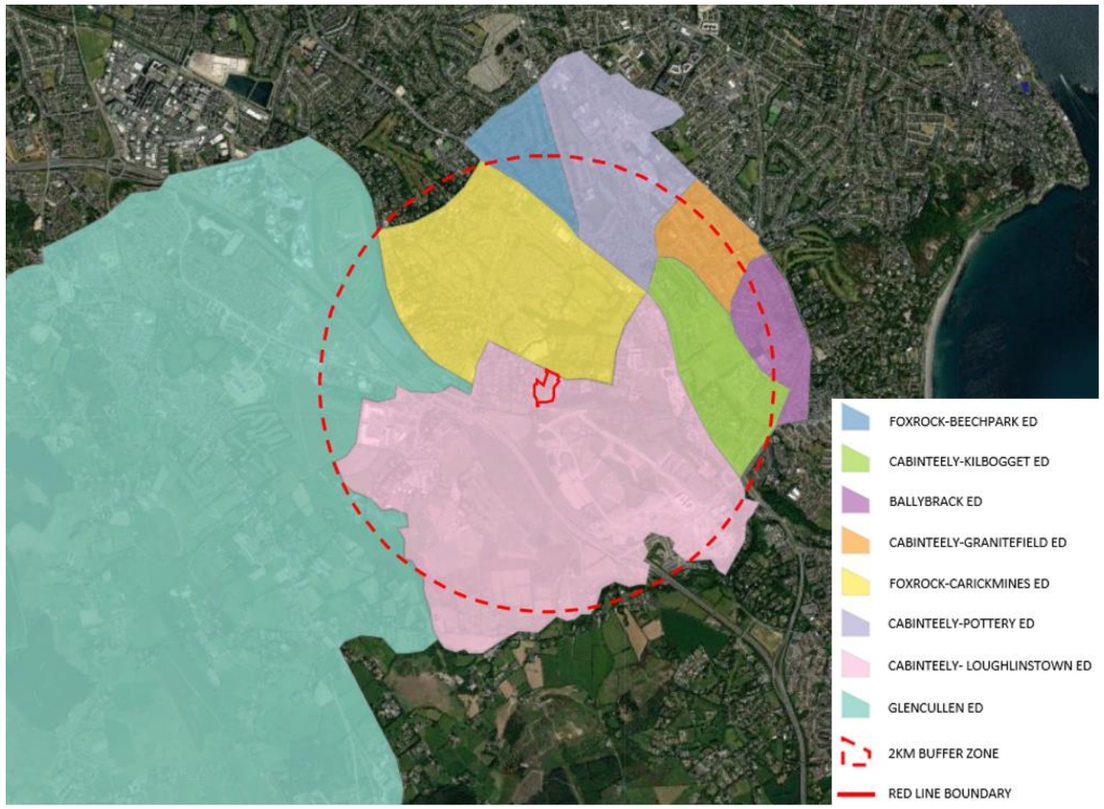

Figure 4.1 Electoral Divisions within 2km of the Subject Site. Source: Author

Electoral Divisions	2011 Populations	2016 Population
Cabinteely-Loughlinstown	3,806	4,280
Foxrock-Beechpark	1,653	1,680
Cabinteely-Kilbogget	2,723	2,686
Ballybrack	2,851	2,962
Cabinteely-Granitefield	2,481	2,702
Foxrock-Carrickmines	6,088	5,951
Cabinteely-Pottery	4,833	4,997
Total	24,435	25,258

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

Area	2011	2016	% Change 2011-2016
Ireland	4,588,252	4,761,865	3.8%
Leinster	2,504,814	2,634,403	5.2%
Dublin	1,273,069	1,347,359	5.8%
Local Area	24,435	25,258	3.4%

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

Area	Estimated 2021 Pop	% Change 2016-2021
Ireland	5,010,000	5.2%
Dublin	1,430,000	6.1%
Local Area	27,170	7.6%

*Calculated by finding 1.9% of Dublin's estimated population (1,430,000*0.0286)

Table 4.3 Estimated 2021 Population. Source: CSO

Age Profile

Approximately 25,258 no. people were living with the Local Area at the time of the 2016 Census, an 3.4% increase on the 2011 population.

The local area has seen a 160% increase in population over the age of 65, an increase of 21% in population of older adults (35-64 years old) and a decrease of 12% for young adults (20-24 years old). However, the area maintains a relatively young population with 42% of the population of the 2016 population under 35 and 24% under 20. In addition, the area has a strong representation (59%) of working aged people (20-64) living in the area in 2016. This is in line with the national average of 59% people aged 20-64.

The decrease in 20-30 age group is likely due to out-migration as people move away for jobs etc. This significant percentage increase in the number of people in the aged 85+ is due to the low number of people in this age bracket. The increase in the 0-4 age group of 9% indicates that there are new families moving into the area.

2011 Population	2016 Population	Population Change 2011-2016	Percentage Change 2011-2016
24,435	25,258	823	3.4%

Table 4.4 CSO ED Census data

Age	2011	2016	Change	Percentage Change
0-4 Pre-school	1469	1606	137	9%
5-19 School Children	4873	4770	-103	-5%
20-34 Adults	4876	4659	-217	-12%
35-64 Adults	9419	9721	302	21%
65+ Adults	3798	4502	704	157%

Table 4.5 CSO Census Data - ED age groups

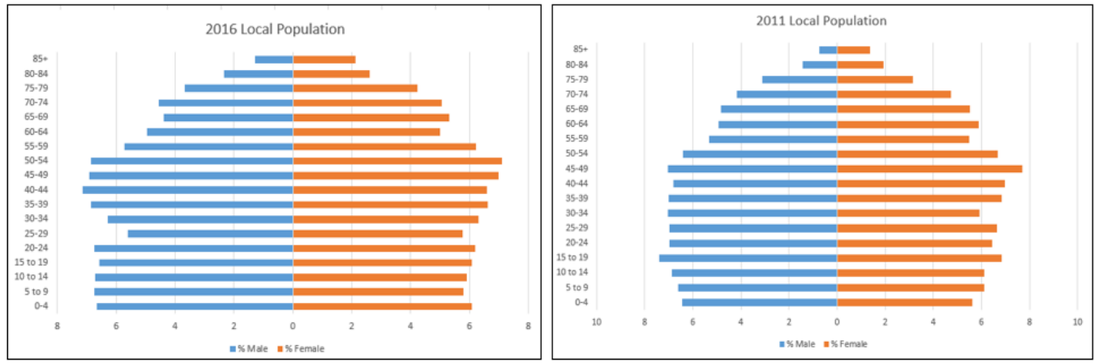

Figure 4.2 Local Area 2011 and 2016 Population Pyramids. Data Source: CSO

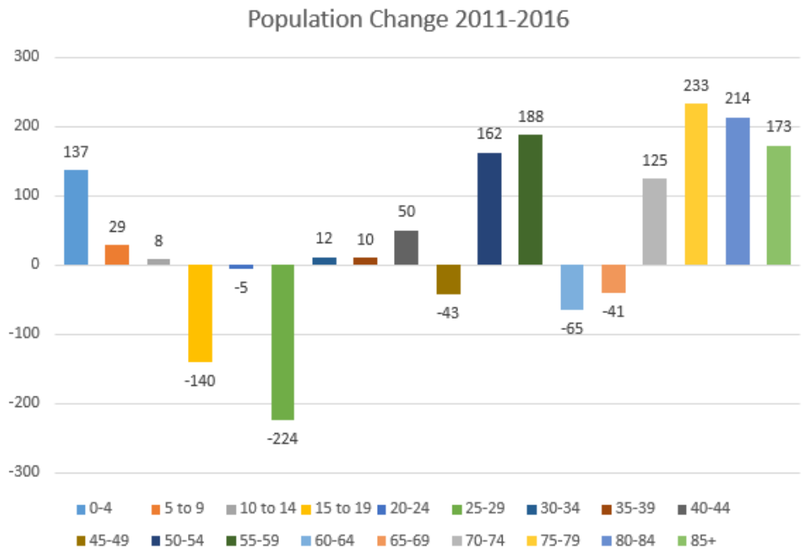

Figure 4.3 Raw Change in population from 2011-2016 by Age Group. Data Source: CSO

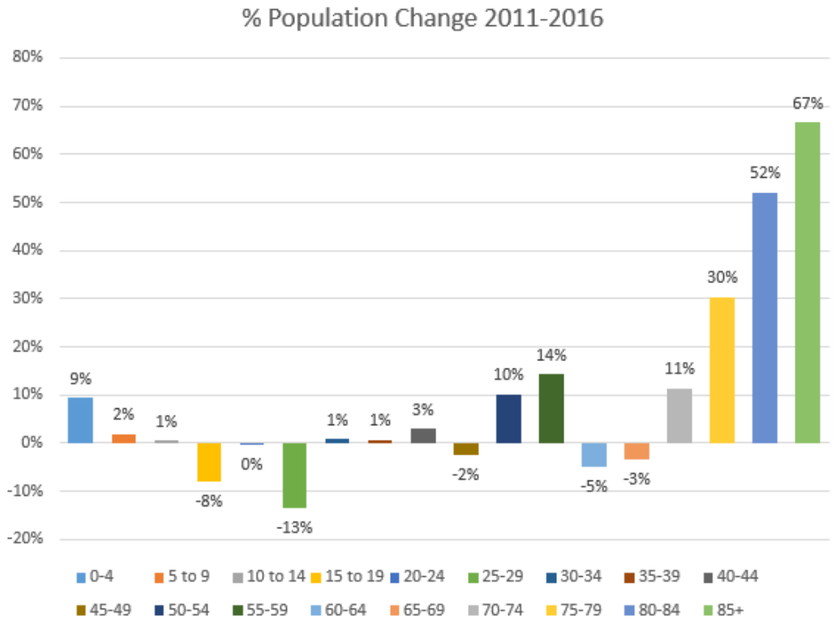

Figure 4.4 % Change in Population from 2011-2016 by Age Group. Data Source: CSO

Employment

The CSO's Quarterly Labour Force Survey provides information in relation to national employment levels, unemployment levels and current labour force participation rates. The Covid-19 pandemic has significantly impacted the employment and unemployment levels since March 2020. Therefore, slightly adjusted measures are now produced to ensure transparency around the impact of Covid-19 on the labour market.

- Since March 2020 the CSO has produced an extra COVID-19 Adjusted Measure of Monthly Unemployment. This measure adds people who receive the Pandemic Unemployment Payment (PUP) to the monthly estimate of unemployed persons.
- Since Q1 2020, the CSO has provide a Covid-19 Adjusted Measure of Employment as part of the LFS. The measure subtracts people receiving the PUP at the end of each quarter from the numbers in employment as measured by the LFS.

The CSO notes that, given the uncertainty regarding the official labour market status for those individuals receiving the PUP, the COVID-19 Adjusted Measure of Unemployment can be seen as the upper bound or highest possible value for unemployment, while the COVID-19 Adjusted Measure of Employment can be seen as the lower bound or the lowest possible value for employment.

The unadjusted data for Q1 of 2021 shows a decrease in employment of 2.95% compared to Q1 of 2019, while unemployment increased by 48.91% over the same period. The unadjusted employment rate for Q1 2021 is 7.1% and the Covid adjusted unemployment rate is 25.5%.

ILO Economic Status Ireland	Q1 2019	Q1 2020	Q1 2021	Annual Change	
All Persons				2019-2020	%
In Labour Force	2,412,900	2,461,800	2,401,100	-11,800	-0.49
In Employment	2,298,300	237,200	2,230,600	-67,700	-2.95
Unemployed	114,500	114,700	170,500	56,000	48.91
Not in Labour Force	1,483,600	1,496,500	1,603,400	119,800	8.07
Total Persons aged 15 or over	3,896,500	3,958,400	4,004,400	107,900	2.77
Unemployment Rate %	4.8	4.7	7.1		

Table 4.6 Labour Force Survey Q1 2019, 2020 and 2021 (standard methodology) Source: CSO

	Standard In Employment	**Covid Adjusted In Employment**	**Standard Unemployment**	**Covid Adjusted Unemployment**
Q1 2020	2,353,500	2,070,371	114,400	382,311
Q1 2021	2,230,600	1,785,923	170,500	612,443
Change	-122,900	-284,448	56,100	230,132
% Change	-13.74	-13.74	49.04	60.19

Table 4.7 Comparison between standard and covid adjustment figures. Source: CSO

Within the local catchment area, 72% of the population aged 15 and over are in work. Commerce and Trade is the most common industry in the area, followed closely by Professional Services.

Retail and Community Facilities

A desktop survey of the existing retail and community services within a 2km buffer of the site was carried out. The key retails areas are identified in blue in figure 4-6 (numbered 1-7) and are listed in Table 4-7.

Carrickmines shopping Park (number 1) provides the most services and facilities with a range of shops, pharmacies, supermarkets, medical centres, post offices and restaurants/cafes. This is a c.20 minute walk from the subject site. The Park Shopping Centre is located c.15 minute walk from the proposed development site. This provides a grocery store, a medical clinic, a café, a pharmacy and a child care facility.

Figure 4.5 Retail clusters surrounding subject site

Map No.	Retail Cluster
1.	Carrickmines Park
2.	Leopardstown Shopping Centre
3.	Cornelscourt Shopping Centre
4.	Park Shopping Centre
5.	Foxrock Village
6.	Cabinteely Village
7.	Ballybrack Shopping Centre

Table 4.8 Retail Clusters as shown in Figure 4.6

Figure 4.6 Parks within 2km of Subject site

Figure 4.7 Business Parks in surrounding area

Childcare

Desktop research was carried out analysing information provided by Pobal and Dun Laoghaire Rathdown Childcare Committee. A catchment area comprising of a 1.5km buffer from the subject site was chosen as the basis for analysing the childcare provision in the area.

Pobal, the government agency, maintains an up to date map of registered childcare facilities within Ireland, enabling an objective analysis of childcare provision and the targeting of areas where facilities may be needed in the future. McGill Planning Ltd also liaised with Dun Laoghaire Rathdown Childcare Committee.

The results of this survey are shown in the table below. The survey allowed an up-to-date analysis of the existing facilities in the area. However, it is worth noting that these surveys took place during the Covid-19 pandemic which may have impacted the number of children attending the childcare facilities.

There are 10 no. existing childcare facilities within 2km of the subject site. Based on the survey carried out there are a known 151 no. children in childcare facilities in the area, with some creches unable to provide a total no. of children within their facilities. We note that there are no vacancies in any of the childcare facilities, therefore the proposed development will cause an increasing demand for childcare spaces in the area. Therefore a childcare facility of sufficient size is proposed as part of the development to address any future demand.

	Childcare Facility	Total No. Children	Vacancies
1.	Once Upon a Time	18	0
2.	Little Star Preschool	22	0
3.	Tiny Tots	50	0
4.	Miss Judi's Montessori	-	-
5.	Park Academy Childcare Cabinteely	-	-
6.	Little Maples	39	0
7.	Lorraine Wynn Preschool	-	-
8.	Park Academy Childcare Cherrywood	-	-
9.	Kids Inc Cherrywood	-	-
10.	Springfield Montessori School	22	0
11.	Dimples Creche & Montessori	110	0
12.	Inbetween Kids' Club	-	-
13.	Lilliput Childcare Foxrock	-	-
14.	Poppets Childcare	22	0
15	Lorraine Wynne Preschool	-	-
16.	Pixies Montessori	44	0
17.	Giraffe Childcare Cherrywood	-	-
18.	Brighton Day Care	56	0
Total		**383**	**0**
Future Creche			
Brennanstown Wood to the north west		63	63

Table 4.9 Childcare Facilities

Figure 4.8 Locations of Childcare Facilities

Schools

Desktop research of the schools in the area was carried out using the available information from The Department of Education and Google Maps. A 2km catchment area was chosen on the basis for examining the schools in relation to the subject site. Within this catchment area there are four primary schools and three post-primary schools. The locations of these schools are shown in Figure 4.9.

The Department of Education provides enrolment information for all primary and post primary schools in the country. The 2020/2021 enrolment figures for the schools within 1km of the subject site are shown in the Table 4.10 below. The capacity of each of the schools has been estimated based on teacher student ratio for primary school level and for post-primary level.

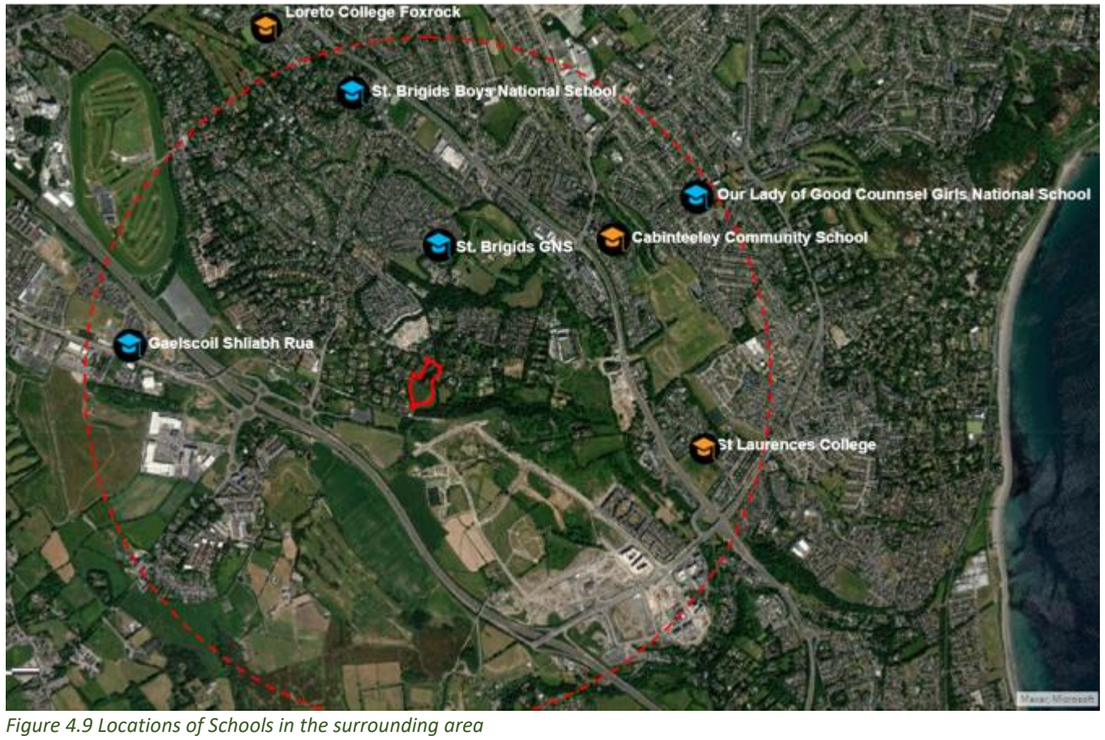

Figure 4.9 Locations of Schools in the surrounding area

Based on the primary level staffing schedule will operate on a general average of 25 pupil to every 1 teacher (25:1). St. Brigids Boys National School is currently operating at full capacity with its 18 no. mainstream teachers with no vacancies available. St Brigids Girls National school has c.77 no. vacancies, Gaelscoil Shiladh Rua has c.23 no. vacancies, and Our Lady of Good Counsel Girls National School has c.117 no. of vacancies. It is estimated that there is a c. 217 no. spaces available between the four primary schools.

At post primary level, teachers are currently allocated at a ratio of 19:1. St Laurence's College has the capacity to cater for 500 no. students and has 242 no. potential vacancies. Loreto College Foxrock has c.60 teachers and can likely accommodate c.580 no. of vacancies. It is unclear how many teachers are employed in Cabinteely Community School, therefore the capacity of this school and potential vacancies has not been estimated. Nonetheless, between St Laurence's College and Loreto College Foxrock there would be an estimated 822 no. of post-primary vacancies in the vicinity.

Roll no.	Primary School	Ethos	Gender	2020/21 Enrolment	Potential Vacancies
16352 U	St. Brigid's Boys NS	Catholic	Boys	458	0
16353 W	St. Brigid's Girls NS	Catholic	Girls	548	77
20425 U	Gaelscoil Shilabh Rua	Multi	Mixed	302	23
19321 B	Our Lady of Good Counsel GNS	Catholic	Girls	433	117
				Total	217

Roll no.	Post - Primary School	Ethos	Gender	2020/21 Enrolment	Potential Vacancies
60262 T	St Laurence's College	Catholic	Mixed	258	242
91310 E	Cabinteely Community School	Inter Denom	Mixed	471	-
60240 J	Loreto College Foxrock	Catholic	Girls	560	580
				Total	822

Table 4.10 Schools within 2km Catchment of Subject Site

Health

Human Health is a very broad factor and is interrelated with climate and air quality, water quality, the noise environment, access to nature, mobility and accessibility, and human connections. The World Health Organization defines "health" broadly as "*a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity*".

The 2016 census records the self-evaluation general health status of respondents. Results from the 2016 census indicated that 65.7% of the local area identified themselves as being of "Very Good" health. This is in comparison with 59.4% of the State's population identifying as being of "Very Good" health. According to data, the highest percentage of the population of the local area identified themselves as being of "Very Good" health, and the lowest percentage of the population identified themselves as being of "Very Bad health".

General Health	Local Area	State
Very Good	65.7%	59.4%
Good	24.5%	27.6%
Fair	6.3%	8.0%
Bad	0.9%	1.3%
Very Bad	0.2%	0.3%
Not Stated	2.3%	3.3%
Total	100%	100%

Table 4.11 Schools within 2km Catchment of Subject Site

The surrounding context of the site consists of a mix of residential, community and amenity related land uses. Therefore, it is not expected that future residents of the scheme will suffer from poor levels of air quality or noise levels from surrounding activities. The surrounding area also does not include any man-made industrial sites or activities (including SEVESO II Directive sites) that would be likely to result in a risk to human health and safety.

Access to nature has biological, mental, and social benefits to people. There are a number of parks within the vicinity of the subject site. For instance, Cabinteely Park is located c. 600m north of the subject site and provides a large public open space with playing fields and green spaces. These existing, accessible public spaces, along with the proposed open spaces in the development willaccessibility provide opportunities for residents to recreate and to connect with adjoining communities in the area.

4.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development consists of a strategic housing development with residential units, a creche, retail units and open space.

A detailed development description is included in Chapter 3 of this EIAR and in the statutory notices.

4.5 POTENTIAL IMPACTS

Impacts on Business and Residences

Construction Phase
The development in the short term (5 years maximum) will provide for construction related employment during the different phases of development, with additional spend in the local shops, restaurants etc.

Businesses directly involved in the construction phase of the development will generate value and secure direct employment which in turn will contribute to the overall GDP of the economy and tax revenues at national level. The construction of the proposed development is therefore likely to have a moderate positive effect on the local employment and economic activity too. Through additional spending, this positive impact will be temporary through the construction phase.

Operational Phase
The proposed development will provide 534 no. of residential units and considering the national household size of 2.75 people this development will likely generate a population of c. 1,469 when fully occupied.

Considering the number of people in employment in the local area (72%), it can be expected that c.1058 of the population generated will be working. The proposed retail unit will bring new employment and economic activity to the area and will support the existing and future residential populations. It is estimated that c. 15 people would be employed in the retail unit. The proposed creche will also bring employment to the area, it is estimated that c.7 people would be employed in the creche. The Build to Rent apartment scheme's operational team will also provide employment. It is expected that a community of this scale is likely to have 8-10 permanent staff on site.

This increase in the local employment population will contribute positively to local businesses and amenities, while also improving the vibrancy and vitality of the area and the community. This will have a positive permanent effect on Business and Residences.

Impacts on Air Quality and Climate

Construction Phase
Dust emissions from the construction phase of the proposed development have the potential to impact human health through the release of PM_{10} and $PM_{2.5}$ emissions. As per Table 9.5 PM_{10} emissions can occur within 25 m of the site for a development of this scale. There are a number of high sensitivity receptors bordering the site to the west, north and east, a small number of which are within 15m of the site boundary. Therefore, in the absence of mitigation there is the potential for slight, negative, short-term impacts to human health as a result of the proposed development.

Operational Phase
Traffic related air emissions have the potential to impact air quality which can affect human health. However, air dispersion modelling of traffic emissions has shown that levels of all pollutants are below the ambient air quality standards set for the protection of human health. It can be determined that the impact to human health during the operational stage is long-term, neutral and imperceptible and therefore, no mitigation is required. These effects are discussed in further detail in Chapter 9 - Air Quality and Climate.

Impacts on Retail and Community Services

Construction Phase
During the construction phase, the local retail and community services will be temporarily negatively impacted by construction noise, traffic and dust. Although negative, this impact will be minor and will only continue for the construction period. The local retail and community services will also be positively impacted by increased spending in the area by construction workers.

Operational Phase
The local population increase that will be generated by the proposed development will support the existing and retail and community facilities in the area. The proposed retail unit will serve both the proposed development and the surrounding area. It will complement the existing retail in the area.

Impacts on Human Health

The European Commission's Guidance on the preparation of the Environmental Impact Assessment Report states at footnote no. 2

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

It is clear from this broad definition that human health is interrelated with many factors which are addressed in separate EIAR Chapters. The relevant potential impacts from those chapters are summarised below

Construction Phase
The construction phase of the proposed development may give rise to short term (less than 5 years) impacts to the locality such as
- increased construction traffic including the hauling of building materials to and from the proposed development site
- increased surface contaminants,
- increased exposure to dust and exhaust emissions,
- increased exposure to traffic and construction noise, and
- increased littering.

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, and in fact, the development is likely to positively impact the wellbeing of residents. 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. The landscape design is made up of an amphitheatre, community gardens, natural play areas and communal open spaces.

When complete the proposed development will increase the permeability and walkability of the site by providing safe and inviting pedestrian and cycling connections off Brennanstown Road to the northeast and connecting to the Luas stop to the south. This will make walking and cycling an attractive transport mode and will encourage people to walk and cycle, which will in turn increase daily physical activity and improve people's health.

Chapter 11 Traffic and Transportation notes the proposed development will generate a number of trips by various modes of travel including vehicular, pedestrian, cycle and public transport. These trips may have an impact on the surrounding road network and could contribute to increased congestion.

Chapter 8 Noise and Vibration states that once the development is operational, the potential noise impacts to the surrounding environment are minimal. The residential aspect of the development is not expected to generate any significant noise sources over and above those which form part of the existing environment at neighbouring residential areas (road traffic noise, estate vehicle movements, children playing etc.) and hence no significant impact is expected from this area of the development site.

Impacts on Childcare

Construction Phase

There are no childcare facilities within 500m of the site. However, during the construction phase, the childcare facilities may be temporarily impacted by construction noise, traffic and dust. Although negative, this impact will be minor and will only continue for the construction period.

Operational Phase

The proposed developments projected need for childcare spaces has been based on the local demographics, the quarterly national household survey, and national guidelines.

The Childcare Facilities Guidelines for Planning Authorities (2001) provides a standard of one childcare facility with a minimum 20 childcare places per approximately 75 dwellings. This would require a childcare facility of c. 142 no. childcare spaces for the proposed development.

The 2020 Guidelines on Design Standards for New Apartments note that the threshold for the provision of childcare facilities *'should be established having regard to the scale and unit mix of the proposed development and the existing geographical distribution of childcare facilities and the emerging demographic profile of the area'. It also notes that 'one-bedroom or studio type units should not generally be considered to contribute to a requirement for any childcare provision and subject to location, this may also apply in part or whole, to units with two or more bedrooms'*

Based on the average household size of 2.7 persons, the estimated population of the proposed development when complete is c. 1,441 no. (534 no. units*2.7 household size). Based on the local demographic analysis above, it is estimated that c. no.91 of this population will be aged 0-4 (6.3% of 1,441 people).

As noted above, not all children in the 0-4 age cohort require private childcare. The Quarterly National Household Survey (QNHS) indicated that in the Dublin region only 25% of pre-school age children attend private childcare. Applying this percentage to the total estimate of children indicates that c. 23 no. childcare spaces are needed, assuming that each apartment has children in the 0-4 age category.
The Apartment Guidelines recommend the exclusion of studio units and one bed units when calculating childcare demand. When these units are excluded from the calculations, it is estimated that c. 63 no. children aged 0-4 will be in the development. When the QNHS is considered the no. of children attending childcare will be c. 16 children (369 no. units * 2.7 persons=c. 996 people * 6.3% = 63 no children). The above calculations are summarised in the table below. The table also includes a scenario in which 50% of the children would require private childcare, but this scenario is unlikely.

Pre-school children

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

Figure 4.10 Extract from Quarterly National Household Survey, 2016 Q4 Module on Childcare

The table below provides an overview of the expected childcare demand resulting from the 'Barrington Tower' development, as calculated in line with the above guidelines and local demographics.

	2001 Guidelines	Apartment Guidelines	Apartment Guidelines	Apartment Guidelines
	All apartments	Without Studios + 1 beds	Without Studios, 1 beds + 50% 2 beds	3 beds only
Calculation based on 2001 Guidelines				
No. of units	534	369	210	51
2001 Guidelines (20 no. spaces/75 no. units)	142.4	98	56	14
Refined calculation based on population analysis as advised in the Apartment Guidelines				
Total Population generated (2.7 per household)	1,441	996	567	138

Population 0-4 (6.3% of Pop)	91	53	36	9
Quarterly National Household Survey 25% of all 0-4 year old				
Total Requiring Childcare (25%)	23	13	9	2
Worst case scenario total Requiring Childcare (50%)	46	27	18	5

Table 4.12 Estimated Childcare Demand from Proposed Development

As demonstrated above, the estimated childcare demand arising from the proposed development will be c. 98 no. childcare spaces when based on the 2001 guidelines and the studios and one beds are excluded. When the census data is considered it is estimated that there will be a demand for c. 53 childcare spaces.

The proposed creche will provide for 99 childcare spaces, which will accommodate the full development and also provide capacity for the wider area. On this basis the sizing of the creche is considered appropriate for the development. This will have a neutral/positive effect on population and human health as the proposed creche will accommodate for the 98 no. childcare spaces required.

Impacts on Schools

Construction Phase

During the construction phase of development there will be minimal impact on the surrounding schools. There are no schools within 500m of the application site. If any school is impacted, it will be temporarily negatively impacted by construction noise and dust. However, any negative impact will be of short duration and will be mitigated appropriately

Operational Phase

The 2016 census indicates the share of population in the Primary School (4-11) and Post Primary School (12-19) years. This percentage share was used to estimate the number of primary and post-primary school children the proposed development would generate.

An analysis of the 2016 Census information shows that the total population for the local area (consisting of seven electoral divisions) was 25,258 people, of which 4,770 were of primary school age and post-primary school age (5-19). This equates to approximately 8.8% of the population as primary school age and 10.1% as post-primary school age.

Local Area Catchment	Number of People	% Total 2016 Population
Primary School Age (5-11)	2221	8.8%
Post Primary School Age (12-19)	2549	10.1%
Total 2016 Population	4770	18.9%

Table 4.13 Breakdown of 2016 Local Population

The national household size, according to the 2016 census, is 2.75 people. The proposed residential development contains 534 no. units and will have an expected population of c. 1,469 when mature. Using the percentages explained above, the estimated maximum primary school going population that would be generated by the development is c. 129 and c. 148 students for post-primary.

	Projected Population when Mature
Total Population	129
Primary School Age (5-11)	148
Post Primary School Age (12-19)	277

Table 4.14 Projected School Aged Population of Development

Based on the assessment of the school capacity in the area, it is noted that there are at c. 217 no. spaces currently available at primary school level and at c. 822 no. spaces at post-primary level. Therefore, it is considered that there is sufficient capacity within the existing schools in the area to cater for the increased demand expected from the proposed development.

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

The Department of Education published *Projections of Full-Time Enrolment Primary and Second Level 2020-2038* in November 2020 which outlined the results of 3 possible scenarios for the future enrolment in schools. Enrolment projections show that primary school enrolment numbers reached their peak in 2018 and that a continuous decline in enrolment until 2036 is expected. The projected enrolment for post-primary schools is not expected to peak until 2024 or 2025, which is then expected to be followed by a continuous decline until 2039.

Following these projections, it could be assumed that the increase in primary school aged children caused by the development may be lower than the c. 129 children as projected above. However, we note that these national projections may not be directly applicable to the local area.

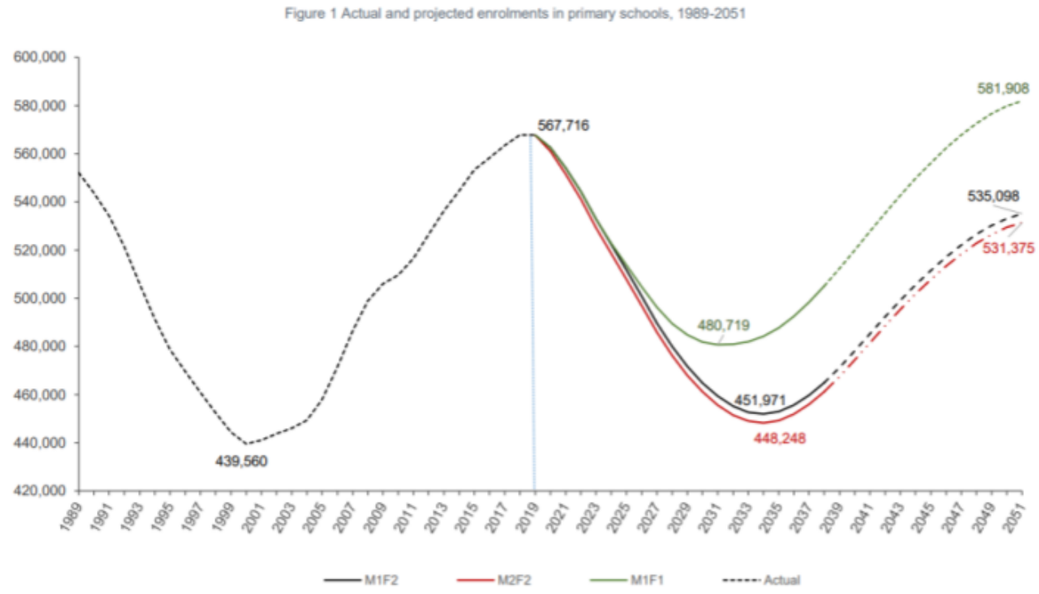

Figure 4.11 Projected Primary School Enrolment. Source: Dept. of Education

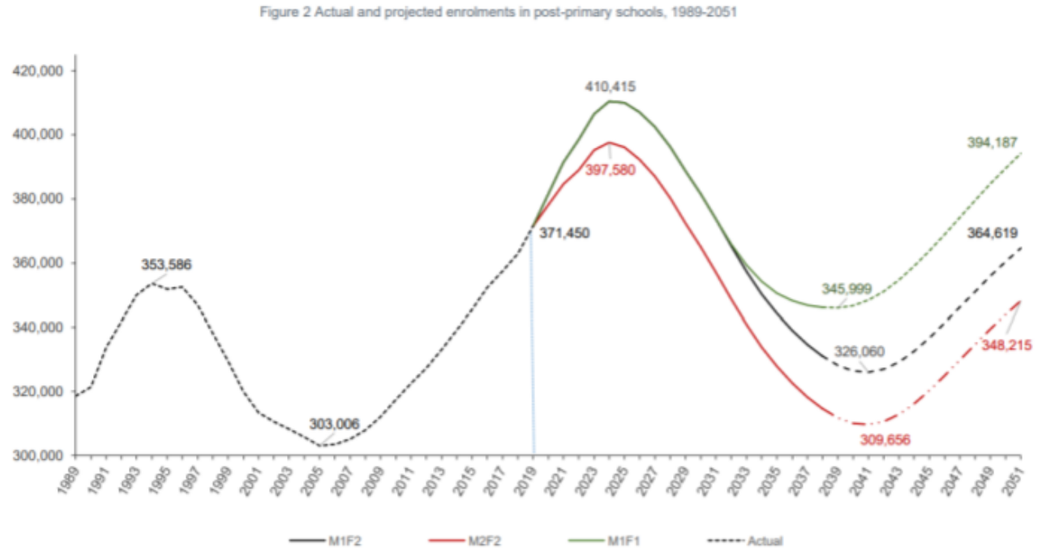

Figure 4.12 Projected Post-Primary Enrolment. Source: Dept. of Education

4.6 POTENTIAL CUMULATIVE IMPACTS

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

4.7 MITIGATION MEASURES

Construction Phase
A preliminary Construction and Environmental Management Plan (CEMP) has been prepared by AWN and will be implemented during the construction phase to reduce the detrimental effects of the construction phase on the environment and local population and is submitted with this application. While this preliminary CEMP provides the baseline of measures that will be implemented, a more detailed CEMP will be formally agreed in writing with the planning authority in writing prior to the commencement of the development and will incorporate any required updates, such as those amended by any condition of planning.

Construction noise and vibration impacts are expected to vary during the construction/demolition phase depending on the distance between the activities and noise sensitive buildings and that best practice control measures will ensure impacts at off-site noise sensitive locations are minimised. These are outlined in detail in Chapter 8.

Chapter 11 Traffic and Transportation and the CEMP submitted with the application include traffic management measures to minimise the impact of construction traffic.

These measures are put forward to avoid any significant negative environmental impacts on the population and human health. No additional mitigation measures are considered necessary.

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.

Chapter 9 Climate and Air Quality notes the proposal includes operational phase mitigation by design measures to minimise the impact on air quality and climate. These include thermally efficient glazing, thermal insultation, natural gas heating, inclusion of electric car charging points.

Chapter 11 Traffic and Transportation has been prepared for the proposed development with the aim of encouraging sustainable travel practices for all journeys. Increased sustainable travel practices will also reduce the negative impact of traffic emissions on the air quality.

No additional mitigation measures are considered necessary.

4.8 PREDICTED RESIDUAL IMPACTS (POST-MITIGATION)

Construction Phase
Any adverse likely and significant environmental impacts will be avoided by the implementation of the remedial and mitigation measures proposed throughout this EIAR.

Chapter 8 Noise and Vibration notes during the construction phase of the project there is the potential for short-term noise effects on nearby noise sensitive properties due to noise emissions from site activities. The application of binding noise limits and hours of operation, along with implementation of appropriate noise and vibration control measures, will ensure that noise and vibration impact is kept to a minimum as far as practicable. Likely noise and vibration effects during the construction phase will be local, negative, short-term and moderate.

Chapter 9 Climate and Air Quality notes that once the dust minimisation measures outlined in Chapter 9 and Appendix 9.2 are implemented, the impact of the proposed development in terms of dust soiling will be short-term, negative, localised and imperceptible at nearby receptors.

Chapter 11 Traffic and Transportation notes that provided the mitigation measures and management procedures outlined in the Construction Management Plan are incorporated during the Construction Phase, the residual impact upon the local receiving environment is predicted to be temporary in the nature and slight in terms of effect.

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

Chapter 8 Noise and Vibration notes that the predicted impact, once mitigation measures are implemented, of additional traffic, the mechanical plant, retail units and the creche will be of neutral, imperceptible, and long-term impact.

Chapter 9 Climate and Air Quality notes that the air dispersion modelling has shown that emissions of air pollutants are significantly below the ambient air quality standards which are based on the protection of human health, impacts to human health are long-term, negative and imperceptible.

Chapter 11 Traffic and Transportation notes that from the analysis results as summarised above, the proposed Junction 5 is expected to operate well within capacity during the AM and PM peak hours in the 2026 + Proposed Development (Opening Year) scenario and would continue to do so for the future assessment year of 2041.

Overall, the predicted impacts of the Operational Phase are considered to be long term and positive to population and human health.

4.9 CONCLUSIONS

Do Nothing Scenario

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

4.10 MONITORING AND REINSTATEMENT

There is no monitoring required during the construction or operation of the proposed development in relation to population and human health. The monitoring measures required for the aspects of water, air quality and climate, noise, landscape and visual impact, etc provides an appropriate response in this instance. There are no reinstatement works proposed for the proposed site.

4.11 DIFFICULTIES IN COMPILING INFORMATION

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

- The census data that informed this chapter's analysis dates from 2016, which could be considered out of date.
- This chapter was prepared during the Covid-19 pandemic which has impacted the employment levels and the childcare capacity levels. It is not yet clear what the long-term effects of this pandemic will be. Despite these limitations to the data collection, every effort was made to ensure that the data collected and analysed was as accurate as possible.

4.12 REFERENCES

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5 BIODIVERSITY

The biodiversity chapter was carried out by Altemar Limited, with the bat assessment being carried out by Dr Tina Aughney of Bat Eco Services and the Wintering Bird Assessment being carried out by Hugh Delaney.

5.1 INTRODUCTION

The Biodiversity assessment has been undertaken by Altemar Limited and Bat Eco Services. It assesses the biodiversity value of the proposed development area and the potential impacts of the development on the ecology of the surrounding area and within the potential zone of influence (ZOI). The programme of work in relation to biodiversity assessment was designed to identify and describe the existing ecology of the area and detail designated sites, habitats or species of conservation interest that could potentially be impacted by the proposed development. It also assesses the significance of the likely impacts of the scheme on the biodiversity elements, and designs mitigation measures to alleviate identified impacts.

A separate AA Screening/Natura Impact Statement, in accordance with the requirements of Article 6(3) of the EU Habitats Directive, has been produced to identify potential impacts of the development on European (Natura 2000) sites, Annex species or Annex habitats. It concludes that '*In a strict application of the precautionary principle, it has been concluded that mitigation measures were required during construction to prevent impacts on the Rockabill to Dalkey Island SAC. Impacts are likely from the proposed works in the absence of mitigation measures, primarily as a result of direct hydrological connection from the proposed development site to the Rockabill to Dalkey Island SAC. As a result, there is potential for downstream impacts on this SAC from the project during site clearance, enabling, construction, landscaping and drainage works.'*

'Following the implementation of the mitigation measures outlined, the construction and presence of this development would not be deemed to have a significant impact on the integrity of European sites. No significant impacts are likely on European sites, alone in combination with other plans and projects based on the implementation of standard construction phase mitigation measures.'

BACKGROUND TO THE PROJECT TEAM

Altemar Ltd. is an established environmental consultancy that is based in Greystones, Co. Wicklow that has been in operation in Ireland since 2001. Bryan Deegan MCIEEM is the Managing Director of Altemar Ltd. and holds a M.Sc. Environmental Science, BSc (Hons.) in Applied Marine Biology and a National Diploma in Applied Aquatic Science. He has over 27 years' experience as an environmental consultant in Ireland and was the ecologist for all aspects of this project. Previous projects where Altemar were the lead project ecologists include the Lidl Ireland GmbH regional distribution centres in Newbridge and Mullingar, 18 airside projects for daa at Dublin Airport and 7 fibre optic cable landfalls in Ireland including the New York to Killala cable project in 2015. Bryan Deegan is the sole "External Expert" that provides support to Inland Fisheries Ireland in relation to environmental assessment.

Dr Tina Aughney (Bat Eco Services) has worked as a Bat Specialist since 2000 and has undertaken extensive survey work for all Irish bat species including large scale development projects, road schemes, residential developments, wind farm developments and smaller projects in relation to building renovation or habitat enhancement. She is a monitoring co-ordinator and trainer for Bat Conservation Ireland. She is a co- author of the 2014 publication Irish Bats in the 21st Century. This book received the 2015 CIEEM award for Dr Aughney is a contributing author for the Atlas of Mammals in Ireland 2010-2015. All analysis and reporting were completed by Dr Tina Aughney. Data collected and surveying is completed with the assistance of a trained field assistant. Mr. Shaun Boyle (Field Assistant) NPWS licence DER/BAT 2021-19 (Survey licence, expires 15th March 2022).
Hugh Delaney provided specialist support to Bryan Deegan in relation to birds. Hugh Delaney is an ecologist (ornithologist primarily) having completed work on numerous sites with ecological consultancies over 10+ years. Hugh is local to the Dun Laoghaire-Rathdown area in Dublin and is especially familiar with the bird life and its ecology in the environs going back over 30 years.

5.2 METHODOLOGY

A pre-survey biodiversity data search was carried out in August 2020 and updated in March 2022. This included examining records and data from the National Parks and Wildlife Service (NPWS), National Biological Data Centre (NBDC) and the Environmental Protection Agency (EPA), in addition to aerial, 6 inch maps and satellite imagery. A habitat survey of the site was undertaken within the appropriate seasonal timeframe for terrestrial fieldwork. Field surveys were carried out as outlined in Table 5.1. All surveys were carried out in the appropriate seasons.

Area	Surveyors	Survey Dates
Terrestrial Ecology/ Aquatic Ecology/Avian Ecology	Bryan Deegan (MCIEEM) of Altemar	15th September 2020 27th August 2021
Bat Survey	Dr Tina Aughney of Bat Eco Services	Extensive bat assessments were carried out by Bat Eco Services in 2018, 2019, 2020 and 2021. Appendix 5.1.
Mammal / Amphibian Survey	Bryan Deegan (MCIEEM) of Altemar	17th March 2020/ 3rd March 2021, 2nd March 2022
Wintering Bird Assessment	Hugh Delaney Ornithologist	18th December 2021, 21st January 2022, 11th February 2022 & 10th March 2022

Table 5.1 Field Survey

PROXIMITY TO DESIGNATED CONSERVATION SITES AND HABITATS/SPECIES OF CONSERVATION INTEREST

The designated conservation sites within 15km of the site and those with potential pathways to the proposed development side were examined for potential impact. No designated sites beyond 15km had direct or indirect pathways to the proposed development site. There were no recordings of protected species from any site beyond 15km onsite and the site was assessed as unsuitable foraging or nesting habitat for protected birds]. This assessment included sites of international importance; Natura 2000

sites (European sites) (Special Areas of Conservation (SAC), Special Protection Areas (SPA)) and Ramsar sites and sites of National importance ((Natural Heritage Areas (NHA), proposed Natural Heritage Areas (pNHA). Up to date GIS data (2022 NPWS data shapefiles) were acquired and plotted against the proposed development site. A data search of rare and threatened species within 5km of the proposed site (GIS shapefile) was provided by NPWS. Additional information on rare and threatened species was researched through the National Biodiversity Data Centre maps. The Carrickmines Stream is proximate to the site. Works are proposed to the sloped site and as a result it is considered that there is a direct hydrological pathway to the Natura 2000 site (Rockabilll to Dalkey Islands SAC), as the Carrickmines Stream outfalls to the marine environment that extends to the Rockabill to Dalkey Islands SAC. As a result, an AA Screening/Natura Impact statement was carried out for the project and is included with the supporting documentation for this application.

TERRESTRIAL AND AVIAN ECOLOGY

A pre-survey data search was carried out in August 2020 and updated in December 2021. This included a literature review to identify and collate relevant published information and ecological studies previously conducted and comprised of information from the following sources; the National Parks and Wildlife Service, NPWS Rare and Protected Species Database, National Biodiversity Data Centre, EPA WMS watercourses data, in addition to aerial, 6 inch, satellite imagery. Following the desktop study, walk-over assessments of the site were carried out as outlined in Table 5.1. Surveys were carried out by means of a thorough search within the potential ZOI. Habitat mapping was carried out according to Fossitt (2000) using AcrGIS 10.5 and displayed on Bing satellite imagery based on the 27th August 2021 site visit. Any rare or protected species or habitats were noted. A Wintering Bird Assessment was also carried out on 18th December 2021, 21st January 2022, 11th February 2022 & 10th March 2022 (Appendix II). As part of the fieldwork an invasive species assessment was carried out. Birds noted on site were classed based on the Birds of Conservation Concern In Ireland classification, of red, amber and green, which is based on an assessment of the conservation status of all regularly occurring birds on the island of Ireland.

BAT FAUNA

Due to the presence of several bat species roosting on site a detailed survey methodology was put in place. As outlined in Appendix 5.1 this included a desktop assessment, Daytime Inspections, building & structure Inspections, tree potential bat roost (PBRs) inspection, bat habitat & commuting routes mapping, night-time bat detector surveys, dusk & dawn bat surveys, walking transects and passive static bat detector surveys.

RATING OF EFFECTS

The terminology for rating impacts is derived from the EPA Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (2017) (Table 5.2)

Magnitude of impact and typical descriptions.

Magnitude of impact (change)		Typical description
High	Adverse	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements.
	Beneficial	Large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality.
Medium	Adverse	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements
	Beneficial	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.
Low	Adverse	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.
	Beneficial	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring
Negligible	Adverse	Very minor loss or alteration to one or more characteristics, features or elements.
	Beneficial	Very minor benefit to or positive addition of one or more characteristics, features or elements.

Criteria for Establishing Receptor Sensitivity/Importance

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

Quality of Potential Impacts on Biodiversity

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

Significance of Impacts

Significance of Impact	Description of Potential Impact
Imperceptible	An effect capable of measurement but without significant consequences.
Not significant	An effect which causes noticeable2 changes in the character of the environment but without significant consequences.
Slight Effects	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate Effects	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant Effects	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound	An impact which obliterates sensitive characteristics.

Duration of Impact

Duration of Impact	Description
Momentary	Effects lasting from seconds to minutes
Brief	Effects lasting less than a day
Temporary	Effects lasting less than a year
Short-term	Effects lasting one to seven years.
Medium-term	Effects lasting seven to fifteen years.
Long-term	Effects lasting fifteen to sixty years.
Permanent	Effects lasting over sixty years
Reversible	Effects that can be undone, for example through remediation or restoration

Possibility of Impact	Description
Likely Effects	The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
Unlikely Effects	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.

Table 5.2 Impact description terminology

DIFFICULTIES ENCOUNTERED

No difficulties were encountered in relation to the preparation of the biodiversity report. All surveys were carried out in the optimal survey season and access to all areas of the site was possible.

CONSULTATION

Consultation was carried out with the project team in relation to the preparation of the project design and in particular the landscape and lighting strategy and Construction Environmental Management Plan (CEMP).

5.3 RECEIVING ENVIRONMENT

The proposed development site is essentially two large unmaintained houses and gardens that have been neglected for several years. The sites primarily consist of grassland and hedgerows (primarily ornamental) with numerous large trees both internally and around the perimeter. The ground slopes to the south towards the LUAS line. Of particular note is the location of the Carrickmines Stream at the base of the site (outside the site outline) near the LUAS line. This watercourse leads to the marine environment within Killiney Bay, proximate to Rockabill to Dalkey SAC.

ZONE OF INFLUENCE

As outlined in CIEEM (2018) 'The 'zone of influence' for a project is the area over which ecological features may be affected by biophysical changes as a result of the proposed project and associated activities. This is likely to extend beyond the project site, for example where there are ecological or hydrological links beyond the site boundaries.' In line with best practice guidance an initial zone of influence was originally set at a radius of 2km for non-linear projects (IEA, 1995).
However, drainage from site, both surface water and foul, would be seen as the external output from the site during construction and operation that could have potential for effects on European sites. For clarity, information in relation to drainage during construction and operation is provided. In summary, surface water drainage during construction and operation would discharge be to the Carrickmines Stream (Ticknick Stream) which leads to the marine environment within Killiney Bay, proximate to Rockabill to Dalkey SAC. Foul water will require new connections into the public infrastructure network and will enter the public network with treatment at Shanganagh WwTP. Significant reprofiling works are proposed on site and there is potential for contaminated runoff to enter the Carrickmines Stream (Ticknick Stream) with potential impacts on the watercourse and the marine environment in Killiney Bay. The site outline is shown in figure 5.1.

DESIGNATED SITES

As can be seen from Figures 5-2 (SAC's within 15km), 5-3 (SPA's within 15km), 5-4 (NHA and pNHA within 15km), 5.5 (Watercourses proximate to the site.), there are four European sites (Rockabill to Dalkey Island SAC- 4.7 km, South Dublin Bay SAC – 4.7 km, South Dublin Bay and River Tolka Estuary SPA- 4.6 km and Ballyman Glen SAC – 5.0 km) within 5km. The distance and details of all the conservation sites within 15km of and those with the potential for direct or indirect pathways to the proposed development are

seen in Table 5.3a and Table 5.3b. It is important to note that the nearest site with a direct hydrological pathway downstream is a minimum of 1.9 km (Loughlinstown Woods pNHA). Significant settlement, dilution and mixing would occur within the marine environment prior to reaching the designated sites within the marine environment. However, given the proximity of Rockabill to Dalkey Islands SAC and the mobile nature of Harbour Porpoise (*Phocoena phocoena*) one of its features of interest, it is considered that there is a direct pathway to Rockabill to Dalkey Islands SAC via the Carrickmines Stream which enters the marine environment approximately 1.5 km from this SAC. As outlined in the accompanying NIS, mitigation measures will need to be in place to protect local biodiversity, to ensure compliance with Water Pollution Acts and to ensure that the proposed works do not impact on the integrity of Rockabill to Dalkey Island SAC.

European Site	Distance	Direct Hydrological / Biodiversity Connection
Special Areas of Conservation		
South Dublin Bay SAC	4.5 km	**No**
Rockabill to Dalkey Island SAC	4.7 km	**Yes**
Ballyman Glen SAC	5.0 km	**No**
Knocksink Wood SAC	5.3 km	**No**
Wicklow Mountains SAC	7.2 km	**No**
Bray Head SAC	7.9 km	**No**
North Dublin Bay SAC	10.0 km	**No**
Glen of the Downs SAC	12.8 km	**No**
Glenasmole Valley SAC	13.1 km	**No**
Howth Head SAC	13.1 km	**No**
Special Protection Areas		
South Dublin Bay and River Tolka Estuary SPA	4.6 km	**No**
Dalkey Islands SPA	5.2 km	**No**
Wicklow Mountains SPA	7.2 km	**No**
North Bull Island SPA	10.0 km	**No**
Howth Head Coast SPA	14.9 km	**No**

Table 5.3a European sites within 15km of the proposed development

Designation	Site Name	Distance	Direct Hydrological / Biodiversity Connection
pNHA	Loughlinstown Woods	1.9 km	**Yes**
pNHA	Dingle Glen	1.6 km	**No**
pNHA	Dalkey Coastal Zone and Killiney Hill	2.6 km	**No**
pNHA	Ballbetagh Bog	4.1 km	**No**
pNHA	Fitzsimons Wood	4.6 km	**No**
pNHA	Ballyman Glen	5.1 km	**No**
pNHA	Knocksink Wood	5.2 km	**No**
pNHA	South Dublin Bay	4.5 km	**No**
pNHA	Booterstown Marsh	6.3 km	**No**
pNHA	Bray Head	8.0 km	**No**
pNHA	Dargle River Valley	7.3 km	**No**
pNHA	Powerscourt Woodland	6.7 km	**No**
pNHA	Powerscourt Waterfall	11.0 km	**No**
pNHA	Kilmacanoge Marsh	9.7 km	**No**
pNHA	Great Sugar Loaf	8.3 km	**No**
pNHA	Glencree Valley	10.1 km	**No**
pNHA	Glen of the Downs	12.5 km	**No**
pNHA	Glenasmole Valley	12.7 km	**No**
pNHA	Dodder Valley	11.7 km	**No**
pNHA	Grand Canal	10.6 km	**No**
pNHA	Dolphins, Dublin Docks	9.8 km	**No**
pNHA	North Dublin Bay	9.9 km	**No**
pNHA	Howth Head	13.0 km	**No**

Table 5.3b Nationally designated sites within 15km of the proposed development

Figure 5.1 Site outline and location

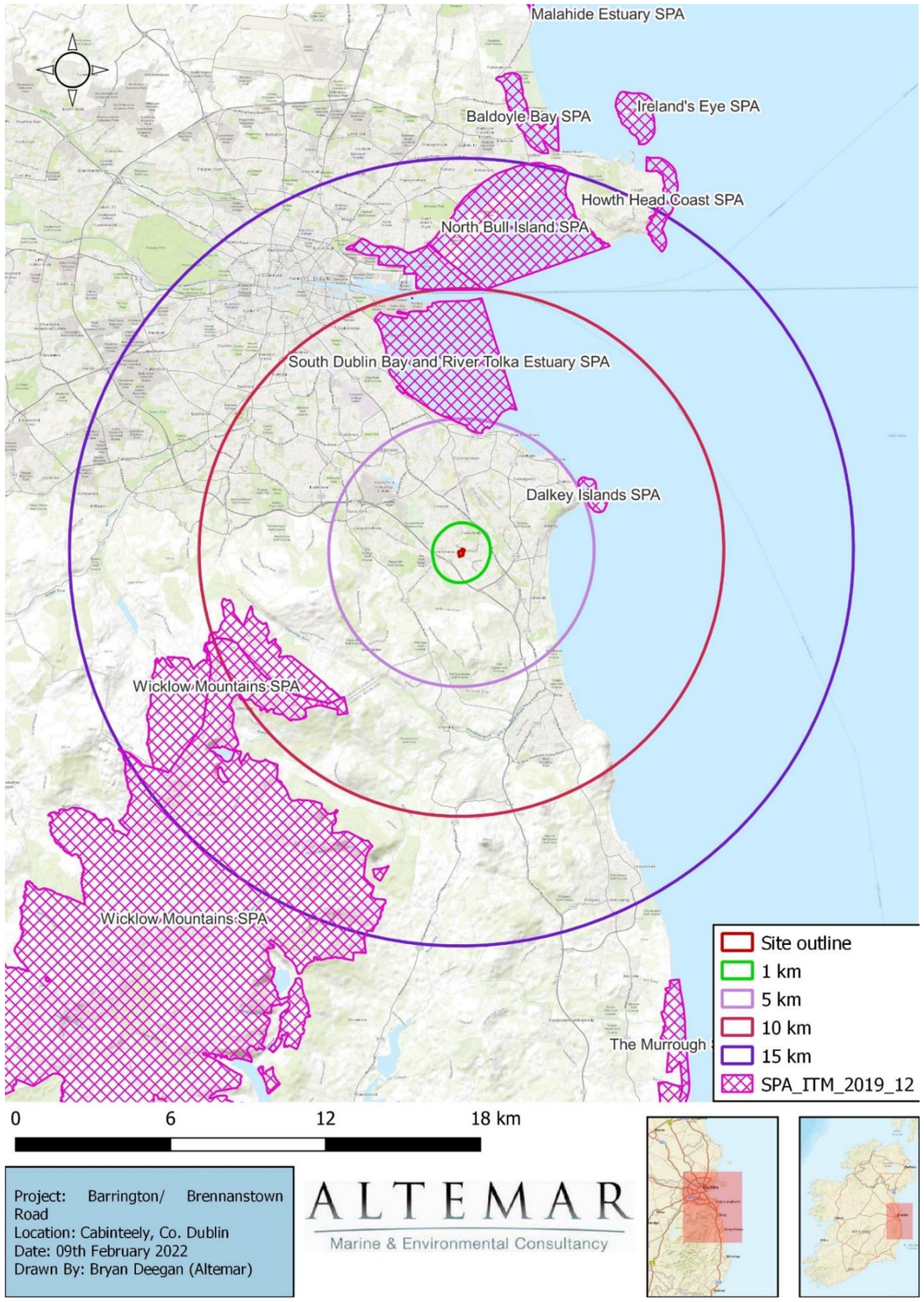


Figure 5.2 SPAs within 15 km of the proposed site

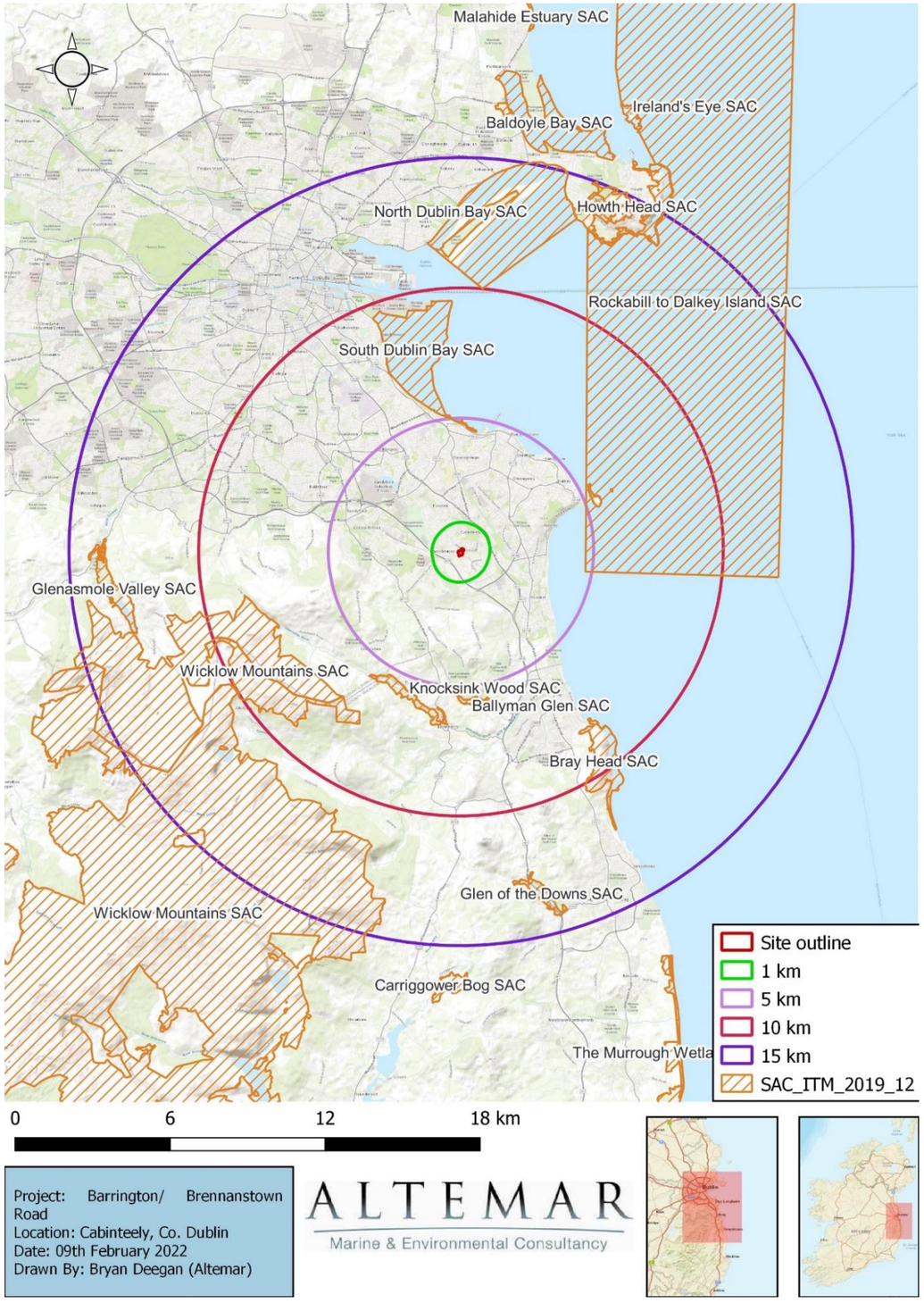


Figure 5.3 SACs within 15 km of the proposed site

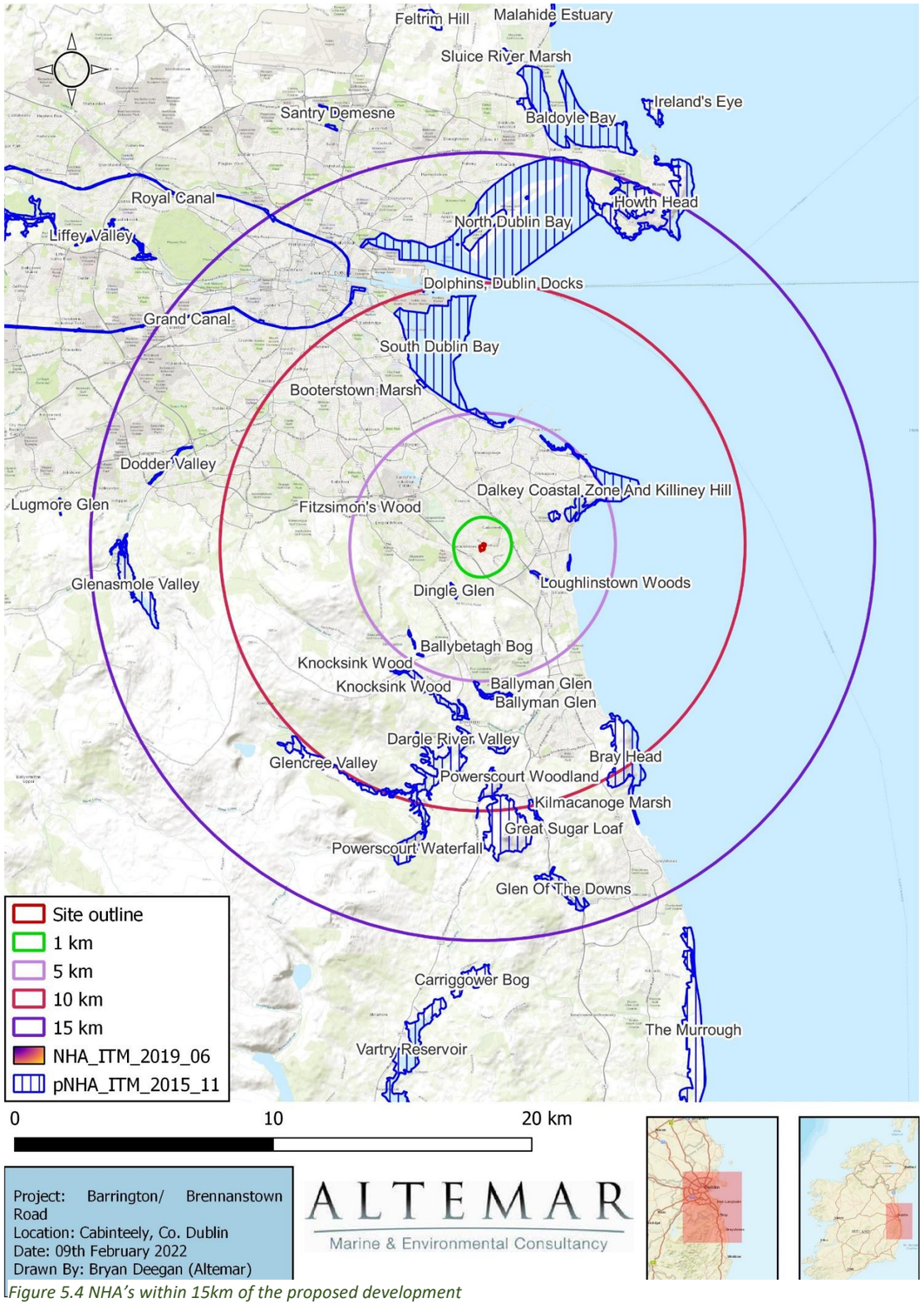


Figure 5.4 NHA's within 15km of the proposed development

Figure 5.5 Waterbodies proximate to the proposed development

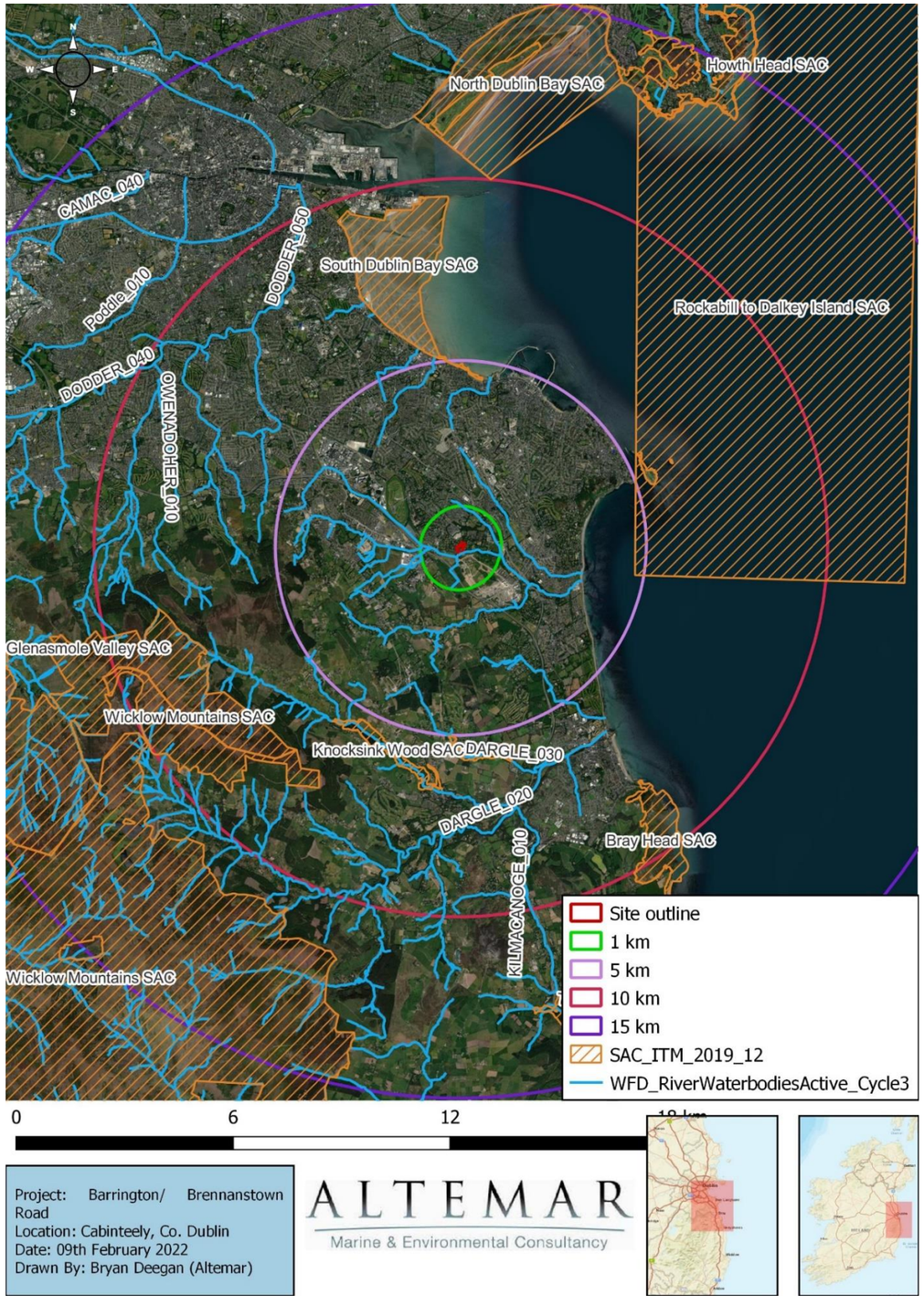


Figure 5.6 Waterbodies and SACs proximate to the proposed development

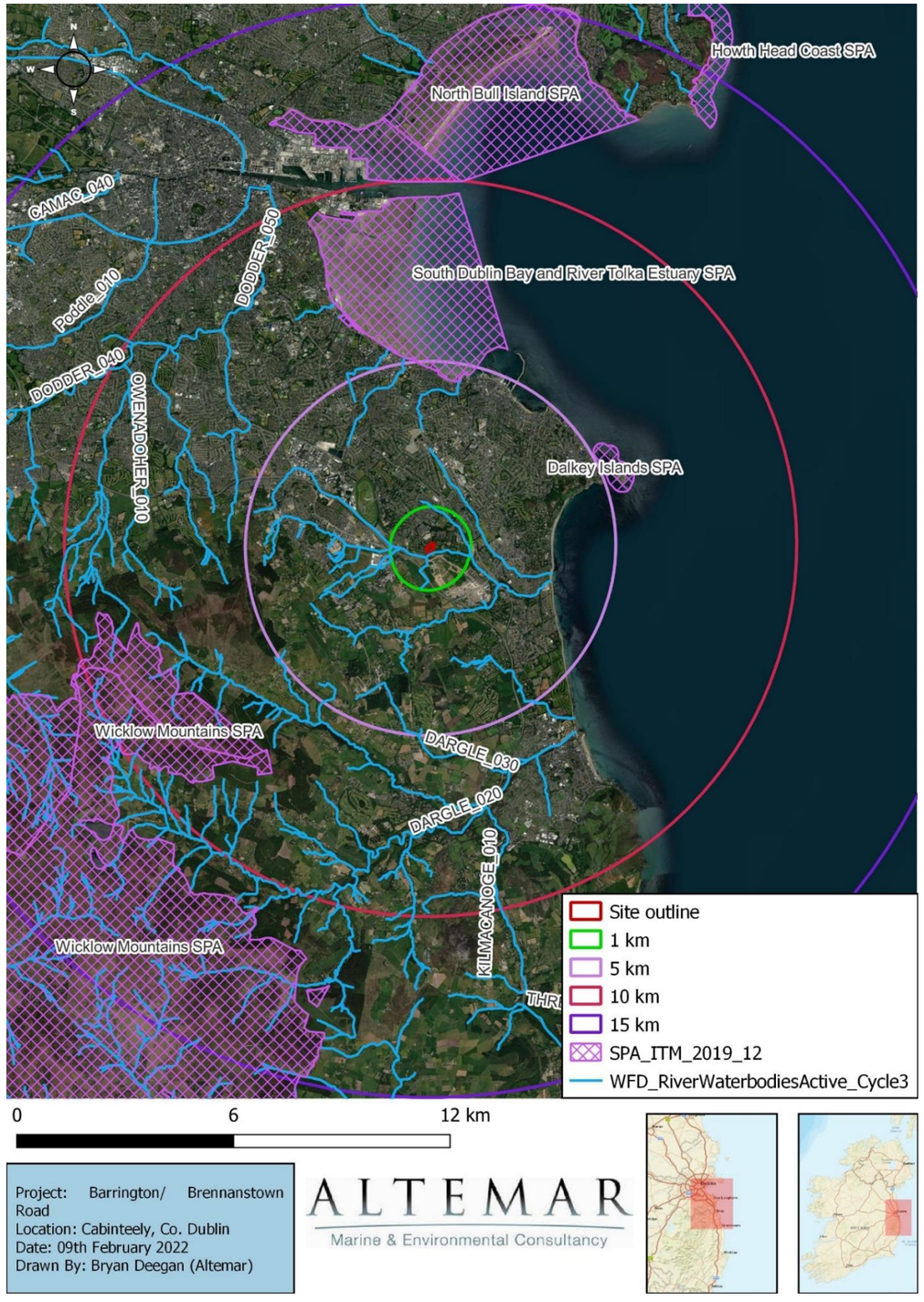
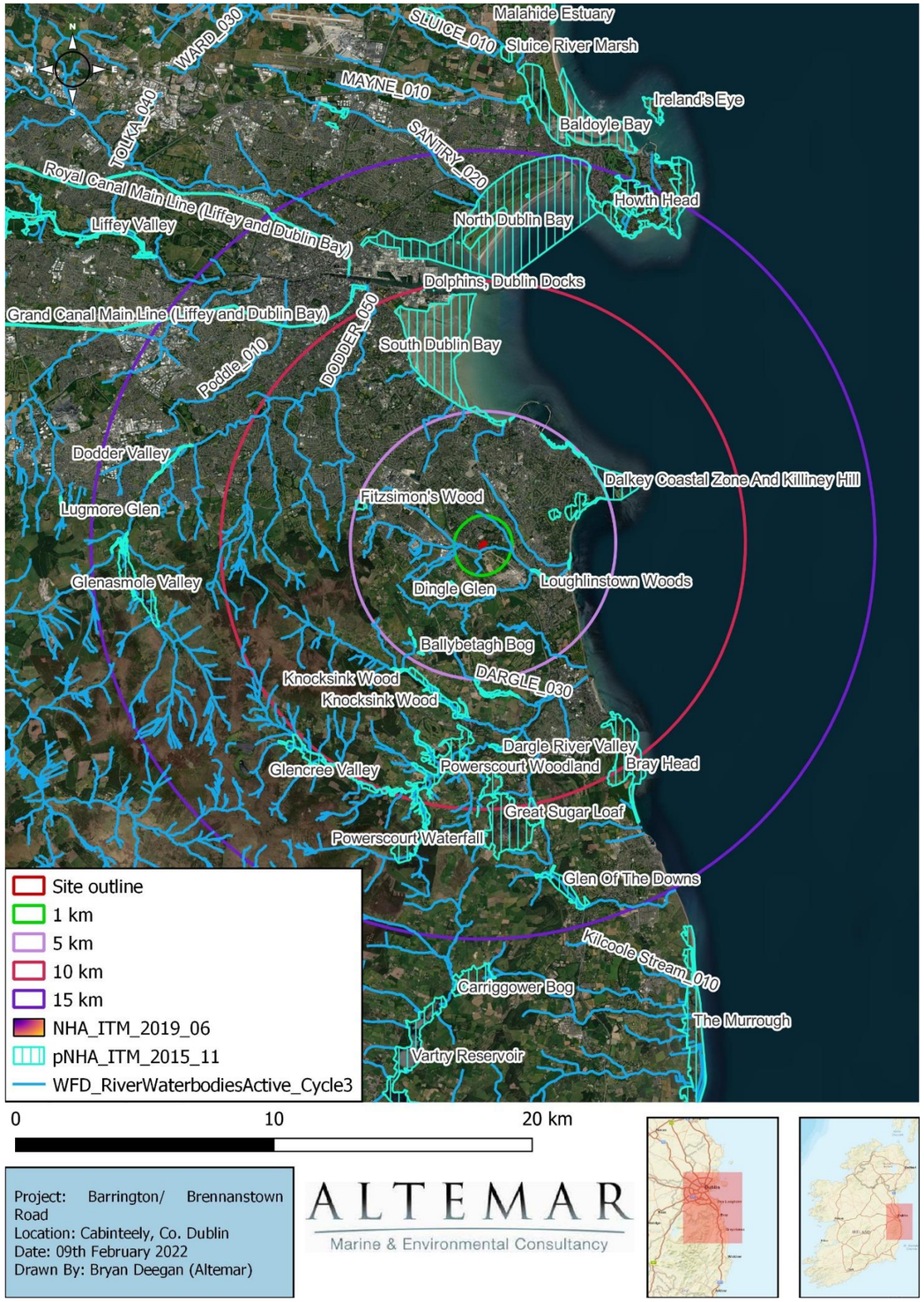


Figure 5.7 Waterbodies and SPA proximate to the proposed development



SPECIES DATA

It should be noted that no species of conservation importance were noted on site, based on NPWS and NBDC records as fine resolution. Species recorded within the 2km grid include are seen in Table 5.4.

Species name	Designation
European Otter (*Lutra lutra*)	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex II || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Brown Long-eared Bat (*Plecotus auritus*)	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Daubenton's Bat (*Myotis daubentonii*)	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Lesser Noctule (*Nyctalus leisleri*)	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Natterer's Bat (*Myotis nattereri*)	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Pipistrelle (*Pipistrellus pipistrellus sensu lato*)	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Soprano Pipistrelle (*Pipistrellus pygmaeus*)	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex IV || Protected Species: Wildlife Acts
Common Frog (*Rana temporaria*)	Protected Species: EU Habitats Directive || Protected Species: EU Habitats Directive >> Annex V || Protected Species: Wildlife Acts
Eurasian Badger (*Meles meles*)	Protected Species: Wildlife Acts
West European Hedgehog (*Erinaceus europaeus*)	Protected Species: Wildlife Acts
Little Egret (*Egretta garzetta*)	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species
Peregrine Falcon (*Falco peregrinus*)	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species
European Golden Plover (*Pluvialis apricaria*)	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Protected Species: EU Birds Directive >> Annex II, Section II Bird Species || Protected Species: EU Birds Directive >> Annex III, Section III Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Mediterranean Gull (*Larus melanocephalus*)	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex I Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Rock Pigeon (*Columba livia*)	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species
Common Wood Pigeon (*Columba palumbus*)	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section I Bird Species
Mallard (*Anas platyrhynchos*)	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section I Bird Species
Common Coot (*Fulica atra*)	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List

Species name	Designation
Eurasian Teal (*Anas crecca*)	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Eurasian Wigeon (*Anas penelope*)	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Tufted Duck (*Aythya fuligula*)	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section I Bird Species || Protected Species: EU Birds Directive >> Annex III, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Greater Scaup (*Aythya marila*)	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section II Bird Species || Protected Species: EU Birds Directive >> Annex III, Section III Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Northern Lapwing (*Vanellus vanellus*)	Protected Species: Wildlife Acts || Protected Species: EU Birds Directive || Protected Species: EU Birds Directive >> Annex II, Section II Bird Species || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Barn Swallow (*Hirundo rustica*)	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Common Kestrel (*Falco tinnunculus*)	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Common Linnet (*Carduelis cannabina*)	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Common Starling (*Sturnus vulgaris*)	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Common Swift (*Apus apus*)	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Eurasian Oystercatcher (*Haematopus ostralegus*)	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
House Martin (*Delichon urbicum*)	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
House Sparrow (*Passer domesticus*)	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Little Grebe (*Tachybaptus ruficollis*)	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Mew Gull (*Larus canus*)	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
Black-headed Gull (*Larus ridibundus*)	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Common Redshank (*Tringa totanus*)	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Herring Gull (*Larus argentatus*)	Protected Species: Wildlife Acts || Threatened Species: Birds of Conservation Concern || Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
Conocephalum salebrosum	Threatened Species: Least concern
Endive Pellia (*Pellia endiviifolia*)	Threatened Species: Least concern
Forked Veilwort (*Metzgeria furcata*)	Threatened Species: Least concern
Overleaf Pellia (*Pellia epiphylla*)	Threatened Species: Least concern
White Earwort (*Diplophyllum albicans*)	Threatened Species: Least concern
Common Feather-moss (*Eurhynchium praelongum*)	Threatened Species: Least concern
Common Tamarisk-moss (*Thuidium tamariscinum*)	Threatened Species: Least concern
Fern-leaved Hook-moss (*Cratoneuron filicinum*)	Threatened Species: Least concern
Fox-tail Feather-moss (*Thamnobryum alopecurum*)	Threatened Species: Least concern
Rusty Feather-moss (*Sciuro-hypnum plumosum*)	Threatened Species: Least concern
Swan's-neck Thyme-moss (*Mnium hornum*)	Threatened Species: Least concern
Swartz's Feather-moss (*Oxyrrhynchium hians*)	Threatened Species: Least concern
Small Heath (*Coenonympha pamphilus*)	Threatened Species: Near threatened
Moss Carder-bee (Bombus (*Thoracombus muscorum*)	Threatened Species: Near threatened
Cornflower (*Centaurea cyanus*)	Threatened Species: Regionally Extinct

Table 5.4a National Biodiversity Data Centre Records within the 2km2 grid.

No species of conservation importance have been noted within the site outline from the National Biodiversity Data Centre.

Common Frog (*Rana temporaria*), West European Hedgehog (*Erinaceus europaeus*), European Otter (*Lutra lutra*), Moschatel (*Adoxa moschatellina*), Yellow Archangel (*Lamiastrum galeobdolon subsp. Montanum),* Henbane *(Hyoscyamus niger*), Sharp-leaved Fluellen (*Kickxia elatine*)

Table 5.4b Species found by NPWS within 5 km.

SITE SURVEY

Site visits were carried out on the 15th September 2020 and 27th August 2021. The Fossitt (2000) habitat map seen in Figure 5.9 is based on the site visit on the 27th August 2021. This included flora and habitat assessments.

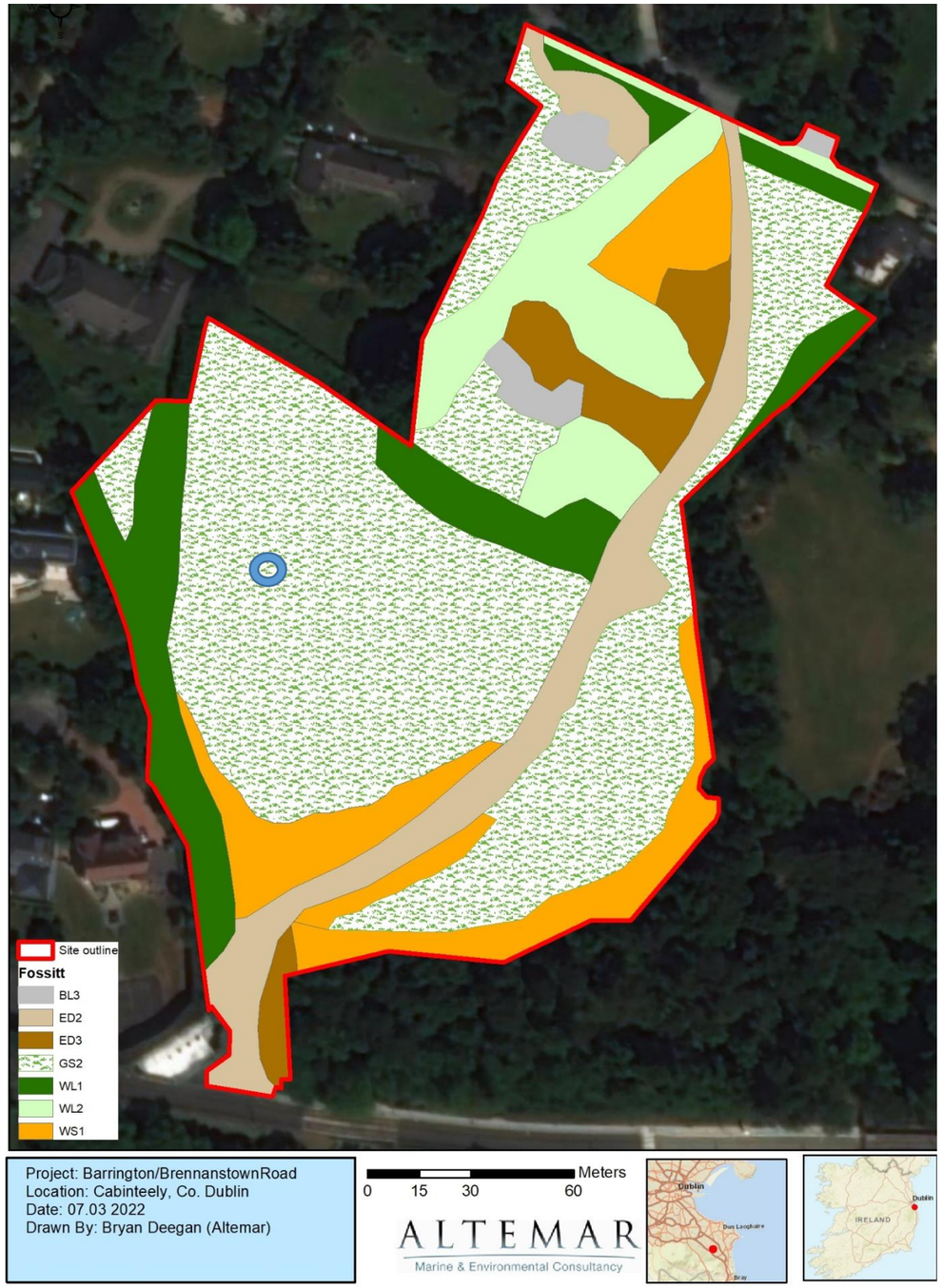


Figure 5.8 Fossitt (2000) Habitats within the proposed development (Fox den blue circle)

Plate 1 GS2-Dry meadows and grassy verges

GS2-Dry meadows and grassy verges

The site consists primarily of two large overgrown gardens surrounded overgrown treeline and hedgerows. The majority of the proposed development site consists of the habitat Dry meadows and grassy verges. As seen if Figure 5.9 these areas are being encroached by scrub. In many cased the overgrown treelines and hedgerows overhang this habitat. Flora species in GS2 consisted of thistles (*Cirsium vulgare*), white clover (*Trifolium repens*), red clover (*Trifolium pratense*), dandelion (*Taraxacum spp*.), creeping buttercup (*Ranunculus repens*), lesser stitchwort (*Stellaria graminea*), daisy (*Bellis perennis*), docks (*Rumex spp*.), plantains (*Plantago spp*.), nettle (*Urtica dioica*), bramble (*Rubus fructicosus*), common ragwort (Jacobaea vulgaris), rosebay willowherb (*Epilobium angustifolium*), gorse (*Ulex europaeus*), raspberry (*Rubus idaeus*), sycamore (*Acer pseudoplatanus*), rape (Brassica napus), self-heal (Prunella vulgaris), wild carrot (*Daucus carota*), Scots pine (*Pinus sylvestris*), winter heliotrope (*Petasites pyrenaicus*), common vetch (*Vicia sativa ssp. Segetalis*), lesser centaury (*Centaurium pulchellum*), Lady's Bedstraw (*Galium verum*) and willow (Salix sp.).

Plate 2 Hedgerows

WL1- Hedgerows

The majority of hedgerows on site consisted of non native species that have remained unmanaged for numerous years. As a result, the understory of this habitat was extremely poor with few species present. Where ground flora were present it was primarily dominated by ivy *(Hedera helix).* The dominant hedgerow species on site was *Griselinia littoralis*. Other species included gorse ((Ulex. Sp.), sycamore (Acer pseudoplatanus), elder (*Sambucus nigra)*, holly *(Ilex aquifolium),* dog-rose *(Rosa canina), Gorse (Ulex europaeus),* bramble *(Rubus fruticosus agg.),* honeysuckle *(Lonicera periclymenum)* buddleia (*Buddleia davidii*) and cleavers *(Galium aparine).* At the edge of this habitat a bramble scrub had commenced to encroach into surrounding areas.

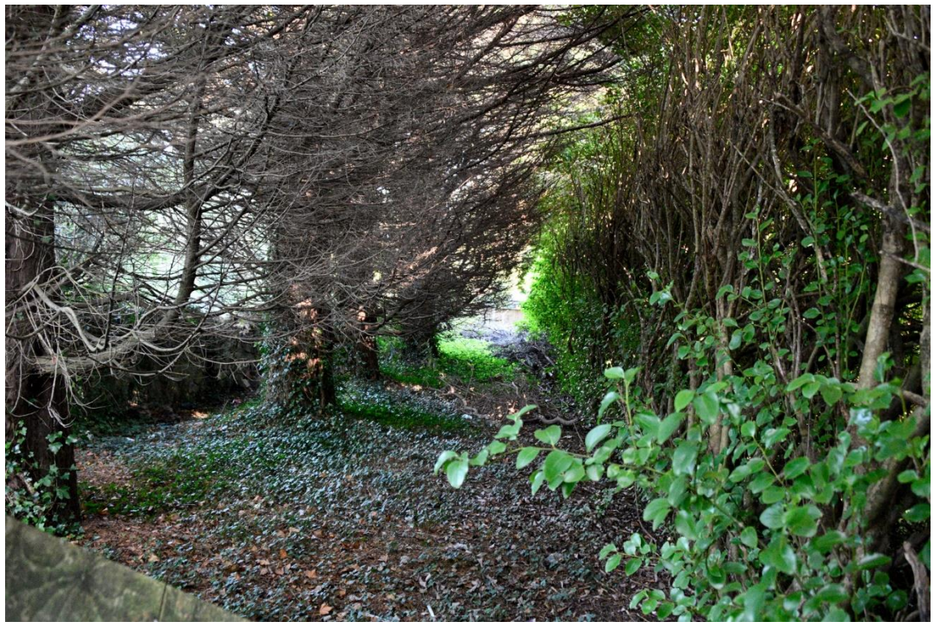


Plate 3 Treelines

WL2 Treelines

The central spine of the northern section of the site is dominated by a tall treeline. Tree species in this area included Scots Pine (*Pinus sylvestris*), Larch (*Larix decidua*), Ash (*Fraxinus excelsior*), Silver Fir (*Abies alba*), Lawson Cypress (*Chamaecyparis lawsoniana*), Cider gum (*Eucalyptus gunnii*), Monterey Cypress (*Cupressus macrocarpa*), Blue Atlas Cedar (*Cedrus atlantica*), Colorado Blue Spruce (*Picea pungens glauca*), sycamore (*Acer pseudoplatanus*), Elder (Sambucus nigra) beech (*Fagus sylvatica*). In addition to the taller trees were holly (*Ilex aquifolium*), ivy (*hedera helix*) nettle (*Urtica dioica*), docks (Rumex spp.), bramble (*Rubus fructicosus*) were noted.

Plate 4 Scrub (near the site entrance)

WS1 (Scrub)
This northern portion of the site near the site entrance and grassland boundaries in the southern part of the sites are being recolonised by a dense bramble (*Rubus fruticosus agg*.) scrub. Other species within the scrub include by nettle (*Urtica dioica*), docks (*Rumex spp*.), butterfly-bush (*Buddleja spp.*`), sycamore (*Acer pseudoplatanus*), gorse (*Ulex europaeus*), dog-rose (*Rosa canina*), oak (*Quercus sp*.), cleavers (*Galium aparine*), willows (*Salix sp*.), hoary willowherb (*Epilobium parviflorum*), clover (*Trifolium spp*.), plantains (*Plantago spp*.), thistles (*Cirsium arvense* & *C. vulgare*), self-heal (*Prunella vulgaris*), docks (*Rumex spp*.), colt's foot (*Tussilago farfara*), snowberry (*Symphoricarpos albus*), wild carrot (Daucus carota), lesser trefoil (*Trifolium dubium*), hedge bindweed (*Calystegia sepium*), herb-robert (*Geranium robertianum*), birch (*Betula sp.*), bracken (*Pteridium aquilinum*) and rosebay willowherb (*Chamaenerion angustifolium*).

Plate 5 Recolonising bare ground

ED3 Recolonising Bare ground.
Based upon an examination of satellite imagery significant works took place on the southern portion of the site in 2009 which coincide with the Luas line construction. Other areas of the site in the vicininty of the built land, consist of recolonising bare ground, primarily due to neglect and lack of maintenance. Species included thistles (Cirsium vulgare), Species noted included rape (*Brassica napus*), winter heliotrope (*Petasites pyrenaicus*), wild Teasel (*Dipsacus fullonum*), oxeye daisy (*Leucanthemum vulgare*), great willowherb *(Epilobium hirsutum*), thistles (*Cirsium arvense, C. vulgare*), common ragwort (*Senecio jacobaea*), moss (*Spagnum sp*.), docks (*Rumex spp*.), plantains (*Plantago sp*p.), nettle (U*rtica dioica*), cat's-ear (*Hypochaeris radicata*), hedge bindweed (Calystegia sepium), common fumitory (*Fumaria officinalis*), ivy (Hedera helix), hoary willowherb (Epilobium parviflorum), gorse (Ulex europaeus), bramble (Rubus fruticosus agg.), purple-loosestrife (Lythrum salicaria), honeysuckle (Lonicera periclymenum) buddleia (Buddleia davidii), cleavers (Galium aparine), white clover (Trifolium repens), red clover (Trifolium pratense), dandelion (Taraxacum spp.), creeping buttercup (Ranunculus repens), daisy (Bellis perennis), docks (Rumex spp.), plantains (Plantago spp.), nettle (Urtica dioica), bramble (Rubus fructicosus), common ragwort (Jacobaea vulgaris), rosebay willowherb (Epilobium angustifolium), common vetch (Vicia sativa ssp. Segetalis), lady's Bedstraw (Galium verum) and willow (Salix sp.), oak (Quercus sp.), Field Forget-me-not (Myosotis arvensis), Cherry Laurel (Prunus laurocerasus) and rushes (Juncus sp.).

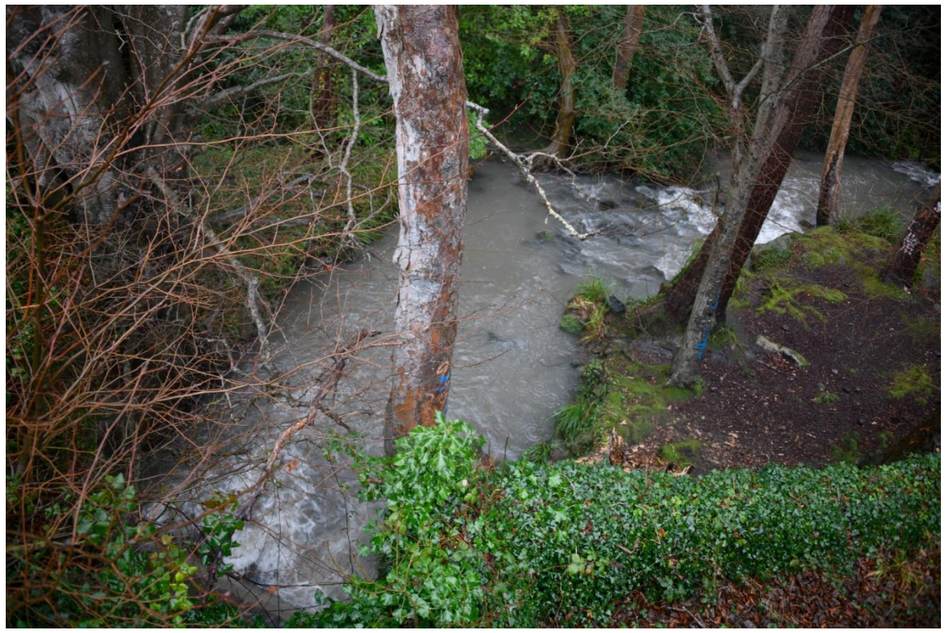


Plate 6 Carrickmines Stream (during high rainfall event)

Carrickmines Stream

The Carrickmines Stream is not located within the site boundary. However, it is downhill of the proposed works just outside the site outline and would be suseptible to surface water runoff in the absence of mitigation. This section of the watercourse would be classed as an eroding upland stream due to the steep nature of the ground, relatively fast flow and lack of deposition. The WFD status for the watercourse is moderate. Bothe otter (*Lutra lutra*) and brown trout (*Salmo trutta*) have been recorded downstream of the proposed development site. The watercourse (IE_EA_10C040350) has been a moderate water quality status under the Waterframework Directive and provides an important biodiversity corridor within the Dun Laoghaire Rathdown County Council area.

Invasive Species

No invasive plant or animal species listed under the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011) Section 49, the Third Schedule: Part 1 Plants, Third Schedule: Part 2A Animals were noted on site. No terrestrial or aquatic invasive species such as Japanese knotweed, giant rhubarb, Himalayan balsam, giant hogweed etc. that could hinder removal of soil from the site during groundworks were noted.

Terrestrial Mammals

Three mammal assessments were carried out (17th March 2020/ 3rd March 2021, 2nd March 2022). No signs of badger activity or an active sett were noted on site. Evidence of fox (*Vulpes vulpes*) was noted on site. A single fox den was noted within the grassland area (Figure 5.9). However, no evidence of otter (*Lutra lutra*) or badger activity were noted on site.

Amphibians and Reptiles

No amphibians or reptiles were noted on site. No ponds are located on site. A small drainage ditch which contained flood water was noted parallel and proximate to the Brennanstown Road during one site visit. In addition, given the fact that there is a watercourse proximate to the site, it is possible that frogs may be present on site.

Bats

The bat assessment is seen in Appendix I. There were no seasonal or climatic constraints as survey was undertaken within the active bat season in good weather conditions with daytime temperatures of greater Extensive bat assessments were carried out by Bat Eco Services in 2018, 2019, 2020 and 2021. This included, daytime inspections, dusk (emergence) surveys, dawn surveys, static surveillance, night-time inspection and IR & thermal imagery filming. As outlined in the Bat Assessment report "*Five bat species were recorded in total by the array of bat surveys completed for this survey site. Three of the bat species recorded were common pipistrelle, Leisler's bat and soprano pipistrelle and these are the three most common bat species in Ireland.*

Common pipistrelle was the most frequently encountered bat species and consistently recorded roosting in Barrington Tower in low numbers. This is likely to be a satellite roost. According to Figure 21 of Kelleher & Marnell (2006), the conservation significance of this roost is deemed to be Low - "Small numbers of common species. Not a maternity roost". A low to medium level of bat activity was recorded for this species of bat within the proposed development site.

Leisler's bats were recorded commuting into the survey area from a northerly direction towards the southern boundary of the proposed development. A low level of bat activity was recorded for this species of bat within the proposed development site.

While soprano pipistrelles were recorded foraging and commuting within the survey area, the timing of their encounters indicated that they travelled some distance before arriving to forage and therefore the roosting sites are not within the proposed development site or immediately adjacent to it. A low level of bat activity was recorded for this species of bat within the proposed development site.

The remaining two bat species are considered to be less common in Ireland. Myotis spp. calls were recorded during static surveillance and walking transects. Daubenton's bat were confirmed roosting in the Barrington Tower during one dusk survey and due to the fact that this species was recorded roosting on one occasion during the four years of the surveys, it is likely to have been a day roost. According to Figure 21 of Kelleher & Marnell (2006), the conservation significance of this roost is deemed to be Medium - "Small numbers of rarer species. Not a maternity roost". This species was also recorded on the Loughlinstown River and overall a low level of bat activity was recorded for this species of bat within the proposed development site.

Brown long-eared bat was also occasionally recorded during the walking transect and on the static surveillance. A small roost was consistently recorded in the tower (ground floor) of Barrington Tower and this roost is likely to be a satellite roost. According to Figure 21 of Kelleher & Marnell (2006), the conservation significance of this roost is deemed to be Medium - "Small numbers of rarer species. Not a maternity roost". A low level of bat activity was recorded for this species of bat 2020 was recorded within the proposed development site." Please see Appendix I for further information.

Birds

The following bird species were noted on site (Table 5.5) during Altemar site visits. As outlined in Appendix 2 "33 bird species were recorded in the survey area covered by these four winter bird surveys. The species diversity was typical of what might be expected in this semi-urban south Dublin site. In the context of wintering bird species that are red listed as species of conservation concern in the revised Birdwatch Ireland List of birds of conservation concern in Ireland (2020-2026) only Redwing were recorded, these passing over the site and noted foraging on-site. Results from the surveys suggest that the site is not an ex-situ foraging or roosting site for species of qualifying interest from nearby Special protection areas (SPA's).".

Common Name	Scientific Name	Conservation Status[1]
Woodpigeon	*Columba palumbus*	Green
Robin	*Erithacus rubecula*	Green
Great Tit	*Parus major*	Green
Wren	*Troglodytes troglodytes*	Green
Rook	*Corvus frugilegus*	Green
Wren	*Troglodytes troglodytes*	Green
Jackdaw	*Corvus monedula*	Green
Robin	*Erithacus rubecula*	Green
Chaffinch	Fringilla coelebs	Green
Hooded Crow	*Corvus cornix*	Green
Magpie	*Pica pica*	Green
Blackbird	Turdus merula	Green
Song Thrush	*Turdus philomelos*	Green
Blue Tit	*Cyanistes caeruleus*	Green
Coal Tit	*Periparus ater*	Green
Goldfinch	*Carduelis carduelis*	Green

Table 5.5 Species of Birds noted during on-site surveys.

Flora

No flora of conservation importance were noted on site. No invasive plant species listed under the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011) Section 49, the Third Schedule: Part 1 Plants, Third Schedule: Part 2A Animals were noted on site.

Discussion Species and habitats

As can be seen from Figure 5.9 the proposed development site consists primarily of Dry meadows and grassy verges (GS2), non native hedgerows (WL1), treelines (WL2), scrub (WS1) and recolonising bare ground (ED3). No flora species of conservation importance or invasive species were noted on site by the NPWS or NBDC or during site surveys. No amphibians or reptiles were noted on site. No terrestrial mammals of conservation importance were noted on site. However, the site is locally important for bats with 5 species being noted on site and bat roosts were confirmed on site. No native hedgerows were noted on site. In relation to bird species no bird species on Annex I of the EU Birds Directive were noted on site by NPWS or NBDC. No mammals of conservation importance were noted. On site.

[1] Birds of Conservation Concern in Ireland 2020-2026 https://birdwatchireland.ie/app/uploads/2021/04/BOCCI4-leaflet-2-1.pdf

5.4 IMPACT ASSESSMENT

This section provides a description of the potential impacts that the proposed development may have on biodiversity in the absence of mitigation The proposed development will involve the removal of terrestrial habitats on site, re-profiling, excavations and the construction of roads, dwellings and associated services. It should be noted that prior to the design of the proposed project, discussions took place between Cairn Homes Properties Ltd., Bat Eco Services and Altemar in relation to the bats on site and the proposed landscaping and lighting plans.

Construction Impacts

The construction of the proposed development, would potentially impact on the existing ecology of the site and the surrounding area. These potential construction impacts would include impacts that may arise during the site clearance, re-profiling of the site and the building phases of the proposed development. Construction phase mitigation measures are required on site particularly as significant reprofiling of the site is proposed which will remove existing terrestrial habitats and can lead to silt laden and contaminated runoff. In addition, the Carrickmines Stream is located downstream of the works, outside of the site boundary. There is potential for silt laden runoff and contamination to enter the watercourse with potential for downstream impacts which could potentially enter the marine environment.

Designated Natura 2000 sites within 15km

The proposed development is not within a designated conservation site. It should be noted that the proposed development site is uphill and could potentially impact on the Carrickmines Stream, leading silt and pollution to enter the marine environment. Construction phase mitigation measures are required on site particularly in relation to the protection of the water quality entering the watercourses. There is potential for silt laden runoff and contamination to enter the watercourse with potential for downstream impacts on the Rockabill to Dalkey Island SAC, as the watercourse outfalls to the marine environment approximately 1.4 km from this SAC.

Impacts in the absence of mitigation: negative; imperceptible-slight; international, short term, not significant. Mitigation is required as outlined in section 5.11.

Terrestrial Ecology

No mammals of conservation importance would be impacted by the proposed development. Loss of habitat and habitat fragmentation may affect some common mammalian species including sika deer. There is potential for species of conservation importance to enter the proposed development site between the time of survey and the commencement of the development.

Impacts in the absence of mitigation: negative; slight, site, short term, not significant. Mitigation is required as outlined in section 5.11.

Amphibians and reptiles. Frogs and reptiles were not observed on site. However, frogs are likely to occur on site. The common lizard may occur on site but, was not observed. There is potential for the works to impact on the habitats on site that could potentially support frogs either by direct destruction of the habitats or by onsite pollution or silt ingress.

Impacts in the absence of mitigation: negative; slight; short term, not significant. Mitigation is required as outlined in section 5.11.

Bat Fauna.

As outlined in Appendix I the overall impact is outlined as follows: "*Without bat mitigation measures, the proposed development will have an overall Moderate impact on local bat populations (Table 11). Moderate impact is "An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends". Current national population trends for both brown long-eared bats and Daubenton's bat are "Stable" while the national population trend for the three remaining bats species recorded (common pipistrelle, soprano pipistrelle and Leisler's bats) are "Increasing" (Aughney et al., 2021). Without bat mitigation measures, the proposed works will reduce roosting resource for three species. The Moderate impact is unlikely in relation to common pipistrelles as the national population of this species is doing well and it is more adaptable to urban areas. Brown long-eared bats and Daubenton's bats are more sensitive to urban development and, while the current national population is stable, the proposed development is likely to reduce the roosting, foraging and commuting resource in the immediate area of the proposed development site.*

- *Roost loss of Barrington Tower during conservation works for common pipistrelles, brown long-eared bat and Daubenton's bat are assessed as Temporary Moderate Negative Effect.*
- *Habitat loss (potential roosting/foraging/ commuting habitat) effects on all bat species are assessed as Permanent Slight to Moderate Negative Effect.*
- *Roost loss of PBRs on all bat species are assessed a Permanent Slight to Moderate Negative Effect.*
- *Disturbance and/or displacement effects on all bat species during the construction phase are assessed as Short-term Slight Negative Effect.*"

Avian Ecology

Site clearance will result in a reduction in the vegetation cover and removal of the mature trees and hedgerows would result in a nesting and foraging resource loss for the bird species noted on site. Clearance works on site during bird nesting season could impact on bird population within the proposed development site. Dust from reprofiling works could potentially impact on vegetation and nesting birds on site within the remaining hedgerows.

Impacts in the absence of mitigation: negative; minor adverse, site, short term, not significant. Mitigation is required as outlined in section 5.11.

Aquatic Ecology

The proposed development site uphill of the Carrickmines Stream. In the absence of mitigation runoff during site clearance, re-profiling, the construction of project elements could impact on the watercourse, with potential downstream impacts on instream biodiversity including otter and trout, in addition to aquatic biodiversity in the marine environment. The contamination of the watercourse could potentially impact negatively on the biodiversity within the watercourses and within the shallow marine environment.

Impacts in the absence of mitigation: negative; slight, short term, not significant. Mitigation is required as outlined in section 5.11.

Operational Impacts

Once constructed all onsite drainage will be connected to separate foul and surface water systems. Surface water runoff will comply with SUDS. The biodiversity value of the site would be expected to

improve as the landscaping matures. It would be expected that the ecological impacts in the long term would be neutral, once landscaping has established due to the implementation of a reduction in tunnelling which would encourage instream biodiversity.

Designated Conservation sites within 15km
Once the proposed development is complete and in the operational phase, the surface water run off will discharge to the Carrickmines Stream, after on site attenuation and foul water from the site will be discharged to Shanganagh WwTP where it will be treated at discharged to the Irish Sea. There will be no impacts from the proposed development during the operational phase. *Impacts in the absence of mitigation: neutral*

Terrestrial Ecology
No mammals of conservation importance would be impacted by the proposed development. Lighting and increased human presence/disturbance may impact on the potential for the site to accommodate terrestrial mammals of conservation importance. It should be noted that significant dialogue has gone into retaining biodiversity corridors on site and minimising light spill info open space areas, hedgerows and treelines on site. Landscaping on site will improve the biodiversity value of the site.

Impacts in the absence of mitigation: negative; slight, site, long term, not significant. Mitigation is required as outlined in section 5.11.

Amphibians and reptiles. Frogs and reptiles were not observed on site. The common lizard may occur on site but, was not observed. There is potential for the operation to impact on the habitats on site that could potentially support frogs either by direct destruction of the habitats through landscaping works or by onsite pollution or silt ingress.

Impacts in the absence of mitigation: negative; slight; longterm term, not significant. Mitigation is required as outlined in section 5.11.

Bat Fauna.
As outlined in Appendix *I "Disturbance and/or displacement effects on all bat species during the operation phase are assessed as Permanent Slight to Moderate Negative Effect."*

Avian Ecology
There is potential for avian biodiversity to be impacted by the artificial lighting on site. The proposed lighting strategy has been discussed and modified to reduce the potential impact on hedgerows and birds. This has included only lighting areas where required and not lighting public open spaces unless necessary. In addition, the lighting strategy has included significant planting of native trees in openspace areas to encourage birds on site. Maintenance of the native hedgerows on site during bird nesting season could potentially impact on nesting birds.

Impacts in the absence of mitigation: negative; minor adverse, site, long term, not significant. Mitigation is required as outlined in section 5.11.

Aquatic Ecology
In the absence of standard operational mitigation there is potential silt and petrochemicals to enter the onsite watercourse or surface water networks that lead to the marine environment. The contamination of watercourses and surfaces water networks could potentially impact negatively on the biodiversity within the watercourses and within the shallow marine environment.

Impacts in the absence of mitigation: negative; slight, short term, not significant. Mitigation is required as outlined in section 5.11.

Terrestrial Ecology
As the landscaping elements improve with maturity it would be expected that the biodiversity value of the site to birds and flora would also increase.

Impacts in the absence of mitigation: negative; slight, short term, not significant. Mitigation is required as outlined in section 5.11.

5.5 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed 'Build-to-Rent' (BTR) development will consist of the construction of 8 no. blocks in heights up to 10 storeys comprising 534 residential units, a creche, a retail unit, residential support facilities and residential services and amenities. The proposal also includes car and cycle parking, public and communal open spaces, landscaping, waste management areas, plant areas, substations, switch rooms, and all associated site development works and services provision.

5.6 POTENTIAL IMPACTS

The construction of proposed development will result in the removal of the majority of existing internal habitats on site including treelines, hedgerows, grassland areas and buildings (with the exception of Barrington Tower). This will result in a moderate local negative adverse impact on nesting and foraging resource for birds. There will be reprofiling on site with the potential for contaminated (silt and petrochemicals) runoff to flow downhill and enter the Carrickmines Stream and there is a pathway from the development site via surface to the marine environment. Works are proposed on Barrinton tower which serves as a bat roost. Given the sloping nature of the site and the level of groundworks required, in the absence of mitigation, locally significant negative medium term adverse impacts would be foreseen on the watercourse that includes a population of otter (*Lutra lutra*) downstream. Impacts could also be potentially foreseen within the marine environment.

5.7 POTENTIAL CUMULATIVE IMPACTS

There are multiple developments that received planning permission located in the area immediately surrounding the subject site. The following planning applications in close proximity to the proposed development are detailed below, as identified on the Department of Housing, Local Government and Heritage's 'National Planning Application Map' portal. The planning applications and their potential for impact on the surrounding environment and sensitive areas were investigated, to determine whether the proposed development either alone or in combination with other developments will have a negative impact on the environment.

Previous planning permission was granted for the proposed development site in 2013. Under the Planning ref. **D07A/0161/E.** The extension of duration of permission was for the development of a total

of 158 no. dwellings; 25 no. detached houses (9 no. three storey five bed units; 15 no. three storey four bed units, 1 no. single storey two bed unties, the above includes 2 no. houses with attached single storey garages); 12 no. semi-detached houses (4 no. three storey four bed units and 8 no. three storey three bed units with integrated garages; 6 no. terraced houses (3 no. three storey four bed units and 3 no. three storey three bed units with integrated garages). 109 no. apartments and 2 no. community rooms (c. total 70 sq.m in area) within a five storey building, incorporating fifth floor set back in four interconnecting blocks, and consisting of 100 no. two bed apartments, 6 no. three bed apartments, 3 no. one bed apartments (Block A to D), 6 no. apartments to be provided within a single three storey block (3 no. three bed duplexes) and 3 bed no. two bed apartments), (a total of 115 apartments to be provided). Vehicular access will be provided via two new entrances onto Brennanstown Road, one of which will serve 1 no. of the aforementioned dwellings and the existing Barrington Tower dwelling, the other serving 157 spaces shall be provided within basement carparking area over two levels directly beneath Blocks A to D. Permission is also sought for a c. 955 metre long foul sewer from subject site to Lambourne Wood along Brennanstown Road. This application also provides for demolition of a habitable dwelling. Permission is also sought for 1 ESB substation, refuses and cycle storage; hard and soft landscaping including a tennis court (c. 261 esq. in total area); boundary treatments and all other site and development works. All proposed works to take place at Barrington Tower (A Protected Structure), Brennanstown Road, on a site of approx. 3.5 ha on lands abounded generally to the North by Brennanstown Road, to the west by Brennanstown Vale housing development, to the east by a laneway accessing a Quaker burial ground to the south by the woodlands on either side of Loughlinstown River and the embankment of the former Harcourt Street Railway Line (no. development works are proposed to Barrington Tower itself) [a dwelling] as part of this planning application).

Planning ref. **D14A/0474** relates to the application located at Druid Glen, Brennanstown Road, Cabinteely, Dublin 18. The project involves the development consisting of: (a) The demolition of an existing derelict 2 storey dwelling house. (b) The construction of a replacement 1 storey with part basement 4 bed dwelling house, 80m from a National Monument 026-007 Glen Druid Portal Tomb. (c) New single house waste water treatment system and associated percolation area. (d) Repair works to Brennanstown Road boundary wall. (e) Associated site works, including landscaping, site drainage and upgrade of internal access road.

Planning ref. **ABP30161418** relates to the application located at Brennanstown Road, Dublin 18. Application to An Bord Pleanála for planning permission for a strategic housing development consisting of 136 no. residential units, comprising of 98 no. apartments and 38 no. houses, to be provided as follows: Apartment Block 1 containing 44 no. apartments, including 3 no. 1 beds, 27 no. 2 beds and 14 no. 3 beds, in a four storey building over basement / lower ground floor; Apartment Block 2 containing 44 no. apartments, including 3 no. 1 beds, 33 no. 2 beds and 8 no. 3 beds, in a four storey building over basement; Apartment Block 3 containing 10 no. apartments, including 2 no. 1 beds and 8 no. 2 beds, in a two storey building; 7 no. 5 bed houses (Type A1 and A2), 23 no. 4 bed houses (Type B1, B2 and E2) and 8 no. 3 bed houses (Type D1, D2, D3 and E1), of two and three storeys in height. A 195 sq. m crèche facility and play area is proposed on the lower ground floor of Block 1. The development includes 227 no. car parking spaces at basement / lower ground floor and surface level. The proposal includes cycle and motorcycle parking spaces, bin storage, public open space, landscaping, boundary walls and fences, internal roads, cyclepaths and footpaths, and 1 no. electricity sub-station. The associated site and infrastructural works include the removal of two existing structures in ruin, the provision of foul and surface water drainage, including attenuation tanks, and all associated services infrastructure. The proposal incorporates works to Brennanstown Road including a roundabout at the proposed new site entrance, road and footpath widening, raised tables/ramps for the purpose of traffic calming, and alterations and enhancements to the Brennanstown Road / Glenamuck Road North (R842) / Brighton Road / Claremont Road junction. The proposal also includes for the provision of a new pedestrian connection to and through Cabinteely Park including works to Cabinteely Park. The proposed connection will utilise a pre-existing opening in the boundary wall in the northeast corner of the proposed site, connecting to Cabinteely Park via a section of open space to be delineated by proposed railings within the adjacent Carrickmines Wood development. The proposed works include the provision of a new entrance gate to Cabinteely Park and new pathways within Cabinteely Park connecting to the existing footpath network within Cabinteely Park. The application contains a statement setting out how the proposal will be consistent with the objectives of the Dun Laoghaire Rathdown County Development Plan 2016-2022.

Planning ref. **DZ19A/0863** relates to the development at a site bounded by Lehaunstown Lane to the west, Carrickmines Stream (partly) to the south and, Cabinteely Stream (partly) to the east and is located within the townland of, Brennanstown, Dublin 18. The application refers to the Permission for a residential development at a site measuring approximately 8.24 ha in area. The development will consist of the construction of 342 new residential dwellings, comprising 189 no. apartments arranged in 4 blocks (all 4-storeys in height and comprising 15 x 1 bed units and 174 x 2 bed units); 28 No. duplex units (comprising 14 x 2 bed units and 14 x 3 bed units); 60 No. triplex units (comprising 40 x 2 bed units and 20 x 3 bed units) and 65 No. 4 bedroom houses (comprising a mix of detached, semi-detached and terraced house types) together with a Childcare Facility at ground floor level within Block C with a floor space of 249sq.m. (GFA), and ancillary open space.
In relation to Planning ref. **DZ19A/0863,** an Appropriate Assessment Screening Report was composed by Brady Shipman Martin (BSM). The report states that: '*It is concluded that the proposed project under appraisal in this report will not have any significant effects on any European sites. As such it can be concluded that the development, either on its own or in-combination with other developments, including those developments listed here, will have no impact on the European sites*.'

Planning ref. **DZ20A/0073** refers to the application for permission at Beech Park, Bray Road, Cabinteely, Dublin 18, Loughlinstown, Co. Dublin. This project involves the development to amend part of a permitted residential scheme (the parent submission Dún Laoghaire Rathdown Count Council Reg. Ref. D15A/0385(An Bord Pleanála Ref. ABP.-300194-17)). The site includes some 0.77 hectares forming part of the Cherrywood Strategic Development Zone Planning Scheme.

The above projects, including ecological assessments were reviewed. No project would be seen to have a cumulative impact with the proposed project.

No significant effects are likely from any cumulative impacts.

5.8 PREDICTED IMPACTS

Construction Phase
The construction of the proposed development would impact on the existing ecology of the site, the surrounding area and may impact downstream of the proposed works. The proposed development involves the ground clearance, re-profiling, groundworks and construction, with potential for runoff, dust, light and noise impacts that could impact on trees to be retained, and other biodiversity due to potential for downstream impacts. It should be noted that there is potential for significant effects on the

qualifying interests of the designated site in the absence of mitigation measures. Construction phase mitigation measures are required on site particularly in relation to the protection of the water quality entering the watercourses. There is potential for silt laden runoff and contamination to enter the watercourse with potential for downstream impacts on the Rockabill to Dalkey Island SAC, as the watercourse outfalls to the marine environment approximately 1.4 km from this SAC.

Operational Phase
Once the proposed development is complete and in the operational phase, the surface water run off will discharge to the Carrickmines Stream, after on site attenuation and foul water from the site will be discharged to Shanganagh WwTP where it will be treated at discharged to the Irish Sea. There will be no impacts from the proposed development during the operational phase.

5.9 'DO NOTHING' SCENARIO

In the absence of development on site it would be expected that the site would become increasingly overgrown and the biodiversity value of the site could improve.

5.10 WORST CASE SCENARIO

In relation to the worst-case scenario event, there is a direct pathway to designated sites from the proposed development via surface water drainage. Impacts could include silt and pollution including petrochemical release. If the development took place and the detailed mitigation were not to function, it is possible that there could be significant short term water quality impacts on the marine environment including designated sites. Compliance with Water Pollution Acts would be seen as the principle way to prevent worst case scenario events on biodiversity. *Unlikely, Negative, Slight, localised, Temporary*.

5.11 MITIGATION & MONITORING

Designed-in Mitigation

A CEMP was been prepared by AWN Consulting (AWN) on behalf of Cairn Homes Property Limited. The CEMP outlines the following mitigaiotn that would prevent adverse effects on the integrity the conservation objectives of Rockabill to Dalkey SAC:

"**Surface Water Management**

Run-off into excavations/earthworks cannot be prevented entirely and is largely a function of prevailing weather conditions.

Care will be taken to ensure that exposed soil surfaces are stable to minimise erosion. All exposed soil surfaces will be within the main excavation site which limits the potential for any offsite impacts. All run-off will be prevented from directly entering into any water courses as no construction will be undertaken directly adjacent to open water.

Designed-in Mitigation

No significant dewatering will be required during the construction phase which would result in the localised lowering of the water table. There may be localised pumping of surface run-off from the excavations during and after heavy rainfall events to ensure that the excavation is kept relatively dry.

The following measures will be put in place during the construction phase to ensure protection of surface waterbodies. Construction works are informed by best practice guidance from Inland Fisheries Ireland on the prevention of pollution during development projects:

- Control of Water Pollution from construction Sites, Guidance for consultants and contractors (C532); and
- Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (2016).
- Environmental Good Practice on Site (3rd edition) (C692).

Surface water discharge from the site will be managed and controlled for the duration of the construction works until the permanently attenuated surface water drainage system of the proposed site is complete. A temporary drainage system shall be installed prior to the commencement of the construction works to collect surface water runoff by the site during construction.

It is envisaged that a number of geotextile lined settling basins and temporary mounding's and/or silt fences will be installed to ensure silts do not flow off site during the construction stage. This temporary surface water management facility will throttle runoff and allow suspended solids to be settled out and removed. All inlets to the settling basins will be 'riprapped' to prevent scour and erosion in the vicinity of the inlet.

Pollution Control

Management of Suspended solids in run-off

Any temporary storage of spoil, hardcore, crushed concrete or similar material will be stored as far as possible from any surface water drains and also stored in receptacles where possible. In order to minimise the risk of contamination, the stockpiled material will be removed off-site as soon as possible. Surface water drain gratings in areas near or close to where stockpiles are located will be covered by appropriate durable polyurethane covers or similar.

There will be no direct pumping of silty water from the works to any watercourse. Sediment entrapment facilities will be installed to reduce sediment discharges to downstream properties and receiving waters. All run-off leaving a disturbed area should pass through a sediment entrapment facility before it exits the site and flows downstream such as straw bales, silt fencing, silt barriers and diversion dams.

Concrete Run-off

Designed-in Mitigation

No wash-down or wash-out of ready-mix concrete vehicles during the construction works will be carried out at the site within 10 meters of an existing surface water drainage point. Wash-outs will only be allowed to take place in designated areas with an impervious surface.

Accidental Spills and Leaks

No bulk chemicals will be stored within the active construction areas. Temporary oil and fuel storage tanks will be kept in the material storage area in suitable containers and will be appropriately bunded as required. Refuelling of vehicles and the addition of hydraulic oils or lubricants to vehicles will take place in designated areas of the site, where possible, which will be kept away from surface water drains.

Spill protection equipment such as absorbent mats, socks and sand will be available to be used in the event of an accidental release during refuelling. Training will be given to appropriate site workers in how to manage a spill event.

The following mitigation measures will be taken at the construction site in order to prevent any spillages to ground of fuels during machinery activities and prevent any resulting soil and/or groundwater quality impacts:

- Refuelling will be undertaken off site where possible;
- Where mobile fuel bowsers are used the following measures will be taken:
  - Any flexible pipe, tap or valve will be fitted with a lock and will be secured when not in use;
  - The pump or valve will be fitted with a lock and will be secured when not in use;
  - All bowsers must carry a spill kit;
  - Operatives must have spill response training; and
  - Portable generators or similar fuel containing equipment will be placed on suitable drip trays.

Monitoring

Weekly checks will be carried out to ensure surface water drains are not blocked by silt, or other items, and that all storage is located at least 10m from surface water receptors. A regular log of inspections will be maintained, and any significant blockage or spill incidents will be recorded for root cause investigation purposes and updating procedures to ensure incidents do not reoccur.

Dust Control Measures

The aim is to ensure good site management by avoiding dust becoming airborne at source. This will be done through good design, planning and effective control strategies. The siting of construction activities and the limiting of stockpiling will take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance. In addition, good site management will include the ability to respond to adverse weather conditions

Designed-in Mitigation

by either restricting operations on-site or using effective control measures quickly before the potential for nuisance occurs.

- During working hours, technical staff will be available to monitor dust levels as appropriate; and
- At all times, the dust management procedures put in place will be strictly monitored and assessed.

The dust minimisation measures should 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 generation. In the event of dust nuisance occurring outside the site boundary, site activities should be reviewed, and procedures implemented to rectify the problem. Specific dust control measures to be employed are presented below.

Site Routes

Site access routes (particularly unpaved areas) can be a significant source of fugitive dust from construction sites if control measures are not in place. The most effective means of suppressing dust emissions from unpaved roads is to apply speed restrictions. Studies show that these measures can have a control efficiency ranging from 25% to 80% [14].

- A speed restriction of 20 km/hr will be applied as an effective control measure for dust for on-site vehicles or delivery vehicles within the vicinity of the site;
- Bowsers will be available during periods of dry weather throughout the construction period. Research shown found that the effect of surface watering is to reduce dust emissions by 50%. The bowser will operate during dry periods to ensure that unpaved areas are kept moist. The required application frequency will vary according to soil type, weather conditions and vehicular use; and
- Any hard surface roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced areas shall be restricted to essential site traffic only.

Excavation

Excavation works during periods of high winds and dry weather conditions can be a significant source of dust.

- During dry and windy periods, and when there is a likelihood of dust nuisance, watering shall be conducted to ensure moisture content of materials being moved is high enough to increase the stability of the soil and thus suppress dust;
- During periods of very high winds (gales), activities likely to generate significant dust emissions will be postponed until the gale has subsided.

The movement of truck containing materials with a potential for dust generation to an off-site location will be enclosed or covered.

Stockpiling

Designed-in Mitigation

The location and moisture content of stockpiles are important factors which determine their potential for dust emissions. The following measures will be put in place:

- Overburden material will be protected from exposure to wind by storing the material in sheltered parts of the site, where possible;
- Regular watering will take place during dry/windy periods to ensure the moisture content is high enough to increase the stability of the soil and suppress dust

Site Traffic on Public Roads

Spillage and blow-off of debris, aggregates and fine material onto public roads will be reduced to a minimum by employing the following measures:

- Vehicles delivering material with potential for dust emissions to an off-site location shall be enclosed or covered at all times to restrict the escape of dust;
- Any hard surface site roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only.
- A power washing facility or wheel cleaning facility will be installed near to the site compound for use by vehicles exiting the site when appropriate, and an example of the washing equipment can be seen in Insert 7.1; and
- Road sweepers will be employed to clean the site access route as required.

General

The pro-active control of fugitive dust will ensure that the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released, will contribute towards the satisfactory management of dust by the construction contractor.

Ecology

The key strategies to be undertaken to minimise impact on the local flora and fauna during site clearing and construction are as follows.

- All site clearance works will comply with current legislative requirements and best practice;
- Taking measures to limit the working area during the construction phase will reduce the impacts of the development on adjacent areas. The construction area will be clearly delimited by the site boundary and machinery should operate only within this allocated site area;
- All re-fuelling of plant, equipment and vehicles will be carried out at the construction site boundary. All fuels, chemicals, liquid and solid waste will be stored in areas bunded in accordance with established best practice guidelines at the construction compound also; and Provision of spill kits;
- Provision of a water and sediment management plan, providing for means to ensure that surface water run-off is controlled such that no silt or other pollutants enter local water courses or drains; a

Designed-in Mitigation

- The measures outlined in Section 7.6 for the EIAR will ensure that silt run-off and potential flooding risks are minimised which will protect any ecological receptors associated with the site.
- Construction lighting will be designed so as to be sensitive to the potential presence of bats and should adhere to the following guidance:
  - Bats & Lighting: Guidance Notes for Planners, engineers, architects and developers (Bat Conservation Trust, 2010) [15];
  - Guidance Notes for the Reduction of Obtrusive Light GN01 (Institute of Lighting Professionals, 2011) [16];
  - Bats and Lighting in the UK – Bats and the Built Environment Series (Bat Conservation Trust UK, January 2018) [17].

- As outlined in the Bat Assessment prepared by Bat Eco Services [18], an NPWS Derogation License will be required to allow the disturbance to bat roosting as a result of the conservation works on Barrington Tower.
- To ensure that there is a roosting resource available during conservation works of Barrington Tower, a "Bat House" constructed to accommodate the three bat species recorded roosting in Barrington Tower. This will be constructed prior to proposed works on Barrington Tower and it will be located close to woodland and the Loughlinstown River (Ticknick Stream) in order to provide connectivity to suitable foraging and commuting routes. Landscaping and lighting plans adjacent to the proposed location of the "Bat House" has also been sensitively designed to prevent disturbance to roosting bats during the operation of the proposed development site (Bat Assessment, Bat Eco Services 2022).
- A bat scheme will be erected to mitigate the removal of trees. These will be erected prior 6 months to tree felling to allow local bat populations to become aware of it prior to removal of the structure (Bat Assessment, Bat Eco Services 2022).
- An ecologist will be appointed to oversee site clearance, reprofiling, construction and landscaping of the proposed project.
- Tree retention will be carried out as outlined in the arborist report.
- A specific site clearance, reprofiling and phasing plan will be provided to the arborist and project ecologist for approval prior to any site clearance or works commencing on site. No site clearance works will commence on site until approval has been provided by the arborist and project ecologist for the works to commence.
- All site clearance, reprofiling and enabling works will be approved and monitored by the arborist and project ecologist to ensure that the integrity of the remaining habitats on site are maintained.
- All works in the riparian corridor will be carried out in consultation with and to the satisfaction of Inland Fisheries Ireland and the project ecologist, following the best practice guidelines for construction in the vicinity of watercourses. All works on site and in the riparian corridor will include mitigation measures to prevent silt from runoff during works as set out below.
- Abstraction of water from the watercourse will not be permitted.
- Relevant guidelines and legislation (Section 40 of the Wildlife Acts, 1976 to 2012) in relation the removal of woody vegetation to outside bird nesting season will be carried out. Should this not be possible, a pre-works check by a qualified ecologist should be undertaken to ensure nesting birds are absent. If bird nests are present the woody vegetation will not be removed unless a derogation licence has been provided by NPWS and the conditions applied.

Designed-in Mitigation
• 60 nest boxes placed on site during landscaping to compensate for resource loss. • Light falling upon any areas of benefit to birds such as hedgerow will not exceed 3 lux to ensure that resting and nesting species are not unnecessarily disrupted. • A pre construction survey for invasive species, bats and terrestrial mammals will be carried out. This will include an inspection for resting and breeding places for both terrestrial mammals and bats. Should resting or breeding places be found a derogation licence will be acquired from NPWS and conditions followed prior to works commencing in the vicinity of the resting or breeding place. • Lighting at all stages should be done sensitively on site as directed by the project ecologist, with no direct lighting of hedgerows and treelines.

Table 5.6 Mitigation Measures

5.12 DIFFICULTIES IN COMPILING INFORMATION

No difficulties were encountered during the preparation of the biodiversity Chapter.

5.13 RESIDUAL IMPACTS (INCLUDING WORST CASE SCENARIO)

Based on the implementation of the mitigation measures above and in particular the Biodiversity Chapter, the additional chapters of the EIAR and the CEMP, there will be no significant impact on biodiversity as a result of the proposed development. The successful implementation of the measures outlined in the EIAR will be essential to the successful mitigation/offsetting of the loss of biodiversity on site.

The proposed development has satisfactorily addressed the current ecology on site into its design so that application of the mitigation measures outlined in this EIAR will help reduce its impact on the local ecology to an adequate level. Where possible biodiversity retention and enhancement measures have been implemented into design to enhance the overall biodiversity value of the site. As a result of the loss of certain biodiversity features on site and the introduction of new buildings and increased human disturbance in addition to the implementation of a sensitive landscaping strategy, with biodiversity enhancement measures it is considered that the overall impact on the ecology of the proposed development will result in a long term neutral residual impact on the existing ecology of the site and locality overall. This is primarily as a result of the loss of some terrestrial habitats on site, supported by the retention of key biodiversity areas and the creation of additional terrestrial biodiversity features, mitigation measures and a sensitive lighting strategy. With bat mitigation measures the proposed development will potentially reduce its impact on local bat populations. If bat mitigation measures are strictly applied, the potential impact of the proposed development will be Permanent Slight Negative impact. Therefore the Residual Impact of the proposed development will be Permanent Slight Negative impact.

In relation to the worst-case scenario event, there is an direct pathway to designated sites from the proposed development via the adjacent watercourse. Impacts could include silt and pollution including petrochemical release. If the development took place and the detailed mitigation were not to function, it is possible that there could be significant short term water quality impacts on the marine environment including designated sites (Rockabill to Dalkey Islands SAC/Loughlinstown Woods pNHA). In relation to additional biodiversity on site no additional worst case scenario impacts are foreseen beyond the impacts outlined above. Compliance with Water Pollution Acts would be seen as the principle way to prevent worst case scenario events on biodiversity. Unlikely, Negative, Slight, localised, Temporary.

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6 LAND, SOIL & GEOLOGY

6.1 INTRODUCTION

Enviroguide Consulting, on behalf of Cairn Homes Properties Limited has carried out an assessment of the likely significant effects of a Proposed Development at 'Barrington Tower', Brennanstown Road, Dublin 18 on land, soils and geology of the receiving environment within the immediate surroundings of the Proposed Development Site. This chapter details the results of an assessment of the potential impacts of the Proposed Development on land, soils and geology and sets out any required mitigation measures where appropriate.

The principal objectives of this chapter are to identify:

- Land, soils, and geological characteristics at the Proposed Development Site;
- Potential impacts that the Proposed Development may have on land, soils and geology including "worst case" scenario assessment;
- Potential constraints that the environmental attributes may place on the Proposed Development;
- Required mitigation measures which may be necessary to minimise any adverse impacts related to the Proposed Development; and
- Evaluate the significance of any residual impact

Quality Assurance and Competence

Synergy Environmental Ltd., T/A Enviroguide Consulting, is a wholly Irish Owned multi-disciplinary consultancy specialising in the areas of the Environment, Waste Management and Planning. All of our consultants carry scientific or engineering qualifications and have a wealth of experience working within the Environmental Consultancy sectors, having undergone extensive training and continued professional development.

Enviroguide Consulting as a company remains fully briefed in European and Irish environmental policy and legislation. Professional memberships include the Institute of Geologists of Ireland (IGI), Chartered Institution of Wastes Management (CIWM), the Irish Environmental Law Association and Chartered Institute of Ecology and Environmental Management (CIEEM).

This EIAR Chapter was written by Fionnuala Joyce BSc., MSc., Hydrogeologist with Enviroguide Consulting and Claire Clifford BSc., MSc., PGeo., EurGeol who is Technical Director - Contaminated Land and Hydrogeology with Enviroguide Consulting and is a Professional Geologist with the Institute of Geologists of Ireland and has extensive experience in preparing hydrogeological and environmental assessments for a range of project types and geological and hydrogeological site settings.

6.2 METHODOLOGY

Regulations and Guidance

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

- Environmental Protection Agency, August 2017. Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2017);
- Environmental Protection Agency, September 2015. Draft Advice Notes for preparing Environmental Impact Statements (EPA, 2015);
- Environmental Protection Agency, 2002. Guidelines on Information to be contained in Environmental Impact Statements (EPA, 2002);
- Environmental Protection Agency, 2003. Advice Notes on Current Practice in the preparation of Environmental Impact Statements (EPA, 2003);
- Environmental Protection Agency, 2006. Environmental Management Guidelines. Environmental Management in the Extractive Industry (non-scheduled minerals);
- Institute of Geologists of Ireland Guidelines, 2002. Geology in Environmental Impact Statements, A Guide (IGI, 2002); and
- Institute of Geologists of Ireland Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements (IGI, 2013).

Scope of Assessment

A phased approach was adopted for this EIAR in accordance with Environmental Protection Agency (EPA) and Institute of Geologists of Ireland (IGI) guidelines as set out above and is described in the following sections.

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

This stage of the assessment included a desk top study that comprised a review of published environmental information for the Site. The study area, for the purposes of assessing the baseline conditions for the Land, Soils and Geology Chapter of the EIAR, includes the Site and potential receptors within a 2.0km radius of the Site (IGI, 2013).

The desk study involved collecting all the relevant data for the Proposed Development Site and surrounding area including published information and details pertaining to the Proposed Development provided by the Applicant and design team.

A Site walkover survey visits to assess the physical conditions of the Site were carried out by Enviroguide Consulting (Fionnuala Joyce) on the 31st January 2022 to assess the general site conditions.

The Element 1 stage of the assessment was completed by Enviroguide and included the review of the following sources of information:

- Environmental Protection Agency (EPA) webmapping
- Geological Survey Ireland (GSI) Datasets Public Viewer and Groundwater webmapping
- Google Earth Mapping and Imagery
- Ordnance Survey Ireland (OSI) webmapping ;
- National Parks and Wildlife Services (NPWS) webmapping; and

- Information provided by the Applicant pertaining to the design proposals for the Proposed Development.

Element 2: The Direct and Indirect Site Investigation and Studies stage was carried out to refine the conceptual site model and undertake a detailed assessment and impact determination. Site investigations that have been completed at the Site include:

- Site Investigations Ltd., November 2020. Brennanstown Road – south Site, Cabinteely, Dublin 18 Site Investigation Report (Contract No. 5752) included: borehole drilling, trial pit excavation, infiltration testing and soil sampling;
- Site Investigations Ltd., May 2021. Brennanstown Road Additional Investigation. Cabinteely, Dublin 18 Site Investigation Report (contract No. 5831) including intrusive site investigation including borehole drilling and trial hole excavation at the Proposed Development Site (SIL, 2021);
- Minerex Geophysics Limited, April 2021. Brennanstown Road, Cabinteely, Dublin 18 Geophysical Survey (Project No.: 6548); and
- Priority Geotechnical Ltd., February 2022. Site Investigation at Barrington, Carrickmines, Dublin, (Reference: JMcS/Rp/P22023) included: borehole drilling, groundwater monitoring and sampling.

Details of the scope and methods for the site investigation and the results are provided in the respective site investigation reports included in SIL, 2020, SIL, 2021 MGL, 2021 and PGL, 2022.

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

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

Description and Assessment of Potential Impacts

Impacts will vary in quality from negative, to neutral or positive. The effects of impacts will vary in significance on the receiving environment. Effects will also vary in duration. The terminology and methodology used for assessing the 'impact' significance and the corresponding 'effect' throughout this Chapter is described in Table 6-1.

Quality of Effects / Impacts	Definition
Negative	A change which reduces the quality of the environment
Neutral	No effects or effects that are imperceptible, within the normal bounds of variation or within the margin of forecasting error.
Positive	A change that improves the quality of the environment
Significance of Effects / Impacts	**Definition**
Imperceptible	An effect capable of measurement but without significant consequences.
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters a sensitive aspect of the environment.
Profound	An effect which obliterates sensitive characteristics.
Duration of Effects / Impacts	**Definition**
Momentary	Effects lasting from seconds to minutes
Brief	Effects lasting less than a day
Temporary	Effects lasting one year or less
Short-term	Effects lasting one to seven years
Medium-term	Effects lasting seven to fifteen years
Long-term	Effects lasting fifteen to sixty years
Permanent	Effects lasting over sixty years
Reversible	Effects that can be undone, for example through remediation or restoration

Table 6.1: Assessment of Potential Impacts Terminology and Methodology

6.3 RECEIVING ENVIRONMENT

Site Description and Landuse Use

The Proposed Development Site occupies a total area of 3.81Hectares (Ha) in lands, which are located to the south of Brennanstown Road, Dublin 18 (as shown in Figure 6.1)

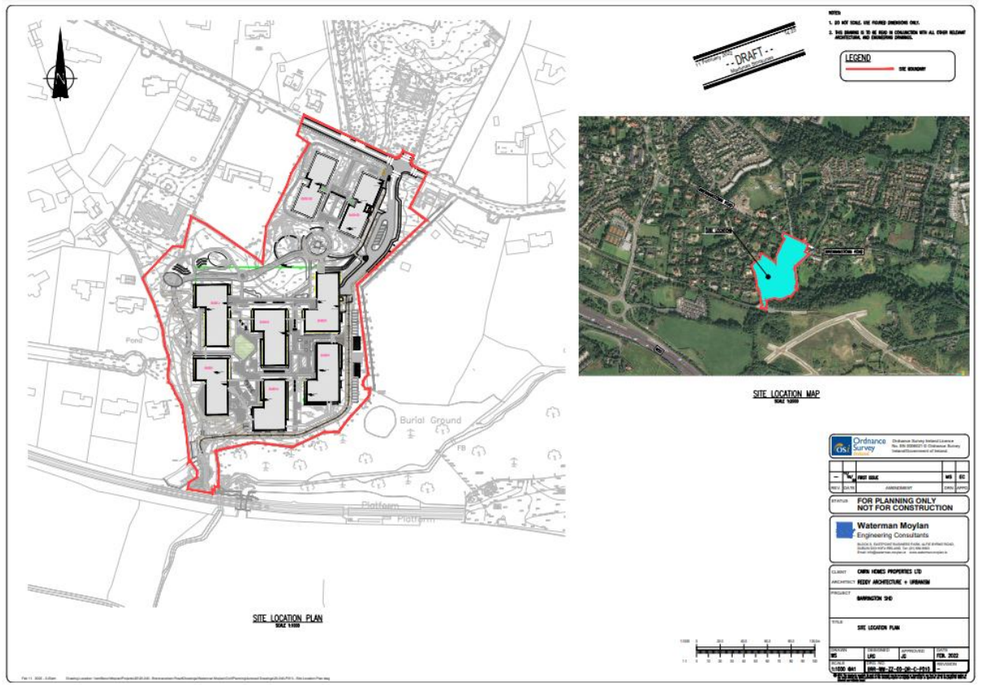

Figure 6.1: Site Location (Source: Waterman Moylan Engineering Consultants Ltd.Drawing Reference BRR-WM-ZZ-00-DR-C-P010)

The Site is in an area with Land Use Zone 'Objective A To provide residential development and/or protect and improve residential amenity' in both the Dún Laoghaire-Rathdown (DLR) County Council 2016-2022 Development Plan and the DLR Draft County Development Plan 2022-2028 (DRLCC, 2022)

A Site walkover carried out by Enviroguide Consulting on the 31st January 2022 confirmed that the Site comprised predominantly undeveloped land containing some derelict buildings/structures. These structures are 'Winterbrook' and 'Barrington Tower' which will be demolished as part of the Proposed Development. An internal access route through the Site from the Brennanstown Road to the southern Site boundary where there is a crossing of the Carrkickmines Stream outside of the Site boundary.

Historical Landuse

Historical mapping and photography available from the Ordnance Survey of Ireland website (OSI, 2022) and Google Earth (Google Earth, 2022) were reviewed and key observations on-site and off-site are summarised in Table 6.2.

Date	Information Source	Site Description
1837-1872	**OSI map 6 inch**	**On-site:** A building identified as 'Barrington's Tower' is located in the north-eastern corner of the Proposed Development Site. The majority of the site is shown as undeveloped/greenfield land. **Off-site** The Site is bound by the Brennanstown Road to the north, by agricultural fields to the west, east and south and by forestry to the south-east. The Carrickmines stream is located approximately 0.05km south of the Proposed Development Site. A burial ground is shown bounding the southwest of the Proposed Development Site. A railway line adjoins the southern site boundary. The majority of land surrounding the site are shown with undeveloped/ greenfield land with some residential housing and farm-buildings.
1888-1913	**OSI map 25 inch**	**On-site:** A 'well' is shown located along the eastern boundary of the Site. **Off-site** A unnamed stream is shown located approximately 0.02km east of the Proposed Development Site flowing southwards and joining the Carrickmines Stream.
1830-1930	**OSI Cassini map 6 inch**	**On-site:** No significant changes **Off-site** No significant changes
1995	**OSI Aerial photography**	**On-site:** No available maps and data for the Site. **Off-site** Significant residential development is shown in lands to the north of the Proposed Development Site.
2000	**OSI Aerial photography**	**On-site:** No significant change. **Off-site** Residential developments are shown in lands bounding the western site boundary and in lands on the north of the Brennanstown Road. Development of commercial units are shown underway approximately 1.5km southwest and1.3km southeast of the Proposed Development Site.
2005	**OSI Aerial photography**	**On-site:** No significant change.

		Off-site M50 carriageway (0.33km south) is under construction
2011-2013	**OSI Aerial photography**	**On-site:** A laneway is shown from the site entrance at the northern boundary of the Proposed Development Site crossing the site to the southern boundary, **Off-site** Development works for the M50 roadway have been completed.
2022	**Google Earth photography**	**On-site:** No significant change. **Off-site** No significant change.

Table 6.2: Historical Land use

Topography

The regional topography generally slopes towards the Irish Sea to the east of the Site from the local high point at Kerrymount (90mOD) located 0.3km north-west of the Proposed Development Site. The topography at the Site slopes from northwest to the south and elevation ranges from 79.9maOD to 62.37maOD (Waterman Moylan Engineering Consultants Ltd., 2022 Drawing No.: BRR-WM-ZZ-XX-DR-C-P010).

Soil

The soil beneath the majority of the Site is mapped as Deep well drained mineral (Mainly acidic) (AminDW) described as "derived from mainly non-calcareous parent materials" from the Acid Brown Earths, Brown Podzolics soil group. The soil beneath the northern portion of the Site is mapped as Shallow well drained mineral (mainly acidic) (AminSW) from the Lithosols, Regosols soil group described as "derived from mainly non-calcareous parent materials". Soil beneath the central portion and along the northern boundary of the Site is mapped as Made Ground (Made). These mapped soils from the Teagasc soil map (GSI, 2022) are presented in Figure 6.2.

Subsoil (Quaternary Deposits)

The quaternary deposits beneath the majority of the Site are mapped as 'Bedrock outcrop' or 'subcrop' indicating that subsoil is generally absent or thin in those areas of the Site. The subsoil beneath the area along the northern boundary of the Site is mapped as 'Till derived from granites (TGr)' (GSI, 2022). The quaternary sediments underlying the Site are presented in Figure 6.3.

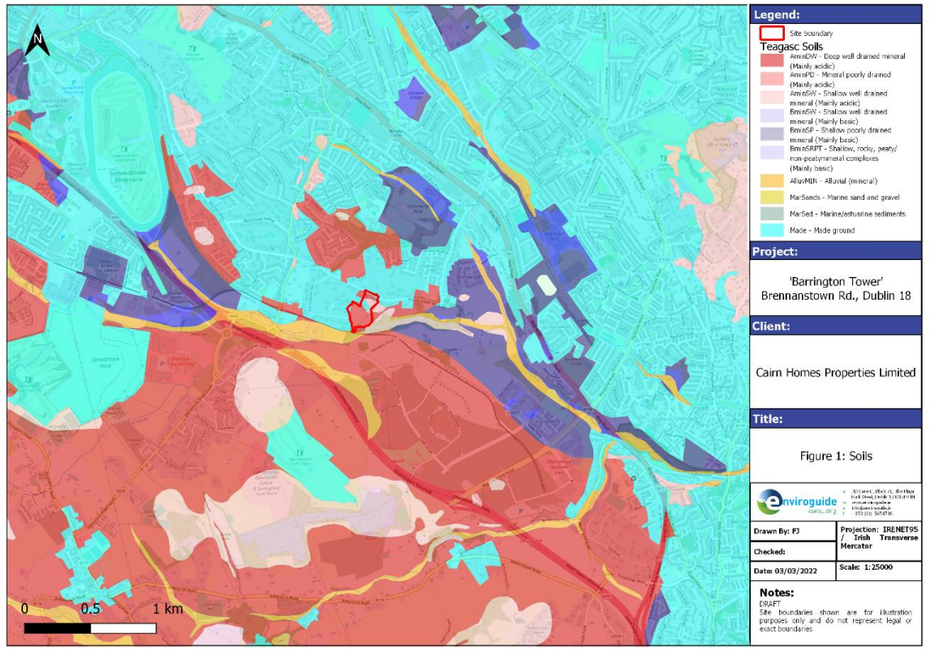

Figure 6.2: Teagasc Soils

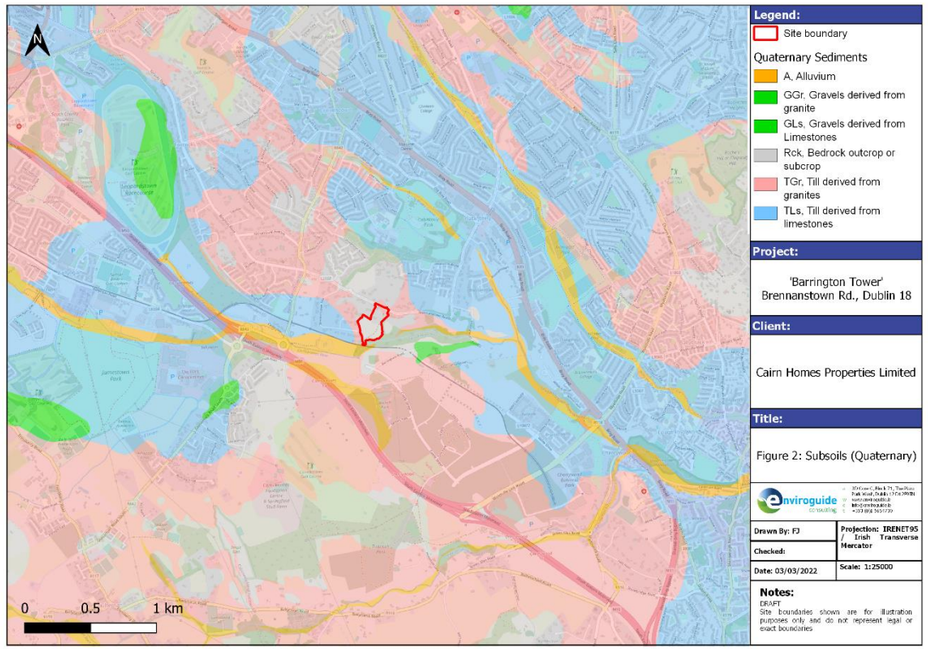

Figure 6.3: Subsoils (Quaternary)

Bedrock Geology

The bedrock beneath the Site is mapped by the GSI as the Type 2e equigranular formation (New Code: IDNLGRE; Stratigraphic Code: Nt2e) which is described by the GSI database as "pale grey fine to coarse grained granite" and is recorded as being part of the Caledonian Granite System (GSI, 2022). The GSI maps this formation as having exposed outcrops at surface level in the northern portion of the proposed Development Site (GSI, 2022). The bedrock geology is presented in

Figure 6.4.

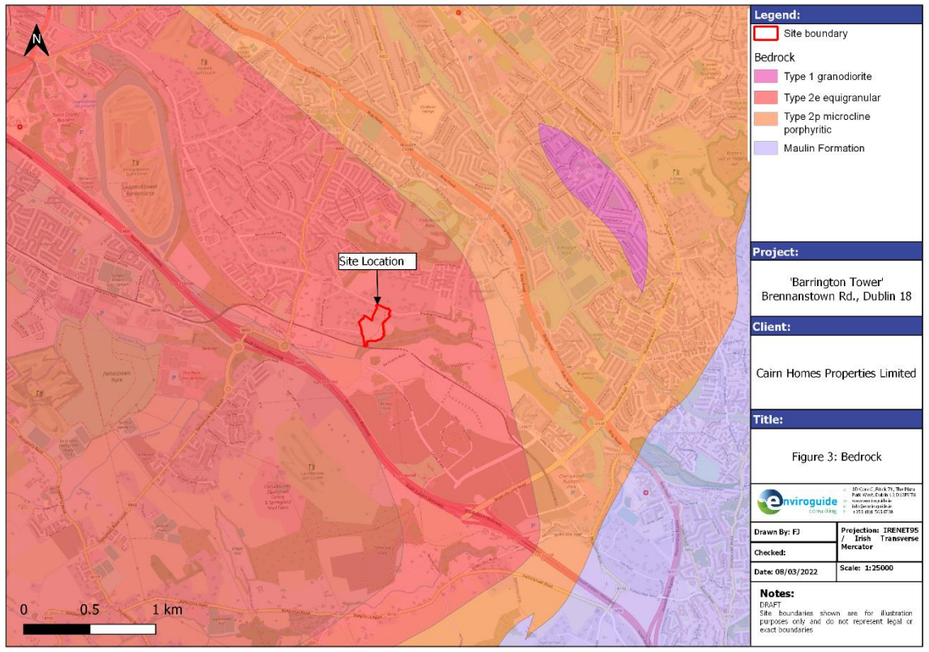

Figure 6.4: Bedrock Geology

Soil and Bedrock Contamination

There are no records of mining (GSI, 2022) or EPA licensed activities (EPA, 2022) within the Proposed Development Site. The closest and only EPA licensed facility is the Ballyogan Landfill Facility and Recycling Park (Registration Code: W0015) and is located approximately 1.9km west of the Proposed Development Site (EPA, 2022).

Site Investigation Results

Ground Conditions and Geology

The geophysical survey conducted at the Proposed Development Site (MGL, 2021) characterised the subsurface strata at the site as four distinct subsurface layers as follows:

- Layer 1 as topsoil from ground level with an average thickness of 1m.
- Layer 2 as overburden below topsoil with firm or dense stiffness described as granular non-cohesive material like sand, granite and boulders. This layer can also contain highly weathered or decomposed granite which we interpret to behave rather like overburden and which can be excavated by digging.
- Layer 3 as weathered granite up to 4.5 m thick below overburden with poor to fair rock quality.
- Layer 4 as granite bedrock below weathered granite where the depth to the top varies between 2 and 8mbgl.

Intrusive site investigations carried out by Site Investigations Ltd (SIL, 2020; SIL, 2021 (Refer to Appendix 6-1)) and Priority Geotechnical Ltd (PGL, 2022) reported the following general ground conditions:

- Topsoil was recorded across the Site at ground level to a maximum depth of 0.3mbGL. with the exception of one location where tarmacadam was recorded at one location (TP17S) from ground level along the eastern site boundary.
- Made Ground was recorded at some localised areas and generally comprised of GRAVEL and slightly silty, sandy, CLAY and GRAVEL with some cobble content and anthropogenic inclusions (i.e., fragments of concrete, brick, plastic and ceramic) at the following locations:
    - Along the northern and eastern site boundaries at five locations to depths of 0.9mbGL (BH15S, TP17S TP18s, TP19S and TP21S) (Refer to Appendix 6-1);
    - Close to derelict structures in the west of the Site at three locations (TP01S, TP02S and TP03S) to a maximum depth of 1.5mbGL with some fragments of anthropogenic material (i.e., fragments of concrete, brick, plastic and ceramic) recorded throughout; and
    - At one location along the roadway from ground level to a depth of 0.7mbGL in the central portion of the Proposed Development (TP09S) with trace anthropogenic inclusions recorded throughout.
- Brown, slightly sandy, slightly gravelly, silty CLAY was encountered across the site at twenty-two of seventy-four site investigation locations, below the Topsoil and /or Made Ground. CLAY was encountered from 0.1mbGL to a maximum depth of 5.7mbGL (BH10) located in the northern portion of the Proposed Development Site.
- Brown to grey, sandy GRAVEL with some cobbles was encountered within some localised areas along the northern, eastern and western boundaries of the Proposed Development Site from depths of 0.1mbGL to 1.1mbGL to a maximum depth of 2.9mbGL (TP20).
- The top of weathered bedrock was encountered at depths ranging from 0.4 in the south of 5.3mbGL in the north of the Site.
- Granite bedrock at depths ranging from 0.9mbGL to 7.5mbGL.
  Rock head generally slopes to the southeast with rockhead elevation ranging from 75.35mOD along the north-west of the Site (RC08S) to between 59.31mOD in the southern portion of the Site. Bedrock was generally described as 'strong to very strong' and discontinuities where generally between sub-horizontal and 60 degrees with occasional subvertical discontinuities in the borehole logs (SIL, 2020; SIL, 2021).
  A schematic geological cross section is provided in Figure 6.5.

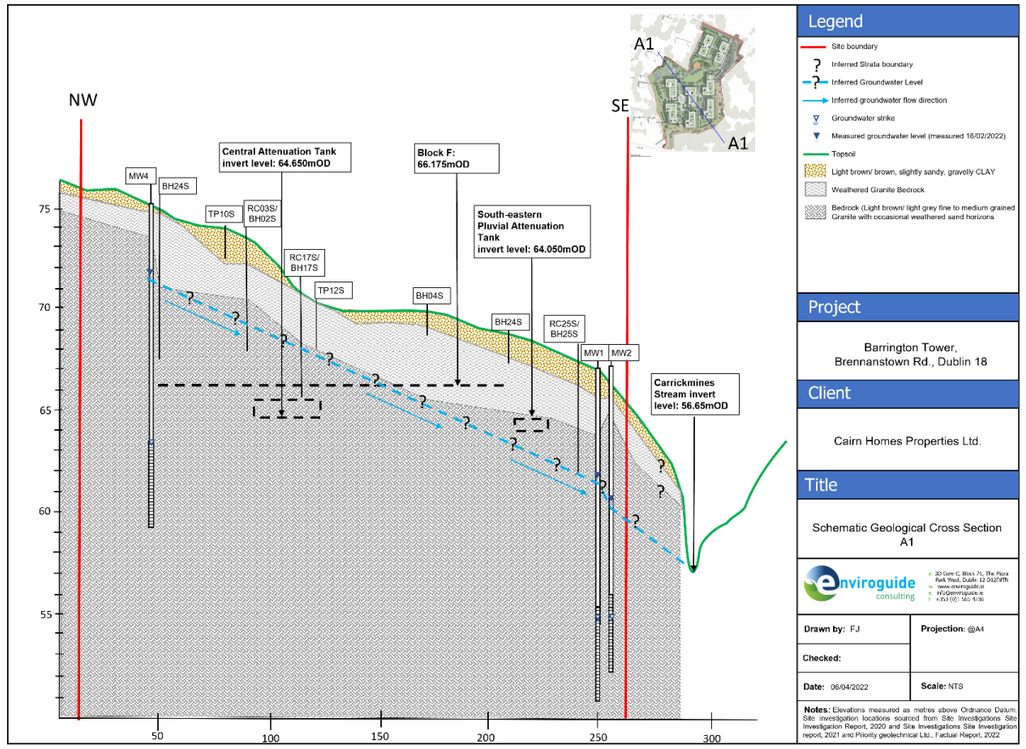

Figure 6.5: Schematic Cross-Section

Ground Conditions and Contamination

The soil encountered was generally native material however, some localised areas of made ground were encountered during site investigations.

Soil analytical results for four soil samples (TP01N 0.5, TP01S 0.5, TP18S 0.5 and TP21 0.5) collected at the Site are provided in Appendix 7 of the site investigation report (SIL, 2020)(Refer to Appendix 6-1). The results were reported as less than laboratory limits of detection for PCBs and BTEX/MTBE and total petroleum hydrocarbon, and only trace levels of total Polycyclic aromatic hydrocarbons (PAH) were identified in a single sample. The key parameters used for the general assessment and identification of contamination and analytical results are as follows:

- Sum of BTEX (benzene, toluene, ethylbenzene, xylenes): <0.01mg/kg for all at four (4 No.) samples (of four samples analysed;
- Sum of 7 PCBs (Polychlorinated Biphenyl): <21ug/kg at all four samples analysed (TP01N 0.5, TP01S 0.5, TP18S 0.5 and TP21 0.5);
- Sum of 16 PAHs (Polycyclic Aromatic Hydrocarbons): <0118ug/kg for three samples (TP01N 0.5, TP01S 0.5 and TP21 0.5) and 237ug/kg (0.237mg/kg) at one sample (TP18S 0.5) within made ground strata, located at the northern portion of the Site;
- Petroleum Hydrocarbons (Total aliphatics and aromatics(C5-44)): <10,000ug/kg (<10mg/kg) for all four samples; and
- Mineral Oil: <5mg/kg for all four samples.

The reported analytical results indicate that the soil is generally free from anthropogenic contamination and the trace PAHs reported for one sample collected from made ground are not indicative of heavily contaminated soil and would not be considered to pose an environmental risk. All PAH results are below published soil Generic Assessment Criteria (GAC) for human health risk assessment (LQM/CIEH, 2015; CL:AIRE, 2014, CL:AIRE 2010 etc) and soil at the Site would therefore not pose any risk to human health

A waste classification report for soil samples collected at the Site (SIL, 2020) classified all fours samples as 'Non-Hazardous soil and stone and assigned the List of waste code (LOW): '17 05 04 soil and stones other than those mentioned in 17 05 03'.

Geochemical Domain

The GSI (GSI, 2022) defined Geochemical Domains maps indicates that the Proposed Development is within Domain 6 which is characterised as "Granitic Rocks".
A summary of the metals values for Domain 6 are presented below in Table 6.3

Element	Units	Value
Arsenic	mg/kg	85.8
Cadmium	mg/kg	2.38
Chromium	mg/kg	54.0
Copper	mg/kg	40.0
Copper	mg/kg	40.0
Mercury	mg/kg	0.527
Nickel	mg/kg	28.2
Lead	mg/kg	108.0
Zinc	mg/kg	168

Table 6.3: Geochemically Appropriate Levels for Domain 6

Geological Heritage

There are no recorded (GSI, 2022) Geological Heritage sites within the Site or within a 2km radius of the Proposed Development Site.

Quaternary Geomorphology

The geomorphology of the surrounding area is characterised mainly by meltwater channels (GSI, 2022). The closest quaternary meltwater channel to the site is mapped located 0.02km east of the site (GSI, 2022).

Radon

The site is mapped by the EPA (2022) to be in an area where between five and ten percent of the homes in the mapped 10km grid square are estimated to be above the Reference level. A High Radon Area is any area where it is predicted that 10% or more of homes will exceed the Reference Level of 200 Becquerel per cubic metre (Bq/m^3). Therefore, the Site is not considered to be within a High Radon Area. It is noted that a high radon level can be found in any area, in any part of the country, but are more likely to be located in High Radon Areas.

Landslides and Seismic Activity

There are no recorded landslides at the Proposed Development Site recorded within a 2km radius of the Proposed Development Site on the GSI database (GSI, 2022) and the closest landslide is recorded approximately 3.2km east of the Proposed Development Site as the Killiney 2005 event at Killiney Beach, Killiney. Given the Proposed Development Site topography and geological setting, landslide events are not likely at the Proposed Development Site (GSI, 2022).

In Ireland, seismic activity is recorded by the Irish National Seismic Network operated by Dublin Institute for Advanced Studies (DIAS) which has been recording seismic events in Ireland since 1978. There are five permanent broadband seismic recording stations in Ireland operated by DIAS. Records since 2010 show that the nearest recorded events were associated with quarry blast. There is a very low risk of seismic activity at the Proposed Development Site.

Economic Geology

There is no granular aggregate potential mapped for the Proposed development Site. The bedrock beneath the Proposed Development Site has been identified by the GSI as having "very high potential" for crushed rock aggregate (GSI, 2022).

There are number of historical pits and quarries mapped within 2km of the Proposed Development Site on the GSI database; nine (9 no.) are recorded as historic pits, two (2 no.) are recorded as historical quarries, 2 No. are recorded as historical sand pits and one (1 no.) is recorded as a historic clay pit.

Summary of Baseline Environment

The TII criteria for rating of the importance of geological features at the Site as documented in the NRA Guidelines (NRA, 2009), are summarised in Table 6.4.

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

Table 6.4: Criteria for Rating Site Importance of Geological Features

Based on the criteria outlined in Table 6-4 the soils and geology underlying the Site would be rated as an attribute of 'medium' importance. The Site is a generally undeveloped within an area mapped as having very high crushed rock aggregate potential however this has not been proven at the Site.

6.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed 'Build-to-Rent' (BTR) development will consist of the construction of 8 no. blocks in heights up to 10 storeys comprising 534 residential units, a creche, a retail unit, residential support facilities and residential services and amenities. The proposal also includes car and cycle parking, public and communal open spaces, landscaping, waste management areas, plant areas, substations, switch rooms, and all associated site development works and services provision. A full description of the development is provided in the statutory notes and in Chapter 3 of the EIAR submitted with this application.

The Proposed Development will include the requirement for bulk excavation of soil and bedrock for the construction of the apartment blocks including a double basement beneath the south of the Site (Beneath Blocks E, F, G, I and J (refer to Waterman Moylan Engineering Consultants Ltd., 2022 Drg No: BRR-WM-ZZ-00-P202)) and the installation of subsurface drainage infrastructure including attenuation tanks and other infrastructure, foundations and ancillary works.

Excavation of up to 9mBGL will be required to achieve the proposed levels for the double basement (FFL 66.175mOD) and attenuation tanks (IL 62.150mOD / 73.125mOD) level as shown on design drawings (Reddy Architecture + Urbanism Ltd. Drg No BRT-1-02-SW-ZZZ-DR-RAU-AR-3001; and Waterman Moylan Engineering Consultants Drawing No.: BRR-WM-ZZ-00-DR-C-P202)

Suitable excavated material (soils and bedrock) will be re-used within the Site as fill and for landscaping and 63,690m^3 of surplus material will be removed offsite. The cut and fill estimated volumes are provided in Table 6.5.

Cut Required	Fill Required	Net
65,100m^3	1,410m^3	63,690m^3

Table 6.5: Cut and Fill Estimates (Waterman Moylan Engineering Consultants Ltd., 2022)

Aggregates and other construction materials will be imported for use during the Construction Phase of the Proposed Development.

6.5 POTENTIAL IMPACTS

Construction Phase
Land Take and Land Use
There will be a land-take required of 3.81Ha for the proposed BRT development with residential units and amenities of what is predominantly, undeveloped and derelict land within an area with the Land Zoning Objective. 'To protect and-or improve residential amenity'. Accordingly, there will be an overall 'negative', 'moderate', 'permanent' impact associated with the required land take and removal of soil and bedrock. Taking account of the zoning objectives and current disused condition of the existing Site it is considered that there will be an overall improvement in regards land use at the Site in line with current land zoning objectives.

Excavation and Removal of Soil and Bedrock
There will be an unavoidable loss of 63,690 m^3 of soil and bedrock from the Site to achieve the required formation levels for the Proposed Development in particular for the construction of the basement. It is intended to retain and re-use suitable excavated soil and subsoil at the Site for engineering fill and landscaping design requirements.

The Proposed Development will result in an unavoidable 'direct', 'negative', 'significant', 'permanent' loss of soil, subsoil and bedrock from the Site.

The ground investigation report (SIL, 2020; SIL, 2021) concluded that '*Temporary support should be used on any excavation that will be left open for an extended period'.* Excavation of 65,000m^3 of bedrock will be required for construction of the basement. The ground investigation report (SIL, 2021) concluded that '*analysis needs to be completed on the volume of rock that needs to be removed as to whether breaking with very large excavators or blasting will be required*.'. The required excavation method, any potential issues and the requirement for the proposed temporary support measures (SIL, 2020; SIL, 2021) will be considered as part of the construction method determined by the appointed contractor and will incorporate appropriate mitigation measures. In the absence of the recommended (SIL, 2020; SIL, 2021) temporary support measures there is a potential for localised 'negative', 'slight to moderate', 'temporary' ground stability issues within areas of excavation particularly in the granular materials (overburden and weather bedrock) during excavation and ground works. Enviroguide Consulting understands there are no anticipated issues associated with excavation of bedrock (Waterman Moylan Engineering Consultants Ltd., 2022).

All surplus soil, subsoil and bedrock will be removed from the Site in accordance with the requirements and recommendations outlined in the Outline Construction and Demolition Waste Management Plan (referred to hereafter as CDWMP) (AWN Consulting Ltd., 2022) the Construction Environmental Management Plan (AWN Consulting, 2022), and managed in accordance with all statutory obligations. The offsite re-use of material will be prioritised noting the high aggregate potential of bedrock at the Site (refer to Economic Geology Section). The re-use of soil offsite will be undertaken in accordance with all statutory requirements and obligations including where appropriate re-use as by-product in accordance with Article 27 of the European Communities (Waste Directive) Regulations 2011 (SI No. 126 of 2011) as amended (referred to hereafter as Article 27).

Any surplus soil not suitable for re-use as a by-product and other waste materials arising from the Construction Phase will be removed offsite by an authorised contractor and sent to the appropriately authorised (licensed/permitted) receiving waste facilities. As only authorised facilities will be used, the potential impacts at any authorised receiving facility sites will have been adequately assessed and mitigated as part of the statutory consent procedures. Accordingly, it is considered that offsite removal of surplus soil will have an 'indirect' 'neutral', 'imperceptible' 'long-term' impact on the land, soil and geology at the destination locations.

In the unlikely event that surplus soil is directed to an unauthorised disposal site there is potential to impact on the receiving land, soil, geology and hydrogeology at that location. In the event of such a scenario it is considered that this could result in a 'negative', 'significant' and 'long-term' impact on the land, soil, geology and hydrogeology at any receiving unauthorised sites. Appropriate controls will be in place to prevent this unlikely scenario.

Importation of Aggregates
Aggregates will be required during the Construction Phase of the Proposed Development for piling mats, haul roads and set down areas. Aggregates will also be required as construction materials and fill in accordance with the design specification. There is no design requirement to import soil and subsoil however, the detailed design may identify a requirement to import soils to achieve proposed levels thereby avoiding the need to import virgin soil from borrow sites.

In order to minimise the requirement to import virgin quarried materials, recycled aggregates will be used where available and subject to meeting specified design requirements and all construction and environmental legislation. This will include where suitable, by-products that meet the legislative requirements of Article 27 and other applicable statutory requirements.

Contract and procurement procedures will ensure that all aggregates and fill material required for construction are sourced from reputable authorised suppliers operating in a sustainable manner and in accordance with the necessary statutory consents. Therefore, it is considered that the potential for importation of contaminated or uncertified materials would not occur. However, in the unlikely 'worst event that such materials are imported there would be a 'direct', 'negative', 'moderate to significant' and 'long term' at the Proposed Development Site.

The potential indirect impacts associated with importation of aggregates include loss of attribute and changes in the geological attributes at the source or borrow sites. Only authorised sources of aggregates and other building materials will be used through robust contract and procurement procedures, therefore there will be an 'indirect', 'neutral', 'imperceptible' and 'permanent' impact on the source site taking account of the fact that the statutory consent process would have required the necessary environmental impacts to be assessed and mitigated as appropriate.

Geological Hazards
Earthquakes are not likely to occur in the vicinity of the Site at a sufficient intensity to pose a risk for the Proposed Development. The GSI database indicates that the Site is located within an area of 'Low' susceptibility to landslides.

The Site is not located within an area associated with karst geology and therefore there are no identified risks associated with karst features.

The Site is identified as not being located within a High Radon Area however, as a high radon level can be found in any area, in any part of the country, standard design measures including appropriate radon membranes will be incorporated into the design of buildings in accordance with relevant Building Regulations.

The site investigation report did not reference any issues associated with pyrite. All aggregates imported to the Site for use in the Proposed Development will be subject to strict quality control procedures in accordance with the design specification and relevant Building Regulations therefore avoiding any potential issues with pyrite in aggregates.

Soil Structure
Topsoil and subsoil will be exposed and subject to potential impact from weather and construction traffic at various stages of the Construction Phase. Topsoil will be stockpiled in a controlled manner and retained for future re-use in landscaping with a potential for impact on soil structure described as 'direct', 'long-term', 'moderate', 'negative' impact on the natural strength of the soils.

Soil Quality and Contamination
The site investigation results indicate soil is generally free of anthropogenic contamination There is no identified human health risk associated with the soil condition at the Site and regardless, these localised areas of soil will be removed as they are within the basement footprints.

There is a potential risk of contamination of soil and bedrock impact on soil quality during the Construction Phase.

The use of cementitious materials in particular where cast in-situ is required during piling, and construction of the basement and other in-ground works could result in a potential 'negative', 'slight' and 'medium term' impact on localised areas of the existing soil and bedrock quality underlying the Site.

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

Human Health
No public health issues associated with the land, soil, geology conditions at the Site have been identified for the Construction Phase of the Proposed Development.
Appropriate industry standard and health and safety legislative requirements will be implemented during the Construction Phase that will be protective of site workers. The necessary measures will also be implemented to address any nuisance issues associated with dust dispersion during construction works including the offsite removal of surplus soil. The potential impacts associated with airborne dust is addressed in Chapter 9 (Air Quality and Climate) and Chapter 4 (Population& Human Health) of this EIAR

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

The design and construction of the Proposed Development in accordance with current Building Regulations will ensure that the Site will be suitable for use for the Operational Phase as a residential development taking account of the geological site setting including the identified potential geological hazards.

There will be no bulk storage of petroleum hydrocarbon-based fuels used during the Operational Phase and the Site will be connected to mains electricity and natural gas. Using such a system removes any potential contaminant sources associated with fuels. All trafficked areas will be connected to the surface water drainage network therefore in the unlikely scenario of an accidental spill from a vehicle there will be no discharge and potential impact to ground and the receiving land, soil and geology environment.
There will be no direct impacts associated with the Operational Phase of the Proposed Development and therefore the potential impacts on land, soil and geology associated will be 'neutral', 'imperceptible' and 'permanent'.

No public health issues associated with the land, soil, geology conditions at the Site have been identified for the Operational Phase of the Proposed Development. The design and specification for all buildings will be in accordance with current Building Regulations including those relevant to previously developed land and radon, albeit not an identified issue at the Site. Human health is assessed in Chapter 4 (Population & Human Health) of this EIAR.

6.6 POTENTIAL CUMULATIVE IMPACTS

Excavated soils and other surplus materials and wastes from the Site could potentially be directed to the same authorised destination locations (sites or facilities) as materials from other permitted developments within the vicinity of the Proposed Development and greater catchment for the nominated destination locations.
The following granted developments were considered in the assessment of potential cumulative impacts:

- Brennanstown Wood Residential Development (ABP reference: ABP-301614-18, Decision: Granted 31st August 2018)
  Viscount Securities were granted planning permission for a strategic housing development at Brennanstown Road, Dublin 18 for 136 number residential units, comprising of 98 number apartments and 38 number houses. A 195 square metre creche facility and play area is proposed on the lower ground floor of Block 1. The development includes 227 number car parking spaces at basement / lower ground floor and surface level.

- Doyle's Nursery (ABP reference: ABP-305859-20, Decision: Granted 25th June 2020)
  Atlas GP limited were granted planning permission for the Demolition of 'Benoni' and extant single storage buildings, construction of 234 no. apartments, creche and associated site works.

There will be a potential cumulative loss of soil and bedrock from the area taking account to Proposed Development and the above granted developments. All surplus materials including excavated soils and bedrock from the Site will be managed in compliance with relevant legislation. Where feasible, soil and bedrock will be re-used to prevent loss of soil and bedrock resource. Re-use of surplus soil and bedrock by-product will only be directed to other development sites for re-use under Article 27 By-Product Notification when it can be demonstrated that all tests for Article 27 compliance are met. Accordingly, it is considered that any cumulative impact on the land, soils and geology associated with the Proposed Development including in combination with other developments would be 'neutral', 'imperceptible' and 'permanent'.

Contract and procurement procedures will ensure that all aggregates and fill material originating from quarry sources that will be required for construction are sourced from reputable authorised suppliers operating in a sustainable manner and in accordance with the necessary statutory consents. Therefore, regardless of the number of other projects and developments using aggregates from the same source sites, there will be an 'indirect', 'neutral', 'imperceptible' and 'permanent' impact on the geological environmental at the source site.

There are no other identified cumulative impacts on land, soil and geology associated with the Proposed Development.

6.7 MITIGATION MEASURES

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

- Groundworks including excavation and management and control of soil during bulk excavation and export from the Proposed Development;
- Management and control of imported soil and aggregates from off-site sources;
- Fuel and Chemical handling, transport and storage; and
- Accidental release of contaminants .

Bulk Excavation

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To prevent any potential issues with slope stability during bulk excavation in soil appropriate measures will be implemented by the appointed contractor. There is no identified requirement for mitigation measures for excavation of bedrock. Where required, suitable batters or retained vertical walls will need to be maintained on excavation faces in particular where there are granular soils are present. The geotechnical report (SIL, 2020) sets out recommendations for the management of temporary sloped sides for excavations of 33º, or 1:1.5 and where excavations extend to stiffer CLAY the temporary slope angle could be increased to 45º, or 1:1. The report also recommends that temporary slope protection measures should be considered to minimise the risk of spalling, that excavated surfaces in clay strata should be kept dry to avoid softening prior to formation placement and that relevant laboratory testing should be specified where stability of side slopes to excavations is a concern. The contractor will ensure the specification for any required mitigation measures are overseen by an appropriately qualified geotechnical Engineer to ensure that ground conditions are engineered and controlled appropriately during excavation of soil and bedrock and any potential impacts are avoided.

Soil Structure
The extent of the required work area and batter for bulk excavation at the Site will be minimised where appropriate to prevent unnecessary excavation of soil and tracking over soil and subsoil outside of the excavation work areas as a result of compaction and rutting from construction traffic.

Dedicated internal haul routes will established and maintained by the contractor to prevent tracking over unprotected soils.

Exclusion zones will be established where soft landscaping is proposed in particular along Site boundaries which are outside of the areas where excavation to ensure soil structure is maintained.

Management of Stockpiles (soil and other materials / wastes)
Segregation and storage of soils for re-use onsite or removal offsite and waste for disposal off site will be segregated and temporarily stored on-site (pending removal or for re-use on-site) in accordance with the CDWMP (AWN Consulting Ltd., 2022) and the CEMP (AWN Consulting Ltd., 2022).
The reuse of up to 1,410$m^3$of excavated soil and bedrock for the Proposed Development (i.e., engineered fill, profiling green areas) will be undertaken in accordance with the engineered design and landscape plan for the Proposed Development. Soil including topsoil and subsoil will be segregated and stored appropriately to prevent deterioration of soil structure and quality to ensure the material will be suitable for re-use onsite. Material surplus to onsite requirements will be segregated and stockpiled appropriately for removal offsite in accordance with the resource and material management plan.

For any excavated material identified for removal offsite, while assessment and approval of acceptance at a destination re-use, recovery site or waste facility is pending, excavated soil for recovery/disposal shall be stockpiled as follows:

- A suitable temporary storage area shall be identified and designated.
- All stockpiles shall be assigned a stockpile number.
- Material identified for reuse on site, off site and waste materials will be individually segregated; and all segregation, storage & stockpiling locations will be clearly delineated on the Site drawings.
- Soil stockpiles will be sealed to prevent run-off from the stockpiled material generation and/or the generation of dust.
- Any waste that will be temporarily stored / stockpiled will be stored on impermeable surface high-grade polythene sheeting, hardstand areas or skips to prevent cross-contamination of the soil below or cross contamination with soil.

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

- Overburden material will be protected from exposure to wind by storing the material in sheltered regions of the Site;
- Regular watering will take place to ensure the moisture content is high enough to increase the stability of the soil and thus suppress dust.
- Stockpiles will not be located near Site boundaries or sensitive receptors and a set-back of 100m will be maintained from any boundary with offsite receptors.

When a stockpile has been sampled for classification purposes, it shall be considered to be complete and no more soil shall be added to that stockpile prior to removal off site. An excavation/stockpile register shall be maintained on-site

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

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

Export of Resource and (soil and bedrock) and Waste

All surplus materials and any waste will be removed off-site in accordance with the requirements outlined in the CDWMP (AWN Consulting Ltd., 2022) and the CEMP (AWN Consulting Ltd., 2022) and will be managed in accordance with all legal obligations. It will be the contractor's responsibility to either; obtain a waste collection permit or, to engage specialist waste service contractors who will possess the requisite authorisations, for the collection and movement of waste off-site.

The re-use of soil offsite will be undertaken in accordance with all statutory requirements and obligations including where appropriate re-use as by-product in accordance with Article 27 of the European Communities (Waste Directive) Regulations 2011 (SI No. 126 of 2011) as amended.

Any surplus soil not suitable for re-use as a by-product and other waste materials arising from the Construction Phase will be removed offsite by an authorised contractor and sent to the appropriately authorised (licensed/permitted) receiving waste facilities. As only authorised facilities will be used, the potential impacts at any authorised receiving facility sites will have been adequately assessed and mitigated as part of the statutory consent procedures.

Any waste soils will be transported under a valid waste collection permit issued under the Waste Management (Collection Permit) Regulations 2007, as amended and will be delivered to an appropriately authorised waste management facility.

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

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

Public roads outside the Site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary. The wheels of all Lorries will be cleaned prior to leaving the Site so that traffic leaving the Site compound will not generate dust or cause the build-up of aggregates and fine material in the public domain. A wheel-wash will be installed at the egress point if required and a road sweeper will be deployed to ensure that public roads are kept free of debris.

Import of Aggregates

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

The importation of aggregates will be subject to management and control procedures which will include testing and assessment of the suitability for use in accordance with engineering and environmental specifications for the Proposed Development including the suitability of material that may be imported in accordance with an Article 27 By-Product Notification. Therefore, any unsuitable material will be identified and avoided prior to importation to the Site.

Handling of Chemicals, and Fuel

Fuel, oils and chemicals used during construction are classified as hazardous.

Storage of fuel hazardous will be undertaken with a view to protecting any essential services (electricity, water etc.) and the receiving water environment.

Bulk quantities of fuel will not be stored at the Site and fuel required for plant and equipment will be delivered directly from a delivery tanker. Fuel will only be stored in the quantities required for emergency use.

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

All drums to be quality approved and manufactured to a recognised standard. If drums are to be moved around the Site, they will be secured and moved on spill pallets. Drums will be loaded and unloaded by competent and trained personnel using appropriate equipment.

- Bunds will comply with the requirements of Environmental Protection Agency guidelines 'Storage and Transfer of Materials for Scheduled Activities' (EPA, 2004) and Enterprise Ireland. Best Practice Guide BPGCS005. Oil Storage Guidelines. All tank and drum storage areas will, as a minimum, be bunded to a volume not less than the greater of the following:
- 110% of the capacity of the largest tank or drum within the bunded area; or
- 25% of the total volume of substance that could be stored within the bunded area.
- Vehicle or equipment maintenance work will take place in a designated impermeable area within the Site;
- Emergency response procedures will be put in place, in the unlikely event of spillages of fuels or lubricants;
- Spill kits including oil absorbent material will be provided so that any spillage of fuels, lubricants or hydraulic oils will be immediately contained;
- In the event of a leak or spill from equipment in the instance of a mechanical breakdown during operation, any contaminated soil will be removed from the Site and compliantly disposed off-site. Residual soil will be tested to validate that all potentially contaminated material has been removed. This procedure will be undertaken in accordance with industry best practice procedures and EPA guidelines;
- Site staff will be familiar with emergency procedures for in the event of accidental fuel spillages; and
- All staff on-site will be fully trained on the use of equipment to be used on-site.
- Portable generators or similar fuel containing equipment will also be placed on suitable drip trays or bunds.

Refuelling of plant and vehicles during the Construction Phase will only be permitted at designated refuelling station locations onsite. Each station will be fully contained and equipped for spill response and a specially trained and dedicated Environmental and Emergency Spill Response team will be appointed by the Contractor before the commencement of works onsite.

A procedure will be prepared by the appointed contractor which will be adhered to during refuelling of on-site vehicles and plant. This will include the following:

- Fuel will be delivered to plant on-site by dedicated tanker;
- All deliveries to on-site vehicles will be supervised and records will be kept and retained onsite of delivery dates and volumes;
- The driver will be issued with, and will carry at all times, absorbent sheets and granules to collect any spillages that may accidentally occur;
- Where the nozzle of a fuel pump cannot be placed into the tank of a machine then a funnel will be used; and
- All re-fuelling will take place in a designated impermeable area to be specified by the contractor. In addition, oil absorbent materials will be kept on-site in close proximity to the re-fuelling area.

Welfare Facilities

Welfare facilities have the potential, if not managed appropriately, to release organic and other contaminants to ground or surface water courses. All waste from welfare facilities will be managed in accordance with the relevant statutory obligations through either a temporary connection to mains foul sewer (subject to receipt of the relevant consent from IW) which will be constructed in accordance with IW and WCC guidelines or by tankering of waste offsite by an appropriately authorised waste contractor.

Concrete Works

The cementitious grout and other concrete works during the Construction Phase, will avoid any contamination of ground through the use of appropriate design and methods implemented by the Contractor and in accordance with industry standards.

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

Operational Phase

There is no requirement for mitigation measures for the Operational Phase of the Proposed Development.

6.8 PREDICTED IMPACTS

Predicted or residual impacts are defined as 'effects that are predicted to remain after all assessments and mitigation measures. They are the remaining 'environmental costs' of a project and are the final or intended effects of a development after mitigation measures have been applied to avoid or reduce adverse impacts.

Residual Impacts

With the protective measures noted above in place during Construction Phase and for excavation works, any potential impacts on soils and geology at the Site and surrounding area will be avoided and there will be no significant adverse impacts on the land, soils and geology of the subject lands are envisaged.

There are no predicted significant adverse impacts are predicted on land, soils or geology associated with the Operational Phase of the Proposed Development.

The predicted impacts and identified residual impacts are outlined in Table 6.6.

Activity	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
Construction Phase							
Construction of the Proposed Development.	Landuse and Land-take: A land-take of 3.81Ha with change from undeveloped/ derelict to residential landuse.	Negative	Moderate	Permanent	Direct	The Site is within lands zoned for residential amenity which will be improved as a result of the Proposed Development.	Positive

Activity	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
Construction Phase							
Excavation and Removal of Soil	The proposed design will require the unavoidable removal of soil and bedrock from the Site.	Negative	Significant	Permanent	Direct	Suitable soils will be retained and re-used within the Proposed Development Site for engineering fill and landscaping. Surplus soil and subsoil, which is clean and inert, will be re-used off site in accordance with appropriate statutory consent procedures including Article 27 to prevent the loss of the valuable soil resource to landfill.	Moderate
Groundworks and ground stability	Bulk excavations for basements and infrastructure could result in temporary stability issues.	Negative	Slight - Moderate	Temporary	Direct	Measures outlined in the geotechnical report (SIL, 2020, SIL 2021) will be implemented where required by the contractor to ensure ground conditions are engineered and controlled appropriately.	Negligible
Removal of surplus soil to offsite lands (facility or site for re-use)	Soil will be removed to an authorised (facility or under Article 27 Notification for appropriate re-use in accordance with all statutory obligations and consents. Control procedures will be in place to prevent the unauthorised removal of materials to unauthorised offsite lands/sites/facilities.	Neutral	Imperceptible	Long-term	Indirect	None required.	Imperceptible
Use of cementitious materials.	Potential release of cementitious material during construction works for foundations, pavements and other structures could result in a localised impact to soil quality.	Negative	Slight	Medium-term	Direct	The cementitious materials used during construction will avoid any contamination of soil and geology through the use of appropriate design and methods implemented by the Contractor and in accordance with industry standards and the CEMP for the works.	Imperceptible
Accidental release of deleterious materials including fuel and other materials	Potential (albeit low) for uncontrolled release of deleterious materials including	Negative	Moderate to significant	Long-term	Direct	All works will be carried out in accordance with a CEMP that will take cognisance of the requirements for use and	Imperceptible

Activity	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
Construction Phase							
being used on-site.	fuels and other materials being used on-site, through the failure of secondary and tertiary containment or a materials handling accident, to the land, soil and geological environment.					containment of fuels and other hazardous materials.	
Import of required aggregates	The potential impacts may include importation of unsuitable or contaminated materials	Negative	Moderate to significant	Long-term	Direct	Contract and procurement procedures will ensure that all imported aggregates meet with industry conformity/compliance standards and statutory obligations	Imperceptible
Import of required aggregates and the loss of resource at the source site	The potential impacts may include loss of attribute and changes in the geological attribute at the source site. Only certified materials from authorised sources will be used.	Neutral	Imperceptible	Permanent	Indirect	None required.	Imperceptible
Operational Phase							
Use of the Proposed Development.	Impact on Land Soil and Geology	Neutral	Imperceptible	Permanent	Direct	None	Imperceptible

Table 6.6: Summary of Residual Impact

6.9 'DO NOTHING' SCENARIO

The Proposed Development Site would continue to be an undeveloped Site and there would be no requirement for land-take or loss of soil, subsoil and bedrock from the Site, however the landuse zoning objective 'To protect and-or improve residential amenity' would not be achieved.

6.10 WORST CASE SCENARIO

The potential accidental release of hazardous material including fuels, or other hazardous materials being used on-site during the Construction Phase could potentially impact on the receiving land, soil and geology environment. This scenario would only occur through the failure of secondary containment or a major incident on the Site. The potential for or inadvertent import of contaminated materials during the Construction Phase could also result in an impact in the absence of the quality control measures. However, taking account of the mitigation measures any environmental harm would be avoided. There would therefore be a 'neutral', 'imperceptible' and 'short-term' impact on the receiving environment. These worst-case scenarios are deemed to be unlikely to occur.

6.11 MONITORING & REINSTATEMENT

During the Construction Phase the following monitoring measures will be considered:

- Routine monitoring and inspections during refuelling, concrete works to ensure no impacts and compliance with ameliorative, remedial and reductive measures.
- Monitoring and site audits will be undertaken daily by the contractor to check for any detectable nuisances such as, noise, dust or other such issues associated with excavation and offsite removal of soil.
- Materials management and waste audits will be carried out at regular intervals to monitor the following:

- management of surplus soils on site and for removal offsite,
- record keeping,
- traceability of all materials, surplus soil and other waste removed from the Site and
- ensure records are maintained of material acceptance at the end destination.

There are no monitoring requirements specifically in relation to land, soil and geology required for the Operational Phase. difficulties in compiling information

There were no difficulties encountered in preparing this Land, Soils and Geology Chapter. references

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7 HYDROLOGY AND HYDROGEOLOGY

7.1 INTRODUCTION

Enviroguide Consulting, on behalf of Cairn Homes Properties Limited has carried out an assessment of the likely significant effects of a Proposed Development at Brennanstown Road, Dublin 18 on the receiving hydrology and hydrogeology (water) environment. This chapter details the results of the assessment of the potential impacts of the Proposed Development on hydrology and hydrogeology (water) and sets out any required mitigation measures where appropriate.

The principal objectives of this chapter are to identify:

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

Quality Assurance and Competence

Synergy Environmental Ltd., T/A Enviroguide Consulting, is a wholly Irish Owned multi-disciplinary consultancy specialising in the areas of the Environment, Waste Management and Planning. All of our consultants carry scientific or engineering qualifications and have a wealth of experience working within the Environmental Consultancy sectors, having undergone extensive training and continued professional development.

Enviroguide Consulting as a company remains fully briefed in European and Irish environmental policy and legislation. Professional memberships include the Institute of Geologists of Ireland (IGI), Chartered Institution of Wastes Management (CIWM), the Irish Environmental Law Association and Chartered Institute of Ecology and Environmental Management (CIEEM).

This EIAR Chapter was written by Fionnuala Joyce BSc., MSc., Hydrogeologist with Enviroguide Consulting and Claire Clifford BSc., MSc., PGeo., EurGeol who is Technical Director - Contaminated Land and Hydrogeology with Enviroguide Consulting and is a Professional Geologist with the Institute of Geologists of Ireland and has extensive experience in preparing hydrogeological and environmental assessments for a range of project types and geological and hydrogeological site settings.

7.2 METHODOLOGY

Regulations and Guidance

The methodology adopted for the assessment has regard to the relevant guidelines in particular the following:

- Council Directive 2000/60/EC, October 2000 Establishing a framework for Community action in the field of water policy. Council of European Communities and as amended (Water Framework Directive);
- Council Directive 80/68/EEC, 1979. On the protection of groundwater against pollution caused by certain dangerous substances. Council of European Communities;
- Council Directive 2006/118/EEC, 2006. On the protection of groundwater against pollution and deterioration. European Parliament and the Council of European Communities;
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- National Roads Authority, 2009. Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2009);
- S.I. No. 272/2009 - European Communities Environmental Objectives (Surface Waters) Regulations 2009 including amendments S.I. No. 327/2012, S.I. No. 386/2015 and S.I. No. 77/2019; and
- S.I. No. 9 of 2010 - European Communities Environmental Objectives (Groundwater) Regulations 2010 including amendments S.I. No. 149 of 2012 and S.I. No. 366 of 201.

Phased Approach

A phased approach was adopted for this EIAR in accordance with the Environmental Protection Agency (EPA) and Institute of Geologists of Ireland (IGI) guidelines and is described in the following sections.

Element 1: An Initial Assessment and Impact Determination stage was carried out to establish the project location, type and scale of the Proposed Development, the baseline conditions, and the type of hydrological and hydrogeological environment, to establish the activities associated with the Proposed Development and to undertake an initial assessment and impact determination.

This stage of the assessment included a desk top study that comprised a review of published environmental information for the Site. The study area, for the purposes of assessing the baseline conditions for the Hydrology and Hydrogeology Chapter of the EIAR, extends beyond the site boundaries and includes potential receptors within a 2.0km radius of the Site. The extent of the wider study area was based on the IGI, 2013 Guidelines which recommend a minimum distance of 2.0km from the Site.

The desk study involved collecting all the relevant data for the Proposed Development site and surrounding area including published information and details pertaining to the Proposed Development provided by the Applicant and design team.

Site walkover survey and inspections were carried out by Enviroguide Consulting on the 31st January 2022 to assess the general site condition.

The Element 1 stage of the assessment was completed by Enviroguide and included the review of the following sources of information:

- Environmental Protection Agency (EPA) webmapping;
- Geological Survey Ireland (GSI) Datasets Public Viewer and Groundwater webmapping;
- National Parks and Wildlife Services (NPWS) webmapping
- Ordnance Survey Ireland (OSI) webmapping ;
- Water Framework Directive Ireland (WFD) webmapping,;
- Office of Public Works (OPW) database on historic flooding and the Catchment Flood Risk Assessment and Management (CFRAM) maps,
- Met Eireann Meteorological Databases (www.met.ie);
- CFRAM Preliminary Flood Risk Assessment (PFRA) maps (www.cfram.ie); and,
- Information provided by the Applicant

Element 2: The Direct and Indirect Site Investigation and Studies stage was carried out to refine the conceptual site model and undertake a detailed assessment and impact determination. All Direct and Indirect Site Investigation included:

- Site Investigations Ltd., November 2020. Brennanstown Road – south Site, Cabinteely, Dublin 18 Site Investigation Report (Contract No. 5752) included: borehole drilling, trial pit excavation, infiltration testing and soil sampling;
- Site Investigations Ltd., May 2021. Brennanstown Road Additional Investigation. Cabinteely, Dublin 18 Site Investigation Report (contract No. 5831) including intrusive site investigation including borehole drilling and trial hole excavation at the Proposed Development Site (SIL, 2021);
- Minerex Geophysics Limited, April 2021. Brennanstown Road, Cabinteely, Dublin 18 Geophysical Survey (Project No.: 6548); and
- Priority Geotechnical Ltd., February 2022. Site Investigation at Barrington, Carrickmines, Dublin, (Reference: JMcS/Rp/P22023) included: borehole drilling, groundwater monitoring and sampling.

Details of the scope and methods for the site investigation and the results are provided in the site investigation reports included in Appendix 6-1.

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

Element 4: Completion of the Hydrology and Hydrogeology Chapter EIAR chapter

Description of Importance of the Receiving Environment

The National Roads Authority (NRA) (now Transport Infrastructure Ireland (TII)) criteria for estimation of the importance of hydrogeological features at the Proposed Development Site during the Environmental Impact Assessment (EIA) stage, as documented by IGI (IGI, 2013) are summarised in Table 7.1.

Importance	Criteria	Typical Example
Extremely High	Attribute has a high quality or value on an international scale.	Groundwater supports river, wetland or surface water body ecosystem protected by European Union (EU) legislation e.g., SAC or SPA status.
Very High	Attribute has a high quality or value on a regional or national scale.	Regionally Important Aquifer with multiple wellfields. Groundwater supports river, wetland, or surface water body. ecosystem protected by national legislation – e.g., NHA status. Regionally important potable water source supplying >2500 homes Inner source protection area for regionally important water source.
High	Attribute has a high quality or value on a local scale.	Regionally Important Aquifer. Groundwater provides large proportion of baseflow to local rivers. Locally important potable water source supplying >1000 homes. Outer source protection area for regionally important water source. Inner source protection area for locally important water source.
Medium	Attribute has a medium quality or value on a local scale.	Locally Important Aquifer Potable water source supplying >50 homes. Outer source protection area for locally important water source.
Low	Attribute has a low quality. or value on a local scale.	Poor Bedrock Aquifer. Potable water source supplying <50 homes.

Table 7.1: Criteria for Rating Site Importance of Hydrogeological Features

Description and Assessment of Potential Impact

Impacts will vary in quality from negative, to neutral or positive. The effects of impacts will vary in significance on the receiving environment. Effects will also vary in duration. The terminology and methodology used for assessing the 'impact' significance and the corresponding 'effect' throughout this Chapter is described in Table 7.2: .

Quality of Effects / Impacts	Definition
Negative	A change which reduces the quality of the environment
Neutral	No effects or effects that are imperceptible, within the normal bounds of variation or within the margin of forecasting error.
Positive	A change that improves the quality of the environment
Significance of Effects / Impacts	**Definition**
Imperceptible	An effect capable of measurement but without significant consequences.
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.

Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters a sensitive aspect of the environment.
Profound	An effect which obliterates sensitive characteristics.
Duration of Effects / Impacts	**Definition**
Momentary	Effects lasting from seconds to minutes
Brief	Effects lasting less than a day
Temporary	Effects lasting one year or less
Short-term	Effects lasting one to seven years
Medium-term	Effects lasting seven to fifteen years
Long-term	Effects lasting fifteen to sixty years
Permanent	Effects lasting over sixty years
Reversible	Effects that can be undone, for example through remediation or restoration

Table 7.2: Assessment of Potential Impacts, terminology and methodology.

7.3 RECEIVING ENVIRONMENT

Site Location and Description

The Proposed Development Site occupies a total area of 3.81 Hectares (Ha) in lands, which are located south of Brennanstown Road, Dublin 18. The Proposed Development Site is generally undeveloped with two derelict buildings at the Site. The Site Location is presented in

Figure 7.1.

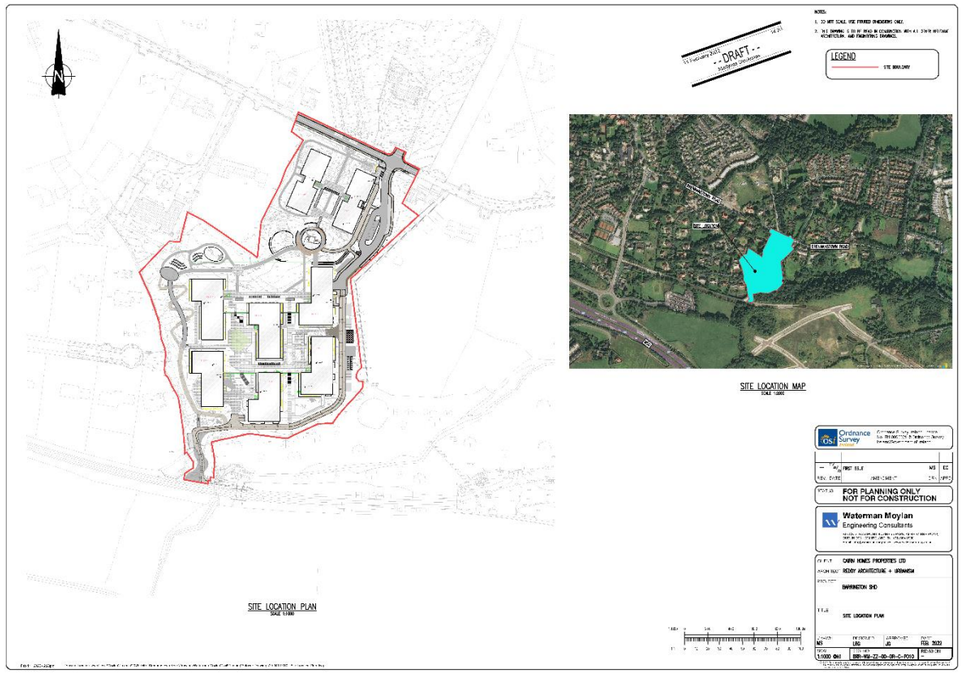

Figure 7.1: Site Location

Topography

The regional topography generally slopes towards the Irish Sea to the east of the Site from the local high point at Kerrymount (90mOD) located 0.3km north-west of the Proposed Development Site. The topography at the Site slopes from northwest toward the south and elevation ranges from 79.9maOD to 62.37maOD (Refer to Waterman Moylan Engineering Consultants Ltd., 2022 Drawing No.: BRR-WM-ZZ-XX-DR-C-P010).

Rainfall and Evaporation

Monthly rainfall data for the site available for 1km x 1km grids (for the period 1981 to 2010) was sourced from Met Éireann (Walsh, 2012) and is presented in Table 7.3: .

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
88	64	67	62	69	67	51	70	69	94	99	91	892

Note: 1km x 1km Irish Grid Coordinates selected for the Site = X (Easting): 322000, Y (Northing): 224000

Monthly rainfall data units: mm

Table 7.3: Long-term mean monthly rainfall data (mm)(Walsh, 2012)

The closest the synoptic meteorological station to the Site is at the Casement Aerodrome, Co. Dublin which is located approximately 18.65km north-west of the Site. The average potential

evapotranspiration (PE) from the Casement Aerodrome station for the period 2021 to 2022 (Met Éireann, 2022) is presented in Table 7.4: .

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
15.2	36.9	56.1	83.4	111.2	130.7	129.3	93.9	64.2	42.7	18.0	15.1	796.7
Note: Potential evaporation data units: mm												

Table 7.4: Average Potential Evapotranspiration (Met Éireann, 2022)

The annual PE at the Site is 796.7mm/year (Met Éireann, 2022) (refer to Table 7.4:). The GSI has calculated an Effective Rainfall (ER) value of 583.1mm/year for the area around the Site (GSI, 2022).

Hydrology

The Proposed Development Site is within the Ovoca-Vartry Catchment and Hydrometric Area (Catchment I.D: 10, Hydrometric Area 10) and the Dargle_SC Sub-catchment (Sub-catchment I.D: 10_5) and within the Carrickmines Stream_010 WFD Sub Basin (EU Code: IE_EA_10C040350) (EPA, 2022).

There are no identified water courses or drainage ditches mapped within the Proposed Development Site and this was verified during the site walkover survey by Enviroguide Consulting (January to February 2022). Historical mapping identifies a pond located in lands located adjoining the western boundary of the Proposed Development Site however, this was not identified during the site walkover.

The closest surface water feature to the Proposed Development Site is the Carrickmines Stream (River waterbody Code: IE_EA_10C040350; EPA code: 10C04 (EPA, 2022)) located 0.05km south of the Site boundary. The Carrickmines Stream flows east and discharges to the Shanganagh River (River waterbody Code: IE_EA_10S010600; EPA code: 10S01) approximately 2km south-east of the Site. The Shanganagh River flows eastwards and discharges to the Southwestern Irish Sea – Killiney Bay coastal waterbody (EU Code: IE_EA_100_0000) (EPA, 2022). at Hackett Island Bay Beach, east of Killiney approximately 3.28km east of the Site. All watercourses within a 2km radius of the Proposed Development Site flow in a general easterly direction and ultimately discharge to Irish Sea.

The watercourses in the vicinity of the Site are presented in Figure 7.2.

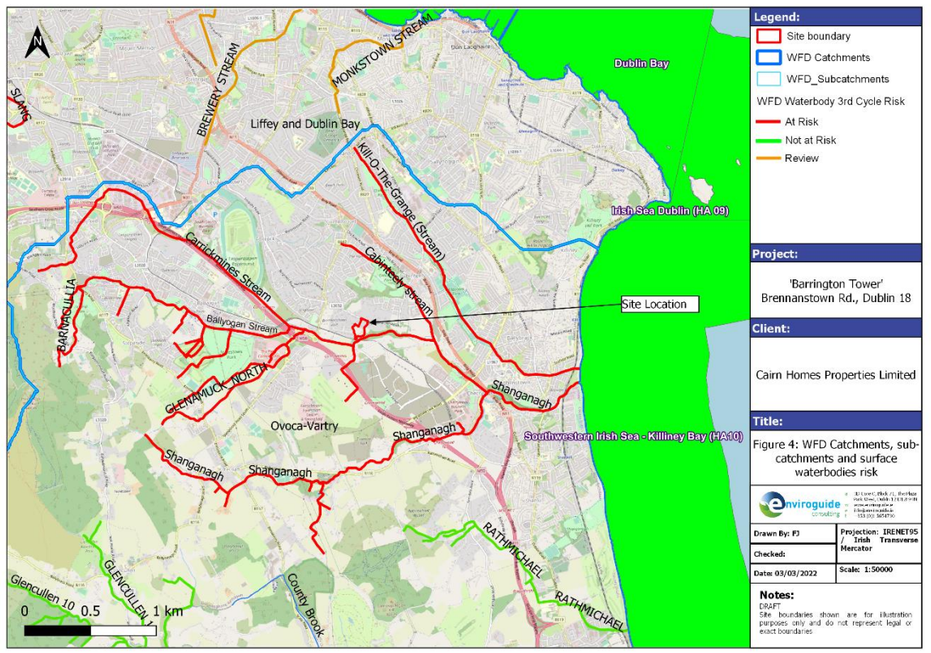

Figure 7.2: Catchments, Sub-catchments and surface waterbody risk

Soil and Geology

The soil and geology at the Site are described in detail in Chapter 6 of this EIAR.

The soil beneath the Site comprises of an area mapped as Made ground in the central western portion of the Site and across the majority of the Site comprises of well drained mineral (mainly acidic) (AminSW and AminDW) "derived from mainly non-calcareous parent materials" (GSI, 2022). The subsoil or quaternary sediments beneath the majority of the Site are mapped as Bedrock outcrop or subcrop (Rck) indicating thin or absent subsoil. Subsoil beneath the northern portion of the Site is mapped as Till derived from granites (TGr) (GSI, 2022).

The bedrock beneath the Proposed Development Site is mapped by the GSI as the Type 2e equigranular formation which comprises pale grey fine to coarse grained granite (GSI, 2022).

Aquifer Classification

The GSI provides a methodology for aquifer classification based on resource value (regionally important, locally important and poor). Resource value refers to the scale and production potential of the aquifer whilst vulnerability refers to the ease with which groundwater may be contaminated by human activities (vulnerability classification primarily based on the permeability and thickness of subsoils).

The bedrock of the Type 2e equigranular Formation is classified as a Poor Aquifer (Pl) (i.e., bedrock which is generally unproductive except for Local Zones) (GSI, 2022).

The bedrock aquifer map is presented in Figure 7.3.

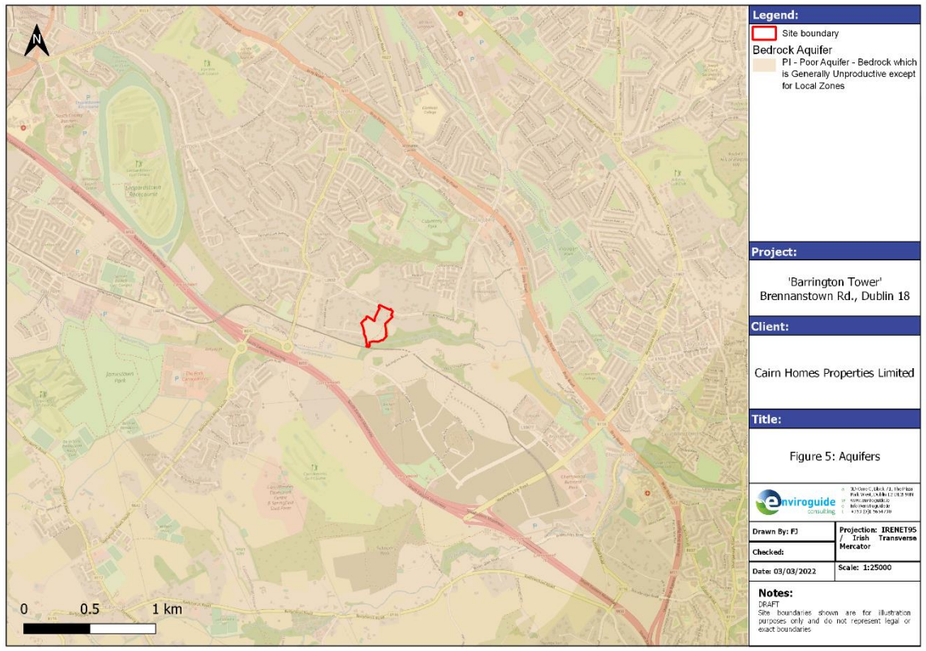

Figure 7.3: Bedrock Aquifer

Aquifer Vulnerability Rating

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

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

The criteria outlined in the Groundwater Protection Schemes document are provided in

Vulnerability Rating	Hydrogeological Conditions				
	Subsoil Permeability (Type) and Thickness			Unsaturated Zone	Karst Features
	High permeability (sand/gravel)	Moderate permeability (e.g. Sandy subsoil)	Low permeability (e.g. Clayey subsoil, clay, peat)	(Sand/gravel aquifers only)	(<30 m radius)
Extreme (E)	0 - 3.0m	0 - 3.0m	0 - 3.0m	0 - 3.0m	-
High (H)	>3.0m	3.0 - 10.0m	3.0 - 5.0m	>3.0m	N/A
Moderate (M)	N/A	>10.0m	5.0 - 10.0m	N/A	N/A
Low (L)	N/A	N/A	>10.0m	N/A	N/A

Notes: (1) N/A = not applicable.
(2) Precise permeability values cannot be given at present.
(3) Release point of contaminants is assumed to be 1-2 m below ground surface.

Table 1. Vulnerability Mapping Guidelines

Figure 7.4

Vulnerability Rating	Hydrogeological Conditions				
	Subsoil Permeability (Type) and Thickness			Unsaturated Zone	Karst Features
	High permeability (sand/gravel)	Moderate permeability (e.g. Sandy subsoil)	Low permeability (e.g. Clayey subsoil, clay, peat)	(Sand/gravel aquifers only)	(<30 m radius)
Extreme (E)	0 - 3.0m	0 - 3.0m	0 - 3.0m	0 - 3.0m	-
High (H)	>3.0m	3.0 - 10.0m	3.0 - 5.0m	>3.0m	N/A
Moderate (M)	N/A	>10.0m	5.0 - 10.0m	N/A	N/A
Low (L)	N/A	N/A	>10.0m	N/A	N/A

Notes: (1) N/A = not applicable.
(2) Precise permeability values cannot be given at present.
(3) Release point of contaminants is assumed to be 1-2 m below ground surface.

Table 1. Vulnerability Mapping Guidelines

Figure 7.4 Vulnerability Mapping Guidelines (Table 1 from Groundwater Protection Schemes, DoELG;EPA, GSI, 1999))

The GSI has assigned a groundwater vulnerability rating of "Extreme" (E) for the groundwater beneath the majority of the Proposed Development Site while a portion towards the eastern site boundary are assigned a rating of "Rock at or near Surface". Therefore the groundwater beneath the Site would be considered vulnerable to impact from any potential contaminant release to ground. The Groundwater Vulnerability is presented in Figure 7.5.

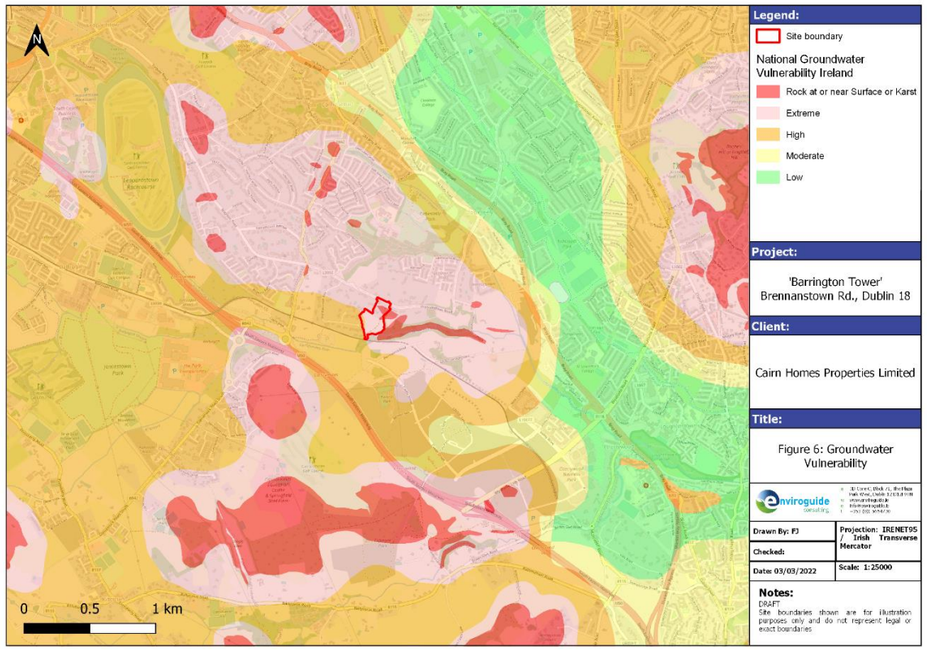

Figure 7.5: Groundwater Vulnerability

Recharge

The GSI groundwater recharge map provides an estimate of the average amount of rainwater that can potentially percolate down through the subsoils to the water table. Groundwater recharge amounts are estimated by considering soil drainage, subsoil permeability, thickness and type, the ability of the aquifer to accept the recharge, and the Met Éireann 30-year average rainfall and actual evapotranspiration for the period 1971-2000.

The GSI have calculated an effective rainfall (ER) value of 583.1mm/year and a recharge coefficient of 60% for the area of the Proposed Development Site (GSI, 2022).

The dominant recharge process expected across the Wicklow GWB is diffuse recharge from water percolating through the overlying tills and into the aquifer. High rates of potential recharge are expected in the hilly areas where there are very thin subsoils and high rainfall. A large portion of this potential recharge will be rejected as the bedrock is classified as a poor aquifer with low storativity. In addition, the steep slopes in the area will increase surface runoff. Therefore, the rapid runoff component to local streams is expected to be higher.

A recharge cap of 100mm/year has been applied to the majority of the Proposed Development Site as it is underlain by a poor aquifer which is generally unproductive except for local zones (PI), thereby indicating a low capacity of the aquifer at the Proposed Development Site to accept recharge via infiltration of rainfall.

Site Investigation Results

Site investigation including a geophysical survey (MGL, 2021), three intrusive ground investigation surveys (SIL, 2020; SIL, 2021 and PGL, 2022) which included the following:

- 23 No. cable percussive boreholes;
- 17 No. rotary boreholes;
- 22 No. trial pits;
- 4 No. infiltration tests;
- 2 No. foundation pits;
- 13 No. California Bearing Ration tests; and
- 4 No. Soil samples
- 6 No. rotary boreholes and monitoring well installations;
- 6 No. permeability tests;
- Groundwater level monitoring; and
- 2 no. groundwater samples for chemical analysis.

Soil and Geology

The detailed description of the soil and geology as encountered from the site investigations is presented in the Site Investigations Section in Chapter 6 of this EIAR and is described in summary below.

The subsurface ground conditions encountered during the geophysical and intrusive site investigations (SIL, 2021, SIL, 2020, MGL, 2021 and PGL, 2022) are summarised as follows:

- Topsoil and Made Ground to a maximum depth of 1.5mbGL overlying CLAY to a maximum depth of 5.7mbGL (BH10) and sandy GRAVEL beneath the clay at some localised areas along the northern, eastern and western boundaries (of the Proposed Development Site to a maximum depth of 2.9mbGL (TP20).;
- White to light brown, weathered granite bedrock was encountered between 0.3mbGL and 2.1mbGL in the south of the Site and between 0.9mbGL and 5.7mbGL in the north of the Site overlying competent granite bedrock. Based on the available data, rock head generally slopes to the southeast with rockhead elevation ranging from 75.35mOD along the northwest of the Site (RC08S) to 59.31mOD in the southern portion of the Site; and
- Bedrock was generally described as 'strong to very strong' and discontinuities were generally between sub-horizontal and 60 degrees with occasional subvertical discontinuities in the borehole logs (SIL, 2020; SIL, 2021).

Groundwater Levels and flow direction

As described in the Hydrogeological Assessment (Enviroguide Consulting, 2022) refer to Appendix 7-1) ground conditions were typically dry in the overburden with the exception of very localised occurrences within the upper 1.2-2.9mbGL of granular overburden in the north of the Site and at one located (TP08 (SIL, 2020)) in the western boundary.

Groundwater was encountered during borehole drilling within the fractured granite bedrock at depths of 9.5mbGL (63.939mODmOD (MW6)) and 13mbGL (62.612mOD (MW4)) during drilling (PGL, 2022).

Groundwater levels were recorded at the six monitoring wells (MW1 to MW6) as shown in Figure 7.6 and Table 7.5. A hydrograph for measured groundwater levels and rainfall data between the 4th February and 16th February 2022 is provided in Figure 7.7. The inferred groundwater flow is to the southeast towards the Carrickmines Stream (refer to Figure 7.6) and a slight upwards hydraulic gradient

was reported (Enviroguide Consulting, 2022). There is limited response to rainfall and longer term monitoring would be required to determine if there is a seasonal or temporal response to recharge events.
The calculated hydraulic gradient at the Site is of 0.082 m/m.

Monitoring Location ID.	Groundwater Level (mbTOC*) 16/02/2022	Groundwater Elevation (mOD)
MW1	4.52	61.106
MW2	6.31	59.918
MW3	9.2	60.04
MW4	4.36	71.432
MW5	2.04	71.45
MW6	1.77	71.669
*mbTOC= m below top of casing		

Table 7.5: Groundwater depth and elevations measured 16/02/2022

The hydraulic conductivity calculated from permeability tests completed at MW1 through toMW6 ranged from $7.65x10^{-8}$m/s to $1.98x10^{-6}$m/s with an average of $8.92x10^{-7}$m/s for wells installed in the bedrock and $4.89x10^{-6}$m/s for the well installed in overburden/weathered bedrock (MW5).

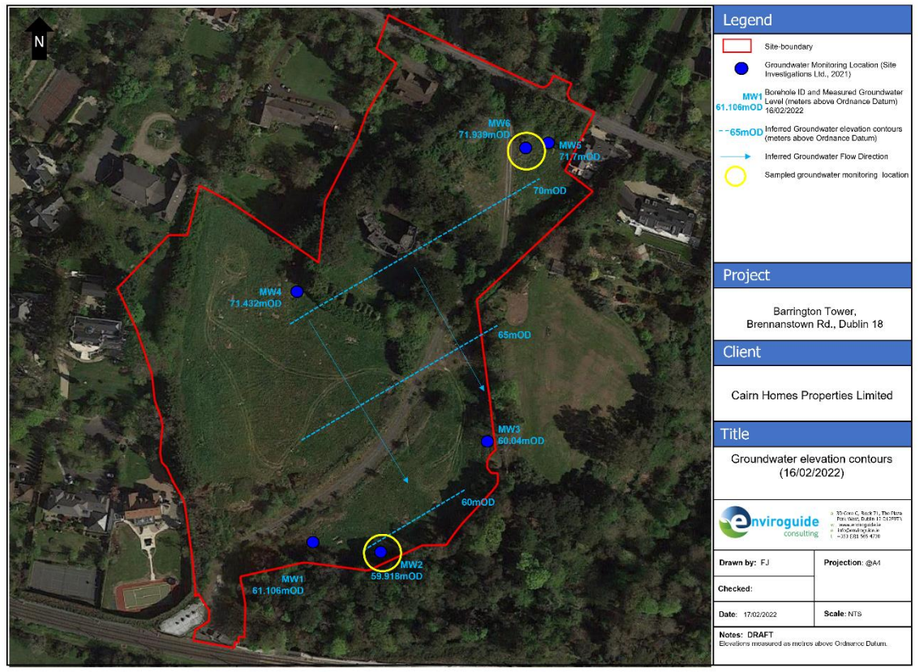

Figure 7.6: Groundwater elevation and inferred groundwater flow direction

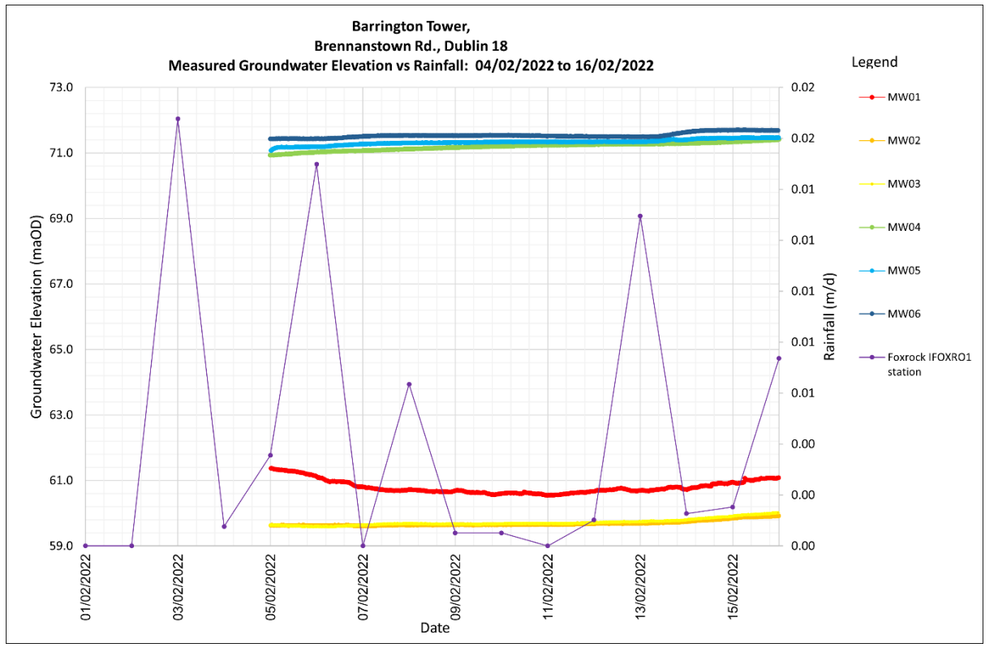

Figure 7.7: Groundwater Levels and Rainfall (04/02/2022 to 16/02/2022)

Groundwater Use and Source Protection
Within a 2km radius of the Proposed Development Site there is one (1 No.) groundwater source recorded approximately 0.8km southeast of the Site and thirty-four boreholes located between 1.85km and 2km north of the Proposed Development Site recorded for 'unknown' use (GSI, 2022). The historical 25 inch OSI map dated 1888-1913 indicates a 'well' is located along the eastern boundary within the Proposed Development Site however, this well was not identified during the walkover survey. The wells and springs located within 2km of the Proposed Development Site are presented in

Figure 7.8 and Figure 7.7.

There are no groundwater source protection areas identified within 2km of the Site (GSI, 2022).

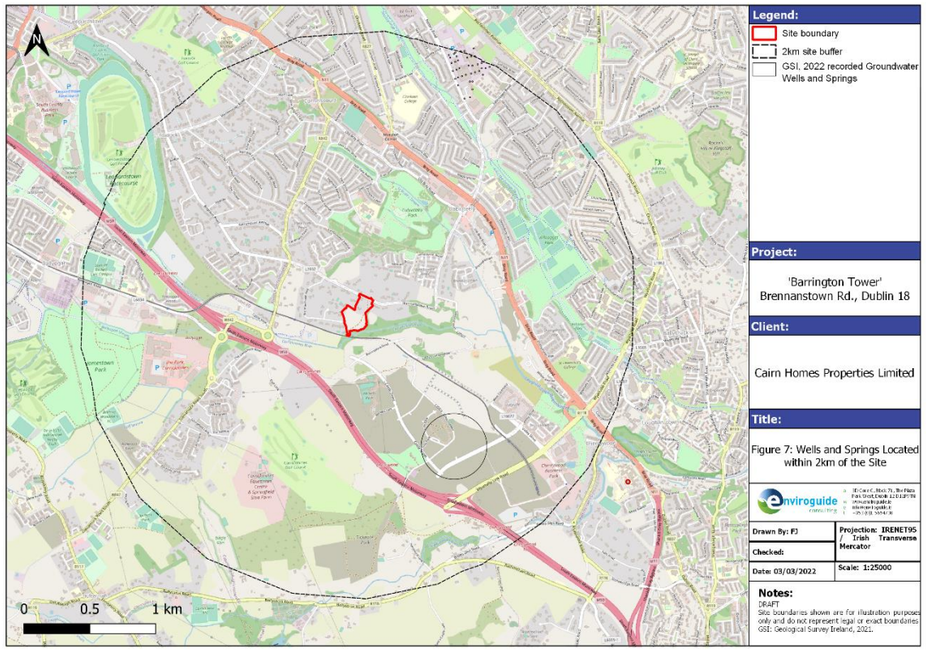

Figure 7.8: Wells and Springs located within 2km of the Proposed Development Site

Water Quality
Surface Water Quality

The EPA water quality monitoring data for the stations on the Carrickmines Stream located closest to the Site is summarised in Table 7.6.

EPA Monitoring Station name	Station Code	Location from Site	Distance from Site	Assigned Q value
Carrickmines Stream – Glenamuck Rd Br (Friarsland/Priorsland)	RS10C040200	West - upstream	0.55	3 "Poor"
Carrickmines Stream – Br Nr Glendruid Ho	RS10C040300	East – downstream	0.34	3-4 "Moderate"

Table 7.6: EPA monitoring stations and assigned Q values

The reported Q-value results indicate that water quality in the Carrickmines Stream in the vicinity of the Site is poor to moderate. The EPA data indicates that there is an upward trend in Total Ammonia and Ortho-phosphate (as P) for the water course for the period 2013-2018 (EPA, 2022). It is also noted that the Ballyogan Landfill facility (Licence Number W0015-01) is located upstream of the Site and the most recent available Annual Environmental Report (AER) for 2020 indicates no non-compliance issues for that reporting period.

The available 2020 AER for the Shanganagh WWTP indicates that discharges from the WWTP to the Irish Sea were compliant with the Emission Limit Values (ELVs).

Groundwater Quality

Published chemical data from EPA groundwater monitoring stations at Roundwood (Ashwood) (Station ID: GWIE_EA_G_07634000011) and Redcross (Station ID: GWIE_EA_G_076340000010) from the Wicklow groundwater body for the period of 2013-2018 shows an upward trend of results at both stations for Ammoniacal Nitrogen as N, Chloride and Ortho-phosphate however, the indicative quality status of each of these analytical results was "Good" (EPA, 2022).

Groundwater monitoring and sampling was undertaken at the Site as part of the site investigation and samples were collected on the 4th February 2022. Sample locations are shown on Figure 7.6. The laboratory analytical results are included in the documents provided in Appendix 6-1.

Groundwater quality results were screened against the relevant assessment criteria specified in the following regulations:

- SI. No. 122/2014 - European Union (Drinking Water) Regulations 2014 and amendments;
- S.I. No. 9/2010 - European Communities Environmental Objectives (Groundwater) Regulations 2010 and amendments; and
- S.I. No. 272/2009 - European Communities Environmental Objectives (Surface Waters) Regulations 2009 and amendments.

The analytical results for Total Petroleum Hydrocarbons were reported below the laboratory limits of detection. Analytical results for all other parameters were reported as detected (i.e. above laboratory limits of detection) were within the applicable limits specified in the Drinking Water, Groundwater and Surface Waters regulations as listed above.

Conceptual Site Model
Regional Hydrogeology

The bedrock aquifer beneath the Site is within the Wicklow GWB (EU Code: IE_EA_G_076). The Wicklow GWB covers some 1396km2 and occupies an area across Co. Dublin, Co. Wicklow and Co. Wexford (GSI, 2022).

The GSI description of the Wicklow GWB identifies that the dominant recharge process will be diffuse recharge from water percolating through the overlying tills and into the aquifer. High rates of potential recharge are expected in the hilly areas where there are very thin subsoils and high rainfall. A large portion of this potential recharge will be rejected because the rocks in this area are considered to be poor aquifers with low storativity. In addition, the steep slopes in the area will increase surface runoff. Therefore, the rapid runoff component to streams will be higher.

Groundwater flow is considered to recharge and discharge on a local scale. Groundwater discharges to the numerous small streams crossing the aquifer, to springs and seeps and also directly to the Irish Sea (GSI, 2022). The GSI (Wicklow GWB Report) identifies that the majority of groundwater flow direction in the aquifer will take place in the upper weathered of the rocks with lateral flow towards discharge points to rivers, streams and towards the coast. Where structural deformation is greater may be a flow within a fracture network which will allow groundwater movement at greater depths. Only flow in isolated fractures is expected below 30m depth.

Site Hydrogeology

The measured groundwater level in monitoring wells installed in bedrock beneath the Site ranged from 71.669mOD at MW6 in the north 59.918mOD at MW2 in the south of the Site with an inferred groundwater flow direction to the southeast toward the Carrickmines Stream.
Shallow groundwater in soil and overburden was generally not identified at the Site with predominantly dry ground conditions in soil and overburden with the exception of a very localised area in the northeast of the Site adjoining the boundary with Brennanstown Road in the north of the Site (TP18, TP19, TP08, MW5 and MW6) and an isolated occurrence at the Southwest boundary (TP21) where shallow groundwater was encountered in the upper 2.9mbGL. Groundwater was encountered during borehole drilling within the fractured bedrock at depths of 9.5mbGL (63.939mODmOD (MW6)) and 13mbGL (62.612mOD (MW4)) during drilling (PGL, 2022).
There is limited capacity in the granite bedrock aquifer of the Wicklow GWB to accept recharge (GSI, 2022). Overland flow with limited infiltration to ground and bedrock and groundwater flow through fracture zones in bedrock are the dominant mechanisms for transport of water through the Site. Surface water as overland flow will discharge to the Carrickmines Stream. Groundwater flow as identified will flow towards and likely discharge to the Carrickmines Stream.

Water Framework Directive Status

The Waterbody Status for river, groundwater, transitional and coastal water bodies relevant to the Site as recorded by the EPA (2022) in accordance with European Communities (Water Policy) Regulations 2003 (SI no. 722/2003) are provided in Table 7.7.

The regulation objectives include the attainment of good status in waterbodies that are of lesser status at present and retaining good status or better where such status exists.

Waterbody Name	Water body; EU code	Location from Site	Distance from Site (km)	WFD water body status (2013-2018)	WFD 3rd cycle Risk Status	Hydraulic Connection to the Site
Surface Water Bodies						
Carrickmines Stream	IE_EA_10C040350; 10C04	South	0.05	Moderate	At risk	Downstream of Site
Shanganagh River	IE_EA_10S010600; 10S01	South-east	2	Moderate	At risk	Downstream River Network to the Carrickmines Stream
Carrickmines Great Stream	10C66	South-west	0.74	Moderate	At risk	Upstream tributary of the Glenamuck North Stream
Glenamuck North Stream	10G19	South-west	1.37	Moderate	At risk	Upstream tributary of the Carrickmines Stream
Jamestown 10 Stream	10I01	South-west	1.37	Moderate	At risk	Upstream tributary of the Glenamuck North Stream
Barnacullia River/ Ballyogan Stream	10B99	West	0.985	Moderate	At risk	Upstream tributary of the Carrickmines Stream
Cabinteely Stream	IE_EA_10K020200; 10K02	North	0.75	Moderate	At risk	Downstream tributary of the Carrickmines Stream
Laughlanstown Stream	10L07	East	0.125	Moderate	At risk	Upstream tributary of the Carrickmines Stream
Coastal Water Bodies						
Southwestern Irish Sea – Killiney Bay (HA10)	IE_EA_100_0000	East	3.28	Good	Not at Risk	Downstream waterbody to the Carrickmines Stream and Shanganagh river waterbodies
Groundwater Bodies						
Wicklow Groundwater Body	IE_EA_G_076	N/A	N/A	High	Review	Underlying groundwater-body

Table 7.7: WFD Risk and Water Body Status

It is indicated that the "Poor" quality status assigned to the Carrickmines Stream and the Shanganagh River are related to an upward trend in Total Ammonia and Orthophosphate (as P) as recorded at the surface water monitoring stations along these water bodies for the period of 2013-2018 (EPA, 2022).

Designated and Protected Sites

The Habitats Directive (92/43/EEC) seeks to conserve natural habitats and wild fauna and flora by the designation of Special Areas of Conservation (SACs) and the Birds Directive (2009/147/EC) seeks to protect birds of special importance by the designation of Special Protection Areas (SPAs). SACs and SPAs are collectively known as Natura 2000 or European sites (referred to hereafter as Natura 2000 sites).

The relevant SACs and SPAs located within a 15km radius of the site are presented in Figure 7.9.

There is a potential direct hydraulic connection with identified Natura 2000 sites in the Irish Sea via the Carrickmines Stream that discharges to the Shanganagh River and ultimately discharges to the Irish Sea at Hackett Island Bay Beach (EPA, 2022). There is a potential direct hydraulic connection with the Dalkey Island SPA (Site Code:004172), with the Rockabill to Dalkey Island SAC (Site Code:003000) and the Bray Head SAC (Site Code:000714) which are located approximately 3.26km north, 1.5km east and 5.62km south respectively from where the Shanganagh River discharges to the Irish Sea.

The Shanganagh River, into which the Carrickmines Stream discharges, flows through the Loughlinstown Woods Proposed Natural Heritage Area (pNHA),

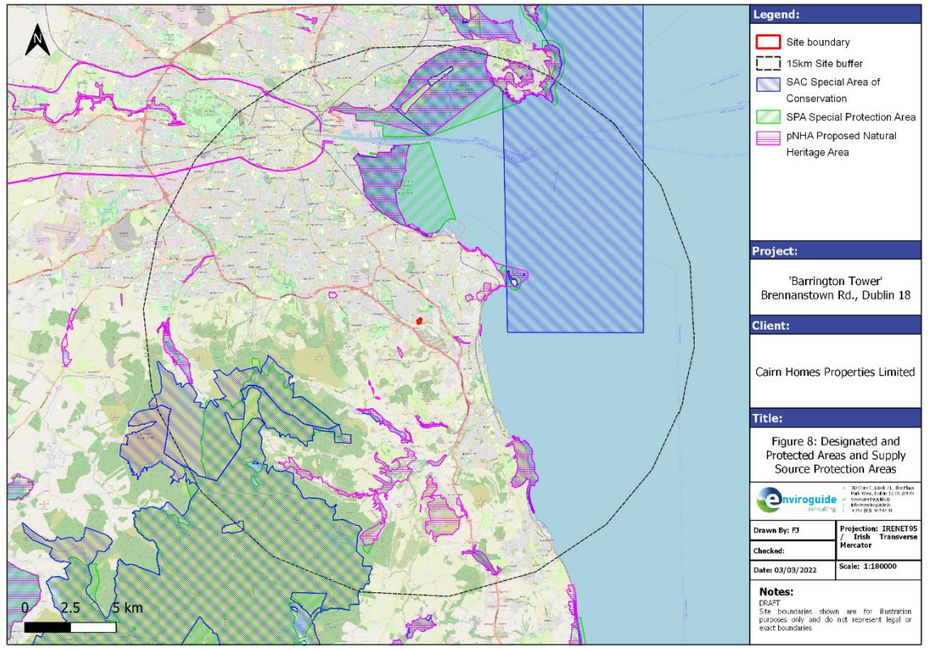

Figure 7.9: Designated and Protected Areas and Supply Source Protection areas

Flood Risk
A Site-Specific Flood Risk Assessment (SSFRA) Report (Waterman Moylan, 2022) has been produced for the Proposed Development Site.

The SSFRA concludes that the likelihood of tidal flooding is 'extremely low' and no mitigation is required. Similarly, there is no mitigation required for fluvial flooding with a 'moderate' likelihood of occurrence identified with an 'extremely low' residual risk and therefore no mitigation is required.

The SSFRA identifies that there is a 'high' likelihood of pluvial (private and public drainage network) and mechanical / human error (drainage network). Mitigation measures outlined to address the potential risk of pluvial flooding including appropriate drainage design, overland flood routing and setting of appropriate floor levels. The SSFRA notes that the flood risk is mitigated by providing attenuation for the development which can store water for the 1 in 100-year storm event plus a 20% allowance for climate change'. (Waterman-Moylan, 2022b). Appropriate maintenance strategy for the drainage network is also required to mitigate flood risk.

The likelihood of groundwater flooding is identified as 'high' with seepage into the basement identified. The residual risk is identified as 'low' with appropriate mitigation measures including adequate waterproofing of the basement structure if necessary (Waterman-Moylan, 2022b).

The SSFRA concludes that 'Considering the assessment of the likelihood, consequence, risk and residual risk of the development for various modes of flooding, the proposed development is considered acceptable in terms of flood risk.' The residual flood risk based on the design proposals for the Proposed Development ranges from 'Low' to 'Extremely Low' (Waterman-Moylan, 2022b).

Importance and Sensitivity of Receiving Environment
In accordance with the criteria outlined in Table 7.1and taking account of the hydrogeological setting of the Site, the attributes are considered to be of "Low" importance based on the classification as a Poor Aquifer and limited resource potential.

The water receiving water bodies have been assigned a WFD Status of 'high' for groundwater, 'good' for coastal and 'moderate' for the surface water bodies immediately downstream of the Site (i.e. the Carrickmines Stream and Shanganagh River). Therefore, the receiving surface water bodies are considered sensitive receptors.

7.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed 'Build-to-Rent' (BTR) development will consist of the construction of 8 no. blocks in heights up to 10 storeys comprising 534 residential units, a creche, a retail unit, residential support facilities and residential services and amenities. The proposal also includes car and cycle parking, public and communal open spaces, landscaping, waste management areas, plant areas, substations, switch rooms, and all associated site development works and services provision. A full description of the development is provided in the statutory notes and in Chapter 3 of the EIAR submitted with this application.

The Proposed Development will include:

- bulk excavation of 65,100m^3 soil and bedrock
- construction of two storey basement beneath the southern portion of the Site with floor level of 66.175mOD (Reddy Architecture + Urbanism Ltd. Drawing No.: BRT-1-02-SW-ZZZ-DR-RAU-AR-1003;
- construction of surface water drainage including attenuation tanks with invert levels of 73.125mOD in the north and between 64.650mOD beneath the basement and 62.150mOD and 64.05mOD in the south of the Site (Waterman Moylan, 2022; Drg No P200);
- construction of a surface water outfall at the Carrickmines Stream; and
- construction of foul drainage with connection to the existing foul sewer located approximately 120m to the south of the Proposed Development Site.

Surface water at the Site will be managed in accordance with the Greater Dublin Strategic Drainage Study (GDSDS) Regional Drainage Policies Volume 6, for New Developments and CIRIA documents and the use of Sustainable Urban Drainage Systems (SUDS) to control run-off from the Site. (Waterman-Moylan, 2022)

All surface water will be collected and treated through the following SUDS:

- Green roofs to be incorporated into the roof design at Block C/D, Block E, Block F, Block G, Block H, Block I and Block J;
- Permeable pavements at surface level at carparking areas to provide treatment and storage to rainwater falling from these areas;
- Swales for access road surface water treatment, to treat water at source before discharge to the onsite hydrobrake and attenuation system before discharge to the Carrickmines Stream;
- Filter drains for the footpaths at surface level to treat surface water at source before directing it to the drainage network;

All surface water collected onsite will be treated and attenuated prior to discharge to the Carrickmines Stream as follows:

- The installation of a full retention Class 1 interceptor trap upstream of the proposed attenuation tank to filter hydrocarbon pollutants from rainwater runoff.
- The installation of an underground sealed attenuation tank system with four concrete tanks located on landscape areas and one concrete tank below the basement slab of Block G in the central portion of the Proposed development Site to create temporary storage of surface water before controlled release to the Carrickmines Stream; and
- The installation of a hydrobreak to control the discharge of surface water to the Carrickmines Stream.

It is proposed to discharge treated surface water from the Proposed Development Site into the Carrickmines Stream, located south of the site (at a rate equivalent to the existing agricultural runoff). This will include a connection from the southern site boundary and the installation of a prefabricated headwall in the bank of the Carrickmines Stream at a point located approximately 0.05km south of the Proposed development Site (Waterman Moylan Drawing Ref: BRR-WM-ZZ-00-DR-C-P200, 2022).

Runoff from within the basement will be collected in the basement drainage network and will discharge to a petrol interceptor prior to discharge to the foul drainage network at manhole FMH07.

New foul water drainage will be constructed at the Proposed development Site. A connection will be made to the existing 225mm/300mm gravity sewer line located approximately 120m south of the Site. As specified in the Engineering Assessment Report (Waterman Moylan, 2022a) Irish Water responded with the Confirmation of Feasibility (COF) on 4th February 2022, with reference no. CDS2000317, stating that an upgrade of the existing 225mmØ and 300mmØ gravity sewer (from the development connection point up to the 900mm trunk sewer) may be required. Any upgrade works will be confirmed following future surveys to be undertaken to establish the integrity and capacity of the existing foul sewer line. The developer will be required to fund any works. It is understood that this foul sewer connects to the Shanganagh Waste Water Treatment Plant (WWTP) (License ref.: D0038-02) located approximately 3.17km east of the Site in Bray (GSI, 2022).

Shanganagh WWTP, located in Bray, discharges treated effluent via the primary discharge (SW001) [long sea outfall] and via the secondary outfall (short sea outfall) (SW002) to the Irish Sea.

It is proposed to supply the Proposed Development Site from watermains using 200mm connections which will connect to the existing 6-inch uPVC watermain which is located along the Brennanstown road at northern boundary of the Proposed Development Site. Irish Water provided a response dated 4th February 2022 states connection to the water supply network is feasible and will not require upgrades (Ref: CDS22000317) for the connection as specified in the Engineering Assessment Report (Waterman Moylan, 2022a).

7.5 POTENTIAL IMPACTS

Construction Phase

Basement Construction and Dewatering

Excavation of subsoil and bedrock will be required for the construction of the basement and drainage including the underground attenuation tanks and associated drainage. Based on the recorded groundwater elevations at groundwater monitoring wells across the Proposed development Site, groundwater will likely be encountered during basement construction of blocks H, I and J where groundwater elevation of 71.432mOD at MW4 was recorded in the vicinity of basement and attenuation tank excavation locations which have a floor-level elevations of between 64.65mOD at the base of the attenuation tank and 67.125mOD at the basement level of Block J.

Where water must be pumped from the excavations, water will be managed through dewatering and water treatment methodologies. It is expected that the impact of dewatering of the fractured aquifer will include a local reduction of groundwater levels in the bedrock aquifer on a temporary, short-term basis. A dewatering strategy will be developed as part of the detailed design and will be managed by the appointed contractor to ensure that the zone of influence of dewatering will be negligible. There will be no expected impact on regional groundwater flows or shallow perched water in the overburden and the associated environmental receptors.

Where required, measures such as piled walls, to enable working in dry conditions and minimising the volume of water required to be pumped and treated from excavations, will be incorporated in the detailed geotechnical design for construction work. A piled wall or similar structure may be constructed around the perimeter of the basement and attenuation tank as part of sequencing of the bulk excavation and construction and will be determined as part of the detailed design.

The impacts of dewatering on the groundwater levels and flow are therefore considered to be within a very localised area of the aquifer with a 'negative', 'slight' and 'temporary'.

In-stream works

The Proposed Development will include the installation of surface water drainage at the Site which will be discharged to the Carrickmines Stream from the southern site boundary. The installation of a prefabricated headwall to discharge the surface water into the stream will be required at one location along the Carrickmines Stream as part of the design which will require in-stream works during the installation.

There may be a requirement for concrete pours and the use of cementitious materials during the installation and construction of the surface water drainage structure and while this will take place on the banks, there is a potential risk to the receiving water quality associated with works near watercourses.

The proposed design of the surface water discharge design will not require temporary diversion of water courses. There is a potential for disturbance of the stream banks and increased suspended solids in the Carrickmines Stream water courses and to watercourses downstream of the works. This could potentially cause a 'negative', 'moderate' 'medium term' impact on the quality of the receiving watercourse and downstream waterbodies.

Bulk Excavation

Excavation of in-situ soil, subsoil and bedrock will be required to achieve the foundation levels of the Proposed Development units including the basements of Block E, Block G and Block J and to the base of the underground attenuation tank at the Proposed Development Site. Where possible, suitable surplus soil will retained for re-use at the Site as fill material and for landscaping purposes.

There is a potential that groundwater may be encountered during excavation and where not encountered the vulnerability of groundwater could be impacted by removal of overburden, The potential impacts on groundwater quality and flow regime are assessed under the relevant headings within this Section 7.5.

Any surplus soil not suitable for re-use as a by-product and other waste materials arising from the Construction Phase will be removed offsite by an authorised waste contractor and sent to the appropriately authorised (licensed/permitted) receiving waste facilities. As only authorised facilities will be used, the potential impacts on the receiving water environment will have been adequately assessed and mitigated as part of the statutory consent procedures. It is considered that offsite removal of surplus soil will have an 'indirect', 'neutral', 'slight' and 'permanent' impact on receiving sites and facilities.

In the unlikely event that surplus soil is directed to an unauthorised disposal site there is potential to impact on the receiving hydrogeology at that location. As the soil at the Site is generally greenfield and identified to be generally free of anthropogenic contamination, the event of such a scenario could result in a 'negative', 'slight' and 'medium-term' impact on the hydrogeology at any receiving unauthorised sites.

Importation of Soil and Aggregate

Where possible, suitable surplus soil from excavation works will be reused as fill and for landscaping at the Proposed Development Site to minimise the requirement for imported fill materials. In order to minimise the requirement to import virgin quarried materials, recycled aggregates will be used where available and subject to meeting specified design requirements and all construction and environmental legislation. This will include, where suitable, by-products that meet the legislative requirements of Article 27 and other applicable statutory requirements.

Therefore, it is considered that the potential for importation of contaminated or uncertified materials would not occur, however in the unlikely event that such materials are imported there would be a 'direct', ''negative', 'moderate to significant' and 'long term' impact at the Proposed Development Site.

Concrete Works and use of Cementitious Material

There is a potential risk associated with the cementitious materials used during construction works including piling, basement and attenuation tank construction, foul water drainage, surface water discharge drainage, permeable pavements and other structures impacting on the underlying groundwater at the Site which may result in a 'negative', 'significant' and 'medium-term' impact on the receiving water environment at the Site of the Proposed Development.

Surface and Ground Water Quality

Groundwater dewatering will be required during the bulk excavation for the basement construction. There will be no direct discharge of groundwater to water courses. However, there is a potential risk of accidental release of untreated water containing suspended sediments during dewatering to with potential impacts on the receiving water environment .

Groundwater impacts could occur during site construction activities including bulk excavation, piling and other groundworks. Noting the GSI delineation of the 'extreme' vulnerability rating for the aquifer as well as site specific data on depth to groundwater, nature of the poor aquifer within the granite bedrock with limited potential to accept infiltration, and the slight upwards hydraulic gradient it is considered that there is some protection of groundwater from migration of dissolved phase contaminants from the ground surface. However, in a worst-case scenario such as a fuel spill within a deeper excavations where groundwater may be encountered there could be potential for migration of contaminants into the bedrock aquifer.

There is a potential risk for the mobilisation or introduction of contaminants (i.e. grout, drilling fluids) during piling works whereby a preferential conduit for contaminants to migrate downwards to groundwater could be introduced.

In the event of such worst case scenarios occurring it is considered that this could result in a 'negative', 'significant', 'long term' impact on groundwater quality

If the accidental release of hazardous material including fuels, chemicals and materials being used on-site, through the failure of secondary containment or a materials handling accident on the Proposed Development Site, were to occur over open ground then these materials could infiltrate to the underlying groundwater or enter groundwater via excavations. In addition, if an accidental release occurred from plant or equipment during the instream works for the outfall to the Carrickmines Stream, there would be an impact on the receiving water quality within the watercourse and downstream water bodies. In particular taking account of the potential limited capacity for attenuation due to the baseline water quality and potential for in-combination effects with other developments and facilities within the catchment of the water course including the Ballyogan Landfill site. In the event of a worst-case unmitigated scenario such as an accidental fuel spill or release of sediment during construction of the outfall at the Carrickmines Stream, this would have a potential to impact on the receiving water quality. In the event of such worst case scenarios occurring it is considered that this could result in a 'negative', 'significant', 'long term' impact on the quality of the receiving water course depending on the nature of the incident.

Water Framework Directive Status

There is a potential risk to water quality during the works that could potentially impact on the WFD status of the receiving water bodies.

The groundwater body quality status for the Wicklow GWB has been assigned an overall 'Good' WFD status (for the period 2013-2018) and in the absence of any avoidance and mitigation measures to prevent or limit impact groundwater quality there could potentially be a 'negative', 'significant' and 'long-term' impact on the WFD status of the groundwater body.

Surface runoff of deleterious material including fuels and materials being used on-site during the construction works could potentially impact the receiving water quality in the Carrickmines Stream. There could potentially be a 'negative', 'significant' and 'long-term' impact on the WFD status of the downstream Carrickmines Stream, Shanganagh River and potentially the receiving Irish Sea coastal water body.

Operational Phase

Surface and Ground water quality

There will be no risk to water quality including groundwater and surface water associated with the Operational Phase of the Proposed Development. It is considered that the design of the Proposed Development is in line with the objectives of the Water Framework Directive (2000/60/EC) to prevent or limit any potential impact on water quality.

There will be no petroleum hydrocarbon-based fuels used during the operational phase> and the main operating system for heating will be gas based, thereby removing any potential contaminant sources associated with fuels.

There will be no discharges to ground from drainage and only surface water and storm water drainage from across the Site, from drainage in open spaces, carparking areas and pavements will be discharged to the Carrickmines Stream following filtration and discharge from the attenuation tank.

The surface water drainage design incorporating SUDS (Waterman Moylan, 2021) includes a number of measures that will capture any potentially contaminating compounds (petroleum hydrocarbons, metals, and suspended sediments) in surface water runoff from roads and the impermeable areas that could potentially otherwise discharge to groundwater or the water courses within the Site and adjoining. The measures incorporated in the SuDS design include filter drains, swales, hydrobrake and petrol interceptor and an underground attenuation tank within the drainage and SuDS system and will be effective in treating in removing any contaminants (polycyclic aromatic hydrocarbons (PAHs) and suspended solids) entrained in surface water runoff.

Accordingly, any potential impact on receiving surface water and groundwater beneath the Proposed Development Site will be avoided taking account of the design proposals. Therefore, it is considered that the water quality protection criteria and objectives of the GDSDS and Water Framework Directive will be achieved.

Groundwater Flow Regime
There will be no groundwater abstractions for the Operational Phase of the Proposed Development.

The basement and subsurface structures which will be water-tight and impermeable and will be constructed with FFL between 62.150mOD – 74.9mOD that will potentially intersect seasonally high groundwater levels in the central portion of the Site (71.432mOD at MW4 16th February, 2022) which may cause the basement, the underground attenuation tank and other subsurface structures to impede groundwater flow in localised portions of the Site. The detailed design will include appropriate groundwater drainage around the basement to prevent impeding groundwater flow across the site.

Overall it is considered that any impact on the groundwater flow regime is unavoidable however will be 'negative', 'slight', 'temporary' within a very localised zone of the bedrock aquifer and this will be managed through appropriate design.

7.6 POTENTIAL CUMULATIVE IMPACTS

The following granted developments were considered in the assessment of potential cumulative impacts. Any existing developments are considered within the assessment of the baseline condition.

- Brennanstown Wood Residential Development (ABP reference: ABP-301614-18, Decision: Granted 31st August 2018)
  Viscount Securities were granted planning permission for a strategic housing development at Brennanstown Road, Dublin 18 for 136 number residential units, comprising of 98 number apartments and 38 number houses. A 195 square metre creche facility and play area is proposed on the lower ground floor of Block 1. The development includes 227 number car parking spaces at basement / lower ground floor and surface level.

- Doyle's Nursery (ABP reference: ABP-305859-20, Decision: Granted 25th June 2020)
  Atlas GP limited were granted planning permission for the Demolition of 'Benoni' and extant single storage buildings, construction of 234 no. apartments, creche and associated site works.

Surface runoff of deleterious material entrained including suspended sediment, fuels and materials being used on-site during the construction works could potentially impact the receiving water quality in the Carrickmines Stream. It is considered that there is limited capacity for attenuation within the Carrickmines Stream taking account of the baseline water quality and potential for in-combination effects with other activities and development sites within the catchment of the water including the developments identified above. It is noted that the Ballyogan Landfill and Recycling Facility, located upgradient of the Proposed Development Site and upstream of the Carrickmines Stream, is operated in accordance with the conditions of waste licence No. W0015-01 and was considered within the baseline conditions for this assessment.

The Proposed Development will be connected to the existing water main serving the area. It is proposed to be connected to the Site via 2 No. 150mm connections to an existing 6-inch uPVC watermains located north of the Site at Brennanstown Road. Irish Water confirmed in the response to the pre-connection enquiry (Ref:CDS22000317) dated 4th February 2022 that the water connection is feasible without infrastructure upgrade. The Irish Water network will be operated in accordance with relevant existing statutory consents therefore there will be no cumulative impacts associated with the Proposed Development on water demand

There are no other identified cumulative impacts water associated with the Proposed Development.

7.7 MITIGATION MEASURES

The following ameliorative, remedial and reductive measures will ensure that there will be no significant impact on the receiving groundwater and surface water environment. Hence, the Proposed Development will not have any impact on compliance with the EU Water Framework Directive, European Communities (Environmental Objectives) Surface Water Regulations, 2009 (SI 272 of 2009, as amended 2012 (SI No 327 of 2012), and the European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010), as amended 2012 (SI 149 of 2012) and 2016 (S.I. No. 366 of 2016).

Construction Phase
All construction activities will be managed in accordance with detailed procedures to be prepared by the appointed contractor taking account of the requirements of the Construction Environmental Management Plan (CEMP) (AWN Consulting Limited, 2022) for the Proposed Development and the design avoidance and mitigation measures outlined in this EIAR Chapter.
Surface and Groundwater Management
It is expected that groundwater will be encountered during the construction works in particular the excavation for the basement, underground attenuation tank and other structures in the central portion

of the Site. Where working in the dry is required, impermeable barriers may be considered by the contractor methodology. As outlined in Section 7.5 there may be a localised impact on groundwater levels with localised mounding of groundwater levels if any such impermeable barriers are used. The Hydrogeological Assessment (Enviroguide Consulting, 2022) (refer to Appendix 7-1) identifies that incorporating standard construction and drainage measures such as groundwater drainage layers around impermeable subsurface structures will minimise impacts of groundwater mounding.

The dewatering methodologies implemented by the contractor will ensure that the identified potential localised impact on the local groundwater levels and flow regime is prevented. Therefore, there will be no impact on habitats and receptors along Site boundaries and offsite associated with any required dewatering.

The methodologies to be implemented by the contractor could include the requirement for discharge of groundwater downgradient of the dewatering works area to minimise any hydrogeological impact on sensitive receptors. Where water is pumped from the excavations, water will be managed through robust dewatering and water treatment methodologies in accordance with best practice standards (CIRIA – C750) and regulatory consents. Discharge of groundwater to ground as part of the dewatering will be undertaken in accordance with the EPA (2011) '*Guidance on the Authorisation of Discharges to Groundwater*'.

Where necessary, the water from dewatering or works areas will be stored and treated onsite (e.g. in settlement/filtration tanks or hydrocarbon separation systems as appropriate) to remove sediment or other potentially contaminating compounds. In the even that treated water is unsuitable for discharge to ground in accordance with EPA guidance (EPA, 2011) water will tankered offsite or discharged to foul sewer under consent of from Irish Water in accordance with Local Government (Water Pollution) Act 1977, as amended. Any such discharge to sewer is likely to be subject to conditions regarding the flow (rates of discharge, quantity etc.); effluent quality prior to discharge and pre-treatment and monitoring requirements.

Straw bales or silt fences will be appropriately located near water-courses to prevent untreated surface and surface water run-off entering any watercourse. A buffer zone of 10m will be established between the silt trap and the watercourse with natural vegetation left intact. The Contractor will be required in accordance with the CEMP to ensure that no contaminated water/liquids leave the Proposed Development Site (as surface water and surface water run-off or otherwise), enter the local drainage system or direct discharge drainage ditches or water courses.

A regular review of weather forecasts of heavy rainfall will be conducted during works, and a contingency plan will be prepared for before and after such events to minimise any potential nuisances. As the risk of the break-out of silt laden run-off is higher during these weather conditions, no work will be carried out during such periods where possible.

Any erosion control measures (i.e. silt-traps, silt-fencing and swales) will be maintained during the Construction Phase.

If a discharge licence is obtained from Irish Water for discharges to sewer, specified monitoring will be undertaken by the contractor in accordance with the licence conditions.

Groundwater level monitoring prior to construction is recommended to ensure up to date information on groundwater levels is compiled prior to commencing construction.

Management of In-stream Works
A 10m buffer will be retained on either side of the Carrickmines Stream south of the Proposed Development Site and construction works and site traffic will only be permitted within this 10m buffer to facilitate instream works to enable construction of the outfall drainage to the Carrickmines Stream.

All instream works or works carried out adjacent to the watercourse, will follow the guidelines published by Inland Fisheries Ireland (IFI) Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters (2016) and The National Roads Authority (now Transport Infrastructure Ireland) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes.

Surplus Soil and Stone
Surplus soil and stone materials will be stockpiled pending removal offsite or reuse onsite and will be located in in designated areas that will be identified in the contractor's CEMP. There will be no storage of materials within 10m of any surface water features/drainage/ditches. Where necessary, stockpiles will be surrounded with silt fencing to filter out any suspended solids from surface water arising from these materials.

Importation of Soil and Aggregate
Contract and procurement procedures will ensure that all aggregates and fill material required are sourced from reputable suppliers operating in a sustainable manner and in accordance with industry conformity and compliance standards and statutory obligations.
The importation of aggregates will be subject to management and control procedures which will include testing and assessment of the suitability for use in accordance with engineering and environmental specifications for the Proposed Development including the suitability of material that may be imported in accordance with an Article 27 By-Product Notification. Therefore, any unsuitable material will be identified and avoided prior to importation to the Site.

Concrete Works and use of Cementitious Material
The use of cementitious grout to be used during the construction of the basement and drainage channels and connections to Carrickmines Stream south of the Site, will avoid any contamination of ground through the use of appropriate design and methods implemented by the Contractor and in accordance with industry standards.

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

If cast-in-place concrete or grout is required, all work will be carried out in dry conditions and be effectively isolated from any water courses or drainage ditches. Pouring of concrete for aprons, sills, and other works should be carried out in dry conditions and allowed cure for 48 hours before re-flooding. Pumped or tremied concrete should be monitored carefully to ensure no accidental discharge into the watercourses. Concrete works for in-stream works will be carried out in accordance with the procedures outlined above under "Management of In stream Works".

Piling Methodology

The proposed piling methodology will minimise the potential for introduction of any temporary conduit between surface and potential sources of contamination at the ground surface and underlying groundwater. The piling method will be determined by the contractor however the method will include procedures to ensure any potential impact to water quality is prevented. These will include preventing surface runoff or other piling/drilling fluids from entering the pile bores. Where there is a requirement to use lubricants, drilling fluids or additives the contractor will be required to use water-based, biodegradable and non-hazardous compounds.

Boreholes

Existing monitoring boreholes that are no longer required at the Site will be decommissioned in accordance with the specifications outlined in EPA Advice Noted 14 (EPA, 2013). This will remove any potential direct conduit for contaminants to enter the groundwater directly.

Handling of fuels and Hazardous Materials

Fuel, oils and chemicals used during construction are classified as hazardous.

Storage of fuel hazardous will be undertaken with a view to protecting any essential services (electricity, water etc.) and the receiving water environment.

Bulk quantities of fuel will not be stored at the Site and fuel required for plant and equipment will be delivered directly from a delivery tanker. Fuel will only be stored in the quantities required for emergency use.

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

All drums to be quality approved and manufactured to a recognised standard. If drums are to be moved around the Site, they will be secured and moved on spill pallets. Drums will be loaded and unloaded by competent and trained personnel using appropriate equipment.

- Bunds will comply with the requirements of Environmental Protection Agency guidelines 'Storage and Transfer of Materials for Scheduled Activities' (EPA, 2004) and Enterprise Ireland. Best Practice Guide BPGCS005. Oil Storage Guidelines. All tank and drum storage areas will, as a minimum, be bunded to a volume not less than the greater of the following:
- 110% of the capacity of the largest tank or drum within the bunded area; or
- 25% of the total volume of substance that could be stored within the bunded area.
- Vehicle or equipment maintenance work will take place in a designated impermeable area within the Site;
- Emergency response procedures will be put in place, in the unlikely event of spillages of fuels or lubricants;
- Spill kits including oil absorbent material will be provided so that any spillage of fuels, lubricants or hydraulic oils will be immediately contained;
- In the event of a leak or spill from equipment in the instance of a mechanical breakdown during operation, any contaminated soil will be removed from the Site and compliantly disposed off-site. Residual soil will be tested to validate that all potentially contaminated material has been removed. This procedure will be undertaken in accordance with industry best practice procedures and EPA guidelines;
- Site staff will be familiar with emergency procedures for in the event of accidental fuel spillages; and
- All staff on-site will be fully trained on the use of equipment to be used on-site.
- Portable generators or similar fuel containing equipment will also be placed on suitable drip trays or bunds.

Refuelling of plant and vehicles during the Construction Phase will only be permitted at designated refuelling station locations onsite. Each station will be fully contained and equipped for spill response and a specially trained and dedicated Environmental and Emergency Spill Response team will be appointed by the Contractor before the commencement of works onsite.

A procedure will be prepared by the appointed contractor which will be adhered to during refuelling of on-site vehicles and plant. This will include the following:

- Fuel will be delivered to plant on-site by dedicated tanker;
- All deliveries to on-site vehicles will be supervised and records will be kept and retained onsite of delivery dates and volumes;
- The driver will be issued with, and will carry at all times, absorbent sheets and granules to collect any spillages that may accidentally occur;
- Where the nozzle of a fuel pump cannot be placed into the tank of a machine then a funnel will be used; and
- All re-fuelling will take place in a designated impermeable area to be specified by the contractor. In addition, oil absorbent materials will be kept on-site in close proximity to the re-fuelling area.

Welfare Facilities

Welfare facilities have the potential, if not managed appropriately, to release organic and other contaminants to ground or surface water courses. All waste from welfare facilities will be managed in accordance with the relevant statutory obligations through either a temporary connection to mains foul sewer (subject to receipt of the relevant consent from IW) which will be constructed in accordance with IW and DLRCC guidelines or by tankering of waste offsite by an appropriately authorised waste contractor.

Operational Phase

The design for the basements will incorporate groundwater drainage to prevent any issues associated with localised groundwater mounding and hydrostatic pressure where the basement is below the groundwater table (Enviroguide Consulting, 2022).

The basement design and construction will incorporated adequately waterproofing of basement structure to prevent any groundwater seepage or ingress into the basement(Waterman-Moylan, 2022b).

Ongoing regular operational monitoring and maintenance of drainage and the SuDS measures as specified the Engineering Assessment Report (Waterman-Moylan, 2022) and in accordance with CIRIA SuDS Manual C753 which will be incorporated into the overall management strategy for the Proposed Development. This will ensure no impacts on water quality and quantity (flow regime) for the Operational Phase of the Proposed Development.

There is no other requirement for mitigation measures for the Operational Phase of the Proposed Development.

7.8 PREDICTED IMPACTS

Predicted or residual Impacts are defined as 'effects that are predicted to remain after all assessments and mitigation measures. They are the remaining 'environmental costs' of a project and are the final or intended effects of a development after mitigation measures have been applied to avoid or reduce adverse impacts.

Taking account of the proposed mitigation and avoidance measures there are no identified significant adverse impacts associated with the Proposed Development.

Based on the design of the design of the proposed development and identified mitigation measures that will prevent or limit impact and deterioration of water bodies the identified potential impact on WFD status of water bodies will be prevented. There will be no impact to the existing WFD status of water bodies associated with the Proposed Development Site including the Carrikmines Stream, Shanganagh River, Southwestern Irish Sea – Killiney Bay and the Wicklow GWB as a result of the Proposed Development.

The predicated and residual impacts together with the proposed avoidance and mitigation measures are provided in Table 7.8.

Activity	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
Construction Phase							
Dewatering during basement and drainage construction and management of water	Dewatering will be carried out following construction of the secant pile walls. However, the extent of the impact is considered to be localised to the immediate area surrounding the basement and attenuation tank area.	Negative	Slight	Temporary	Direct	Dewatering and management of dewatering water will be undertaken in accordance with Construction Environmental Management Plan (CEMP	Imperceptible
Instream works for the construction of crossings	Potential for disturbance of the stream bed and bank sediment resulting in an increased suspended solids content of the water.	Negative	Moderate	Medium term	Direct	All instream works or works carried out adjacent to the Greystones Stream will follow relevant guidelines published by Inland Fisheries Ireland (IFI) and The National Roads Authority (now Transport Infrastructure Ireland) regarding instream works and river crossings. A 10m buffer will be maintained around water courses for any works other than necessary in-stream works. Stockpiles will not be stored within this 10m buffer and will be managed to prevent sediment in runoff.	Imperceptible
Management of water quality including during dewatering	There will be no discharges to water courses. Water may be required to be discharged to ground in accordance with the robust dewatering strategy.	Negative	Significant	Long-term	Direct	All works will be carried out in accordance with a Construction Environmental Management Plan (CEMP) that will take cognisance of the requirements for handling, use and containment of fuels and other hazardous materials.	Imperceptible

Activity	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
Excavation and removal of surplus soil and potential impact of moving material to unauthorised destinations	Soil will be removed to an authorised (facility or under Article 27 Notification for appropriate re-use in accordance with all statutory obligations and consents. Control procedures will be in place to prevent the removal of materials to unauthorised offsite lands/sites/facilities.	Negative	Slight	Medium term	Indirect	Contract and procurement procedures will ensure compliance statutory obligations. All materials will be managed in accordance with the Construction Resource and Waste Management Plan (RWMP) for the Proposed Development	Imperceptible
Use of cementitious materials.	Potential release of cementitious material during construction works for instream works, adjoining water courses and during groundworks (foundations, pavements) to result in water quality impacts	Negative	Significant	Medium-term	Direct	The cementitious materials used during construction will avoid any contamination of soil and geology through the use of appropriate design and methods implemented by the Contractor and in accordance with industry standards and the CEMP for the works.	Imperceptible
Accidental release of deleterious materials including fuel and other materials being used on-site.	Potential (albeit low) for uncontrolled release of deleterious materials including fuels and other materials being used on-site, through the failure of secondary and tertiary containment or a materials handling accident, to the water environment.	Negative	significant	long-term	Direct (worst case)	All works will be carried out in accordance with a CEMP that will take cognisance of the requirements for handling, use and containment of fuels and other hazardous materials.	Imperceptible
Import of required aggregates for the construction of the Proposed Development.	The potential impacts may include importation of unsuitable or contaminated materials	Negative	Moderate to significant	Long-term	Direct	Contract and procurement procedures will ensure that all imported aggregates meet with industry conformity/compliance standards and statutory obligations	Imperceptible
Construction activities including basement construction and works adjoining the Carrickmines Stream	Potential Impact on WFD Status of receiving water bodies. in the absence of design avoidance measures,.	Negative	significant	long-term	Direct (worst case)	The design of the proposed development and identified mitigation measures that will prevent or limit impact and deterioration of water bodies there will be no impact to the WFD status	Imperceptible

Activity	Predicted Impact	Quality	Significance	Duration	Type	Mitigation	Residual Impact
						of water bodies. The required mitigation measures will be incorporated in the CEMP that will prepared by the contractor.	
Operational Phase							
Discharges of foul and surface water from the Site and potential impact on water quality.	There will be no adverse impact on water quality. All foul water will be discharged in accordance with appropriate consents from Irish Water. Surface water runoff will be managed in accordance with SuDS and any entrained contaminants will be removed prior to discharge from the Site to the Carrickmines Stream	Neutral	Imperceptible	Long-term	Indirect	None Required	Imperceptible
Groundwater Flow Regime and Interaction with Surface Water	Any impact will be within a localised zone immediately around the underground structures and no associated impact on stream flows where springs discharge to streams. There is no anticipated impact on regional groundwater flows.	Negative	Slight to moderate	Long-term	Direct	Detailed groundwater drainage design will ensure that local groundwater flow across the site is maintained.	Imperceptible
Drainage and SuDS	There is no identified flood risk at the Site or elsewhere	Neutral	Imperceptible	Long-term	Direct	None Required	Imperceptible
Site Drainage and occupancy as BTR development	Potential Impact on WFD Status of receiving water bodies in the absence of design avoidance measures.	Negative	significant	long-term	Direct (worst case)	The design of the proposed development and identified mitigation measures including SUDS will prevent or limit impact and deterioration of water bodies there will be no impact to the WFD status of water bodies.	Imperceptible

Table 7.8: Predicted Impacts

7.9 'DO NOTHING' SCENARIO

In the 'Do Nothing' scenario it is considered that the Proposed Development did not proceed and the potential impact on the receiving hydrological and hydrogeological environment is considered.

If the Proposed Development did not proceed the Site would continue to exist as undeveloped/ derelict lands and current runoff to surface water courses and infiltration to ground would continue.

7.10 WORST CASE SCENARIO

The potential accidental release of hazardous material including fuels, at the Proposed Development Site could the potentially impact on the receiving surface water and groundwater environment and associated receptors (e.g. Natura 2000 sites) would only occur in the absence of any of the proposed design ameliorative, remedial or reductive measures such the failure of secondary containment or a major incident on the Site in particular during works near the Carrickmines Stream for the outfall construction. However, taking account of the mitigation and avoidance measures of the Proposed Development to effectively prevent and manage such an incident any environmental harm would be avoided. There would therefore be a 'neutral', 'imperceptible' and 'temporary' impact on the receiving environment.

7.11 MONITORING & REINSTATEMENT

Construction Phase
During construction phase the following monitoring measures will be considered and the programme for monitoring and inspections will be prepared by the contractor:

- Inspections and monitoring will be undertaken in accordance with the method and programme of works to be prepared by the contractor during excavations, piling and other groundworks to ensure that measures that are protective of water quality are fully implemented and effective.
- Discharges to sewers will be monitored where required in accordance with statutory consents (discharge licence).
- Monitoring and inspection of the Carrickmines Stream will be undertaken daily during groundworks near the stream at locations upstream and immediately downstream of the works area.
- Monitoring of the in-stream works by an appropriately quality Environmental Clerk of Works will be undertaken and key stages of the works. Monitoring of water courses will be undertaken during the works.
- Monitoring and inspections will be undertaken during refuelling.
- Continuous monitoring will be undertaken during concrete works to ensure no impacts and compliance with ameliorative, remedial and reductive measures.
- Materials management and waste audits will be carried out at regular intervals to monitor the following:
  - management of soils on site and for removal offsite,
  - record keeping,
  - traceability of all materials, surplus soil and other waste removed from the Site and
  - ensure records are maintained of material acceptance at the end destination.

Operational Phase
Ongoing regular operational monitoring and maintenance of drainage and the SuDS systems will be carried as outlined in Section 7.7 of this EIAR Chapter including monitoring and inspection of discharges to the Carrickmines Stream where agreed with the Local Authority.

7.12 DIFFICULTIES IN COMPILING INFORMATION

There were no difficulties encountered in compiling this hydrology and hydrogeology assessment.

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8 NOISE AND VIBRATION

8.1 INTRODUCTION

AWN Consulting Ltd has been appointed to prepare the noise and vibration chapter of the EIAR supporting the proposed Strategic Housing Development (SHD) at Brennanstown Road, Foxrock, Dublin 18.

This Chapter of the EIAR will provide information on the assessment of noise and vibration impacts on the surrounding environment during both the construction and operational phases. The principal objectives of the Noise and Vibration assessment will be to specify appropriate limit values and mitigation measures to ensure that the impact on the environment is minimised and complied with acceptable standards and guidelines.

This assessment has been prepared by Mike Simms BE MEngSc MIOA MIET, Senior Acoustic Consultant at AWN, who has worked in the field of acoustics for 20 years. He has extensive experience in all aspects of environmental surveying, noise modelling and impact assessment for various sectors including, energy, industrial, commercial and residential

Cairn Homes Properties Limited intend to apply to An Bord Pleanála for permission for a strategic housing development at this site of c.3.81 ha at 'Barrington Tower', Brennanstown Road, Dublin 18. The application site contains a Protected Structure 'Barrington Tower' (RPS No. 1729).

The development will include the demolition of Winterbrook, an existing dwelling and partial demolition of the modern extension dwelling to Barrington Tower. The protected structure 'Barrington Tower' will be retained, restored and reused.

The development will comprise a 'Build to Rent' (BTR) apartment development consisting of 8 no. blocks ranging in height up to 10 storeys (including lower ground floor) providing 534 no. apartments. This will result in 30 no studio, 135 no. 1 -beds, 318 no. 2-beds & 51 no. 3-beds. All residential units provided with associated private balconies/terraces to the north/south/east/west elevations. The BTR development will also include Resident Support Facilities & Resident Services & Amenities (total floor area c.1,700 sq.m) including flexible spaces including entertainment rooms, meeting rooms, parcel rooms, media rooms, lounge and workspaces, gyms and studio, chef's kitchen and dining area. The development also includes a creche (c.334 sq.m), and a retail unit (c.318 sq.m). Provision of 419 no. car parking spaces, 1,226 no. cycle parking spaces and 26 no. motorcycle spaces. Vehicular/pedestrian/cyclist accesses from Brennanstown Road. Improvement works to the Brennanstown Road will also be completed. Additional pedestrian access to the Brennanstown Luas Stop. All associated site development works, open spaces, landscaping, boundary treatments, plant areas, waste management areas, cycle parking areas, and services provision (including ESB substations).

8.2 METHODOLOGY

Assessment Overview

The study has been undertaken using the following methodology:

- Baseline noise monitoring has been undertaken across the development site to determine the range of noise levels at existing noise-sensitive locations (NSLs) in the vicinity of the site (See Figure 8.3);
- 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 NSLs to the site;
- Predictive calculations have been performed to assess the potential impacts associated with the operation of the development at the nearest NSLs to the development site;
- A schedule of mitigation measures has been proposed, where relevant, to control the noise and vibration emissions associated with both the construction and operational phases of the proposed development, and;
- The inward impact of noise in the surrounding environment on the proposed buildings has also been assessed to determine the requirements for additional noise mitigation to provide suitable residential amenity for the occupants of the site

Construction Phase

Construction Noise

There is no published statutory Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. Local Authorities typically control 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 2009+A1 2014 Code of practice for noise and vibration control on construction and open sites. Part 1 of this document Noise provides guidance on selecting appropriate noise criteria relating construction works.

ABC Method

The approach adopted here calls for the designation of a noise sensitive location into a specific category (A, B or C) based on exiting ambient noise levels in the absence of construction noise. This then sets a threshold noise value that, if exceeded at this location, indicates a significant noise impact is associated with the construction activities.
BS 5228-1:2009+A1:2014 sets out guidance on permissible noise levels relative to the existing noise environment. Table 8.1 sets out the values which, when exceeded, signify a significant effect at the facades of residential receptors.

Assessment category and threshold value period (L_{Aeq})	Threshold value, in decibels (dB)		
	Category A Note A	Category B Note B	Category C Note C
Night-time (23:00 to 07:00hrs)	45	50	55
Evenings and weekends Note D	55	60	65
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75

Table 8.1 Example Threshold of Potential Significant Effect at Dwellings

Note A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.
Note B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.
Note C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.
Note D) 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.

For the appropriate assessment period (i.e. daytime in this instance) the ambient noise level is determined and rounded to the nearest 5 dB. If the construction noise exceeds the appropriate category value, then a significant effect is deemed to occur. It should be noted that this assessment method is only valid for residential properties and if applied to commercial premises without consideration of other factors may result in an excessively onerous thresholds being set.

The nearest residential noise-sensitive locations to the site are the residential properties to the north, east and west of the site, each of which is approximately 25 m distance from the façade of any a proposed building. Figure 8.3 shows the nearby noise-sensitive locations in relation to the proposed development.

Proposed Threshold Noise Levels

Taking into account the proposed documents outlined above and making reference to the baseline noise environment monitored around the development site (see Section 9.3), BS 5228-1:2009+A1:2014 has been used to inform the assessment approach for construction noise.

For residential NSLs it is considered appropriate to adopt 65 - 75 dB(A) CNT depending on existing noise level. Given the baseline monitoring carried out, it would indicate that Category A and C values are appropriate using the ABC method.

Interpretation of the CNT

In order to assist with interpretation of CNTs, Table 8.2 includes guidance as to the likely magnitude of impact associated with construction activities, relative to the CNT. This guidance is derived from Table 3.16 of DMRB: Noise and Vibration and adapted to include the relevant significance effects from the EPA Guidelines (EPA 2017).

Guidelines for Noise Impact Assessment Significance (DMRB)	CNT per Period	EPA EIAR Significance Effects	Determination
Negligible	Below or equal to baseline noise level	Not Significant	Depending on CNT, duration & baseline noise level
Minor	Above baseline noise level and below or equal to CNT	Slight to Moderate	
Moderate	Above CNT and below or equal to CNT +5 dB	Moderate to Significant	
Major	Above CNT +5 to +15 dB	Significant, to Very Significant	

Table 8.2 Construction Noise Significance Ratings

The adapted DMRB guidance outlined will be used to assess the predicted construction noise levels at NSLs and comment on the likely impacts during the construction stages.

Construction Vibration

Peak particle velocity (PPV) is commonly used to assess the structural response of buildings to vibration. Reference to the following documents has been made for the purposes of this assessment in order to discuss appropriate PPV limit values.

- British Standard BS7385: 1993: Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration, and;
- British Standard BS5228-2: 2009 + A1: 2014: Code of practice for noise and vibration control on construction and open sites – Vibration.

BS 7385 states that there should typically be no cosmetic damage if transient vibration does not exceed 15 mm/s at low frequencies rising to 20 mm/s at 15 Hz and 50 mm/s at 40 Hz and above. These guidelines relate to relatively modern buildings and should be reduced to 50% or less for more critical buildings.

BS5228-2 and BS7385 advise that, for soundly constructed residential property and similar structures that are generally in good repair, a threshold for minor or cosmetic (i.e. non-structural) damage should be taken as a peak component particle velocity (in frequency range of predominant pulse) of 15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz and 50 mm/s at 40 Hz and above. The standard also notes that below 12.5 mm/s PPV the risk of damage tends to zero.

The recommended vibration limits in order to avoid cosmetic damage to buildings, as set out in both documents referred to above, are reproduced in Table 10.3. The documents note that minor structural damage can occur at vibration magnitudes which are greater than twice those presented in Table 10.3. Major damage to a building structure is possible at vibration magnitudes greater than four times the values set out in the Table. It should be noted that these values refer to the vibration at the base of the building.

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

Table 8.3 Transient Vibration Guide Values for Cosmetic Damage

Human response to vibration stimuli occurs at orders of magnitudes below those associated with any form of building damage, hence vibration levels lower than those indicated in Table 10.3 can lead to concern. BS5228-2 also provides a useful guide relating to the assessment of human response to vibration in terms of PPV. Whilst the guide values are commonly used to compare typical human response to construction works, they tend to relate closely to general levels of vibration perception from other general sources. Table 10.4 summarises the range of vibration values and the associated potential effects on humans.

Vibration Level, PPV	Effect
0.14 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies. At lower frequencies people are less sensitive to vibration.
0.3 mm/s	Vibration might be just perceptible in residential environments.
1 mm/s	It is likely that a vibration level of this magnitude in residential environments will cause complaint.

Table 8.4 Guidance on Effects of Human Response to PPV Magnitudes

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

Operational Noise Guidelines

Operational Noise (Outward)

Building Services Plant

Once a development of this nature becomes fully operational, a variety of electrical and mechanical plant will be required to service the development. Most of this plant will be capable of generating noise to some degree. Some of this plant may operate 24 hours a day, and hence would be most noticeable during quiet periods (i.e. overnight). Noisy plant with a direct line-of-sight to noise sensitive properties would potentially have the greatest impact. Plant contained within plantrooms has the least potential for impact once consideration is given to appropriate design of the space.

Good practice guidance on noise emissions from mechanical plant items would typically make reference to the British Standard BS 4142: 2014: Methods for Rating and Assessing Industrial and Commercial Sound. This document is the industry standard method for analysing building services plant noise emissions to residential receptors and is the document used commonly by local authorities in their standard planning conditions and also in complaint investigations.

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

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

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

The following definitions as discussed in BS 4142 as summarised below:

"ambient noise level, $L_{Aeq,T}$" is the noise level produced by all sources including the sources of concern, i.e. the residual noise level plus the specific noise of mechanical plant, in terms of the equivalent continuous A-weighted sound pressure level over the reference time interval [T].

"residual noise level, $L_{Aeq,T}$" is the noise level produced by all sources excluding the sources of concern, in terms of the equivalent continuous A-weighted sound pressure level over the reference time interval [T].

"specific noise level, $L_{Aeq,T}$" is the sound level associated with the sources of concern, i.e. noise emissions solely from the mechanical plant, in terms of the equivalent continuous A-weighted sound pressure level over the reference time interval [T].

"rating level, $L_{Ar,T}$" is the specific sound level plus any adjustments for the characteristic features of the sound (e.g. tonal, impulsive or irregular components);

"background noise level, $L_{A90,T}$" is the sound pressure level of the residual noise that is exceeded for 90% of the time period T.

If the rated plant noise level is +10 dB 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 +5 dB 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.

Assessment of Significance and Change in Traffic Noise Levels

The 'Guidelines for Environmental Noise Impact Assessment' produced by the Institute of Environmental Management and Assessment (IEMA) (2014) have been referenced in order to categorise the potential effect of changes in the ambient noise levels during the operational phases of the proposed development.

The guidelines state that for any assessment, the potential significance should be determined by the assessor, based upon the specific evidence and likely subjective response to noise. Due to varying factors which effect human response to environmental noise (prevailing environment, noise characteristics, time periods, duration and level etc.) assigning a subjective response must take account of these factors.

The scale adopted in this assessment is shown in Table 8.5 below is based on an example scale within the IEMA guidelines. The corresponding significance of impact presented in the Draft 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (EPA, 2017) is also presented.

Noise Level Change dB(A)	Subjective Response	Long Term Impact Classification (IEMA, 2014)	Impact Guidelines on the Information to be contained in EIA Report's (EPA)
≥ 0	No change	Negligible	Imperceptible
≥ 0 and < 3	Barely perceptible		Not Significant
≥ 3 and < 5	Noticeable	Minor	Slight – Moderate
≥ 5 and < 10	Up to a doubling or halving of loudness	Moderate	Moderate – Significant
≥ 10	More than a doubling or halving of loudness	Major	Significant – Profound

Table 8.5 Noise Impact Scale – Operational Noise Sources

The significance table reflects the key benchmarks that relate to human perception of sound. A change of 3 dB(A) is generally considered to be the smallest change in environmental noise that is perceptible to the human ear. A 10 dB(A) change in noise represents a doubling or halving of the noise level. The difference between the minimum perceptible change and the doubling or halving of the noise level is split to provide greater definition to the assessment of changes in noise level.

It is considered that the ratings specified in the above table provide a good indication as to the likely significance of changes on noise levels in this case and have been used to assess the impact of operational noise.

Operational Noise (Inward)

Dún Laoghaire Rathdown County Council Noise Action Plan

The Dún Laoghaire Rathdown County Council Noise Action Plan (NAP) 2018 – 2023 is of relevance here. The NAP indicates that guidance within the ProPG Planning and Noise: Professional Practice Guidance on Planning and Noise document should be referred to:

"In the scenario where new residential development or other noise sensitive development is proposed in an area with an existing climate of environmental noise, there is currently no clear national guidance on appropriate noise exposure levels. The EPA has suggested that in the interim that Action Planning Authorities should examine the planning policy guidance notes issued in England titled, 'ProPG Planning and Noise: Professional Practice Guidance on Planning and Noise'. This has been produced to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England."
In accordance with this NAP policy, the following Acoustic Report has been prepared to comply with the requirements of this policy.

In addition to ProPG, the Dún Laoghaire Rathdown County Council Noise Action Plan 2018 – 2023 has been published in order to address the requirements of the European Noise Directive 2002/49/EC. This NAP produced noise maps in order to determine the population exposure to undesirably high noise levels and also to identify areas with desirably low noise that should be preserved into the future. The NAP defines the following ranges for these descriptions:

- Undesirably high external noise levels are defined as being above 55dB at night and/or above 70dB during the day, and;
- Desirably low external noise levels are defined as being below 50dB at night and/or below 55dB during the day.

It is important to note that the NAP does not recommend that residential development be restricted within areas identified as having undesirably high noise levels. Rather it recommends a range of noise mitigation measures be required for new residential developments within these areas. Noise maps for the site and surroundings are presented towards the end of this section.

Professional Guidance on Planning & Noise (ProPG)

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

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

- Stage 1 - Comprises a high-level initial noise risk assessment of the proposed site considering either measured and or predicted noise levels; and,
- Stage 2 – Involves a full detailed appraisal of the proposed development covering four "key elements" that include:
    - Element 1 - Good Acoustic Design Process;
    - Element 2 - Noise Level Guidelines;
    - Element 3 - External Amenity Area Noise Assessment
    - Element 4 - Other Relevant Issues

A key component of the evaluation process is the preparation and delivery of an Acoustic Design Statement (ADS) which is intended for submission to the planning authority. This document is intended to clearly outline the methodology and findings of the Stage 1 and Stage 2 assessments, so as the planning authority can make an informed decision on the permission.

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

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

Section 3.0 of the ProPG provides a more detailed guide on decision making to aid local authority planners on how to interpret the findings of an accompanying Acoustic Design Statement (ADS). A summary of the ProPG approach is illustrated in Figure 10.1.

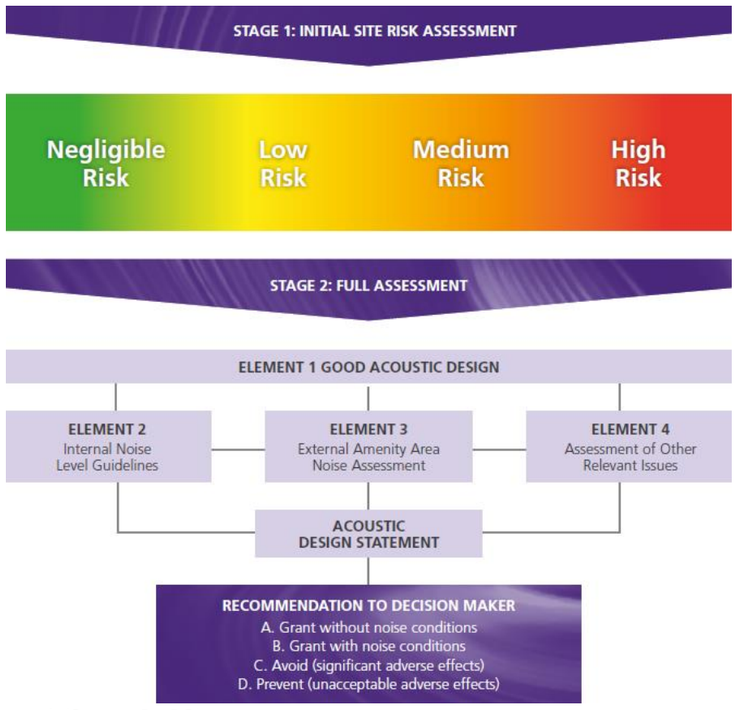

Figure 8.1 ProPG Approach (Source: ProPG)

The ProPG document also sets out recommended internal noise targets derived from BS 8233 (2014). The recommended indoor ambient noise levels are those set out above 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, such as New Year's Eve.
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 5 dB can still provide reasonable internal conditions.

<u>Internal Noise (BS 8233)</u>

There are no statutory guidelines or specific local guidelines relating to appropriate internal noise levels in dwellings. In this instance, reference is made to BS 8233: 2014: Guidance on sound insulation and noise reduction for buildings.

BS 8233 sets out recommended internal noise levels for several different building types from external noise sources such as traffic. The guidance is primarily for use by designers and hence BS 8233 may be used as the basis for an appropriate schedule of noise control measures. The recommended indoor ambient noise levels for residential dwellings are set out in Table 8.6.

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

Table 8.6 Noise Impact Scale – Operational Noise Sources

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

BS 8233 also provides some guidance on individual noise events, it states:

> *"Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or LAFmax, depending on the character and number of events per night. Sporadic noise events could require separate values."*

Typically, a 45dB L_{AFmax} criterion is applied to individual noise events within bedrooms at night. This criterion is generally considered a noise level that should not typically be exceeded.

<u>External Noise (BS 8233 Amenity Areas)</u>

BS 8233 also provides desirable noise levels for external amenity areas such as gardens, patios and balconies. It states:

> *"For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development*

should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited."

Operational Vibration

Once operational, there are no vibration sources associated with the development site.

8.3 RECEIVING ENVIRONMENT

Site Location

The lands are located to the south of Brennanstown Road. The surrounding environment in the vicinity of the development site is residential in nature with mainly detached houses. The Luas line lies to the south of the site.

Figure 8.2 presents the extent of the development site, outlined in red.

Baseline Noise Survey Locations

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.

The noise measurement locations were selected to represent the noise environment at Noise sensitive location surrounding the proposed development. The selected locations are shown in Figure 8.3 and described as below:

- **UN1** – Unattended measurement location to evaluate the potential inward impact on the development from rail noise from the Luas line to the south of the site.
- **UN2** – Unattended measurement location to evaluate the potential inward impact on the development from traffic noise along Brennanstown Road.
- **AT1** – Attended location to capture a snapshot of the daytime noise environment existing houses to the west of the proposed development.
- **AT2** – Attended location to capture a snapshot of the daytime noise environment at existing house along Brennanstown Road.

Figure 8.2 Proposed Development

Figure 8.3 Noise Monitoring Locations

Survey Periods

The attended noise survey was carried out on Friday 11 June 2021. Noise levels were measured over 15-minute periods on a cyclic basis at each measurement location.

The unattended noise surveys were carried out between Friday 11 June and Tuesday 15 June 2021. Noise levels were logged over consecutive 5-minute periods to capture individual tram pass-by events.

Measurement Parameters

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

L_{Aeq}	is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period.
L_{AFmax}	is the instantaneous maximum sound level measured during the sample period using the 'F' time weighting.
L_{A10}	is the sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise.
L_{A90}	is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.
L_{day}	the 12 hour A-weighted long-term average sound level, determined over all the day periods of a year; Levening the 4 hour A-weighted long-term average sound level, determined over all the evening periods of a year;
L_{night}	the 8 hour A-weighted long-term average sound level, determined over all night periods of a year.
L_{den}	"Lday, evening, night": This is based on 24-hour LAeq values but includes 'weightings' for evening and night-time noise levels: 5 dB is added to the evening levels and 10 dB to the night-time levels. It is by definition a value that is based on long-term averaging over a full year

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.

Attended Noise Survey Results

Noise level measurements of 15 minutes' duration were taken at location AT1. The results are presented in Table 8.7.

Time	Subjective Impression of Noise Environment	Measured Noise Levels (dB re. 2x10-5 Pa)			
		LAeq	LAmax	LA10	LA90
12:10	• Road traffic on M50 and Brennanstown Road • Birdsong • Luas at 3 min intervals	50	59	51	48
12:30		51	61	53	49
13:05		49	60	51	47

Table 8.7 Attended Noise Survey Results at AT1

Noise level measurements of 15 minutes' duration were taken at location AT2. The results are presented in Table 8.8.

Time	Subjective Impression of Noise Environment	Measured Noise Levels (dB re. 2x10-5 Pa)			
		LAeq	LAmax	LA10	LA90
13:40		65	83	69	47
14:00		65	83	70	47

14:25	• Road traffic on M50 and Brennanstown Road • Birdsong • Luas at 3 min intervals • Lawnmower	66	84	70	46

Table 8.8 Attended Noise Survey Results at AT2

Unattended Noise Survey Results

Location UN1

The results of the unattended monitoring survey at Location UN1 are summarised for daytime periods in Table 8.9 and for night-time periods in Table 8.10. Daytime noise levels were in the range 52 to 54 dB $L_{Aeq,16hour}$ and 45 to 48 dB $L_{A90,5min}$. Night-time noise levels were in the range 50 to 51 dB $L_{Aeq,8hour}$ and 40 to 42 dB $L_{A90,5min}$. Distant traffic on the M50 was the dominant source of noise. The time history of noise levels measured at UN1 is presented in Figure 8.4. The measured L_{den} value at UN1 was 57 dB(A).

Monitoring Period		Measured Noise Levels (dB re $2x10^{-5}$ Pa)	
		$L_{Aeq,16hour}$	$L_{A90,\ 5min}$
11 June 2021	Highest	57	52
	Lowest	45	44
	Average	52	48
12 June 2021	Highest	59	51
	Lowest	44	41
	Average	51	45
13 June 2021	Highest	58	49
	Lowest	42	40
	Average	51	45
14 June 2021	Highest	59	54
	Lowest	39	38
	Average	53	47
15 June 2021	Highest	62	51
	Lowest	46	44
	Average	54	48
Highest Average		54	48

Table 8.9 Summary of Daytime Unattended noise measurements at UN1

Monitoring Period		Measured Noise Levels (dB re $2x10^{-5}$ Pa)	
		$L_{Aeq,\ 8hour}$	$L_{A90,5min}$
11 June to 12 June 2021	Highest	60	45
	Lowest	39	38
	Average	50	41
12 June to 13 June 2021	Highest	59	46
	Lowest	39	38
	Average	51	40
13 to 14 June 2021	Highest	58	51
	Lowest	38	38
	Average	51	42
14 to 15 June 2021	Highest	60	50
	Lowest	39	38
	Average	50	41
Highest Average		51	42

Table 8.10 Summary of Night-time Unattended noise measurements at UN1

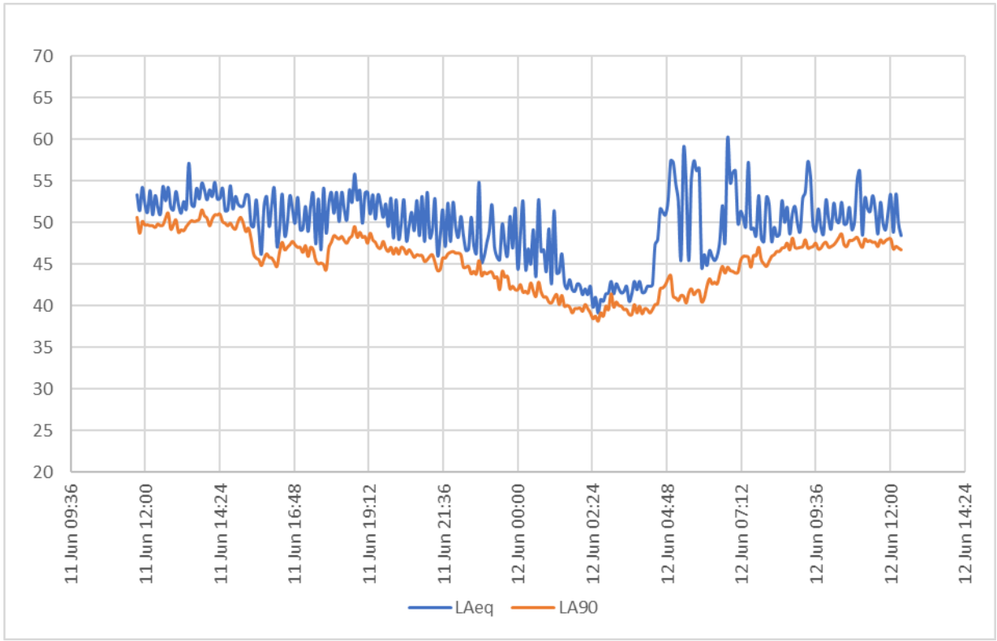

Figure 8.4 Measured Noise levels at UN1

Figure 8.5 and Figure 8.6 present the number of measured L_{Aeq} events for each decibel level during the day and night periods. The night-time figure includes the distribution of L_{Amax} values, where it is noted from Figure 8.6 the noise level of 69 dB L_{Amax} is not normally exceeded.

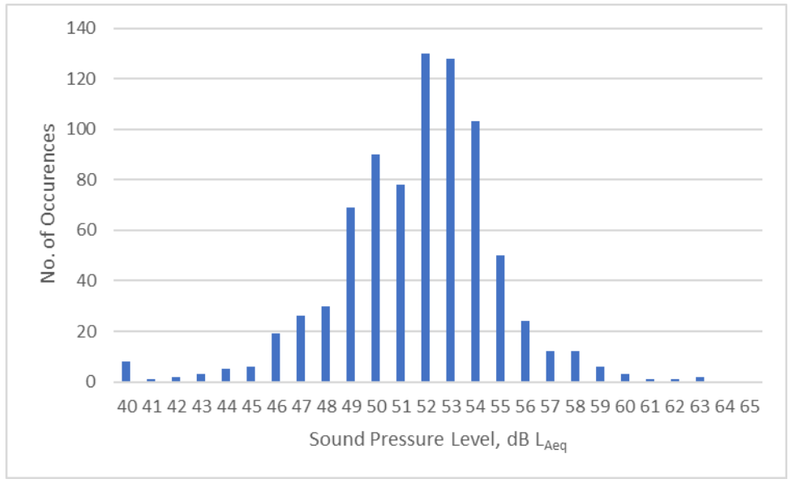

Figure 8.5 UN1: Number of Events at Each Decibel Level – Day

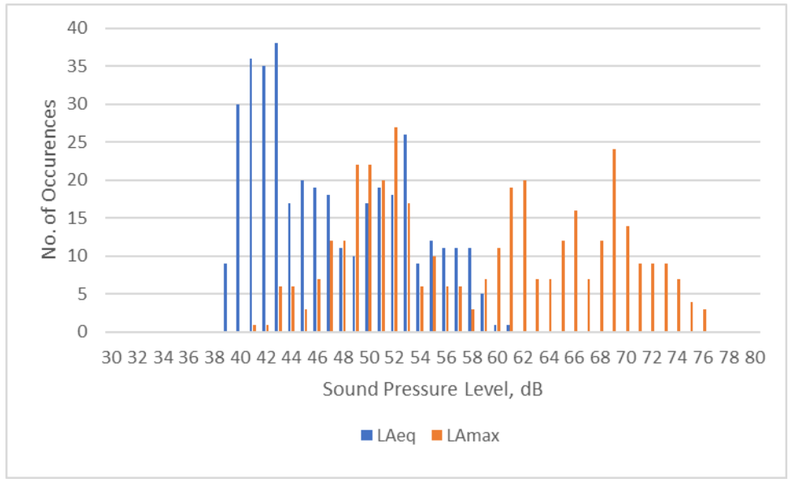

Figure 8.6 UN1: Number of Events at Each Decibel Level – Night

Location UN2

The results of the unattended monitoring survey at Location UN2 are summarised for daytime periods in Table 8.11 and for night-time periods in Table 8.12. Daytime noise levels were in the range 51 to 53 dB $L_{Aeq,16hour}$ and 42 to 48 dB $L_{A90,5min}$. Night-time noise levels were in the range 44 to 45 dB $L_{Aeq,8hour}$ and 32 to 36 dB $L_{A90,5min}$. Distant traffic on the M50 was the dominant source of noise. The measured L_{den} value at UN1 was 53 dB(A).

Monitoring Period		Measured Noise Levels (dB re $2x10^{-5}$ Pa)	
		$L_{Aeq, 16hour}$	$L_{A90,5min}$
11 June 2021	Highest	58	49
	Lowest	43	39
	Average	52	44
12 June 2021	Highest	66	48
	Lowest	40	37
	Average	52	42
13 June 2021	Highest	58	47
	Lowest	37	32
	Average	51	42
14 June 2021	Highest	56	50
	Lowest	33	30
	Average	52	43
15 June 2021	Highest	56	50
	Lowest	47	44
	Average	53	48
Highest Average		53	48

Table 8.11 Summary of Daytime Unattended noise measurements at UN2

Monitoring Period		Measured Noise Levels (dB re $2x10^{-5}$ Pa)	
		$L_{Aeq,8hour}$	$L_{A90,5min}$
11 June to 12 June 2021	Highest	52	41
	Lowest	31	28
	Average	44	35
12 June to 13 June 2021	Highest	50	39
	Lowest	30	27
	Average	44	32
13 to 14 June 2021	Highest	52	46
	Lowest	29	27
	Average	45	36
14 to 15 June 2021	Highest	52	47
	Lowest	30	27
	Average	44	33
Highest Average		45	36

Table 8.12 Summary of Night-time Unattended noise measurements at UN2

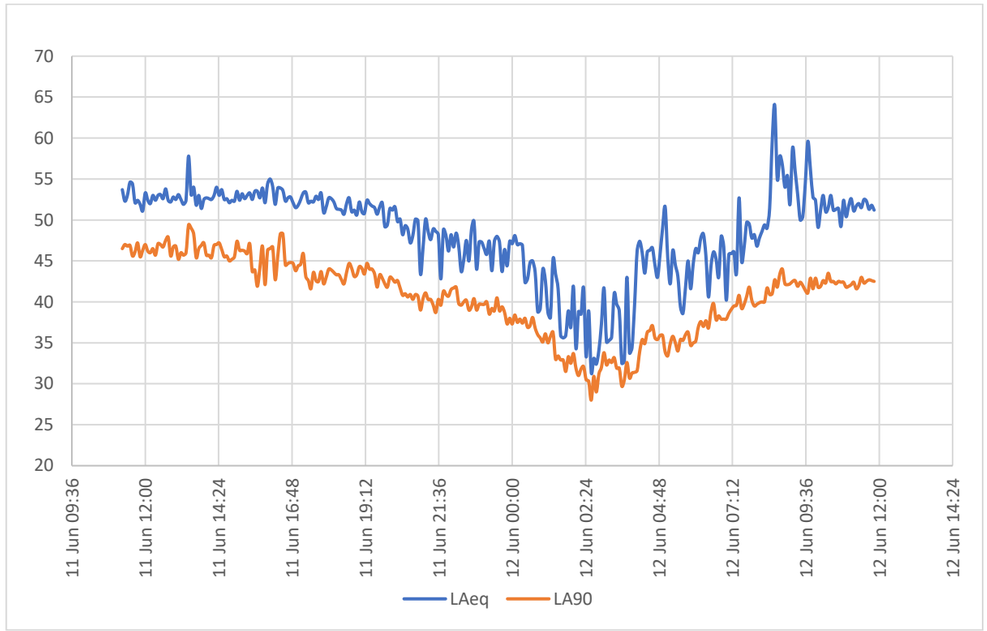

Figure 8.7 Measured Noise levels at UN2

Figure 8.8 and Figure 8.9 present the number of measured L_{Aeq} events for each decibel level during the day and night periods. The night-time figure includes the distribution of L_{Amax} values, where it is noted that the noise level of 63 dB L_{Amax} is not normally exceeded.

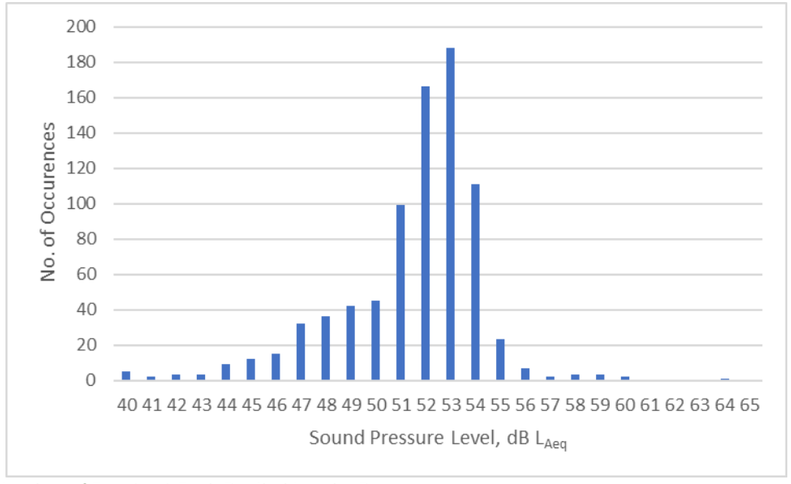

Figure 8.8 UN2: Number of Events at Each Decibel Level – Day

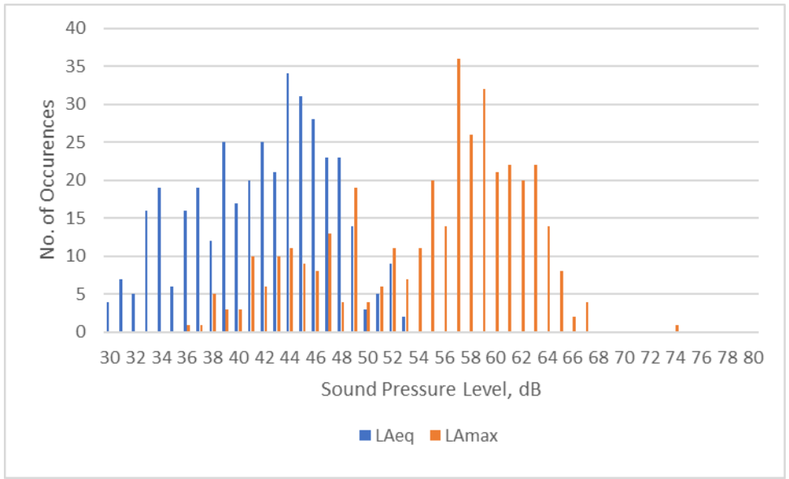

Figure 8.9 UN2: Number of Events at Each Decibel Level – Night

Round 3 Road Noise Maps

The Environmental Protection Agency have produced noise maps for major roads nationally[1]. Figure 8.10 to 8.13 presents the mapped noise levels across the development site for road traffic and rail in terms of L_{den} and L_{night}. The measured value of L_{den} of 57 dB(A) at UN1 is slightly lower than the mapped range of 60 to 64 dB(A). Similarly, the measured value of L_{den} of 53 dB(A) at UN2 is lower than the mapped range of 55 to 59 dB(A). It is noted that traffic flows are likely to have been reduced during the survey period due to movement restrictions for COVID-19. Further comment on the effects of this on the inward noise impact are presented in the following section.

[1] EPA Maps: https://gis.epa.ie/EPAMaps/

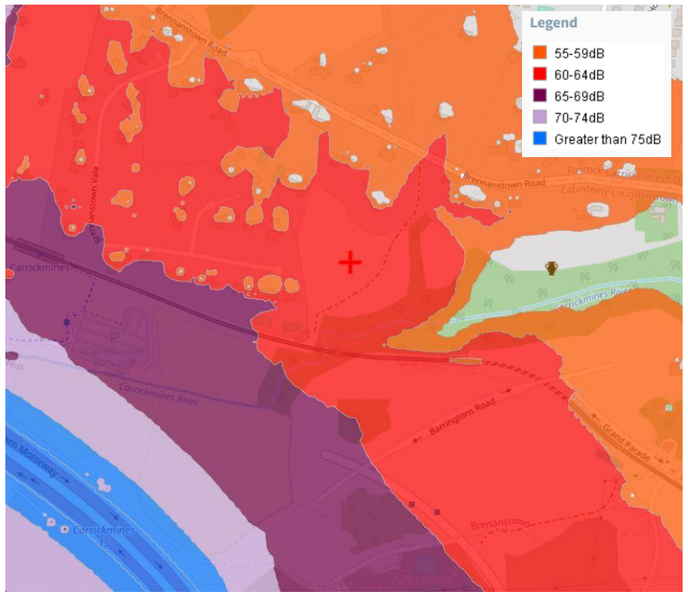

Figure 8.10 EPA Round 3 Noise Map of Lden for Road Traffic

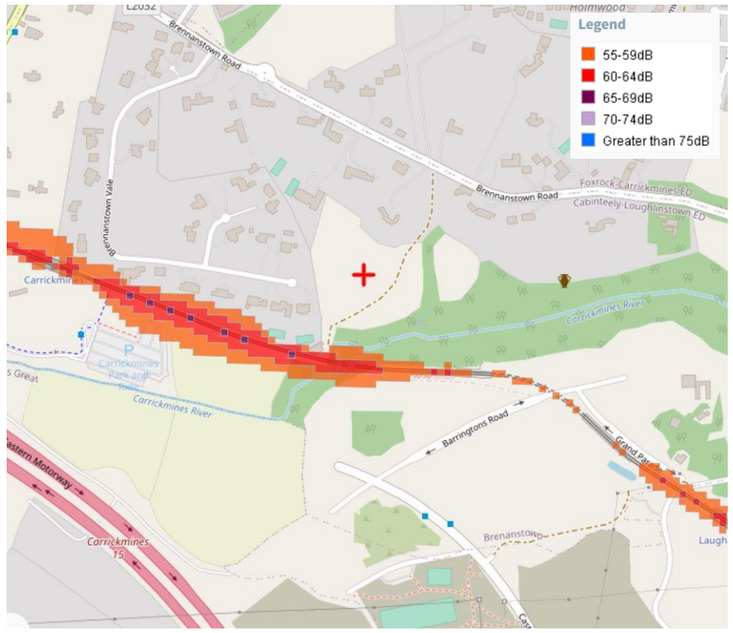

Figure 8.12 EPA Round 3 Noise Map of Lden for Rail Traffic

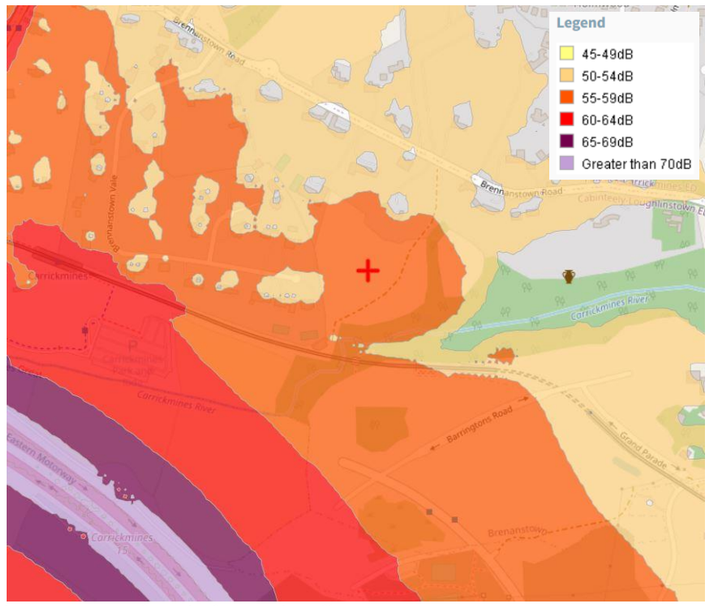

Figure 8.11 EPA Round 3 Noise Map of Lnight for Road Traffic

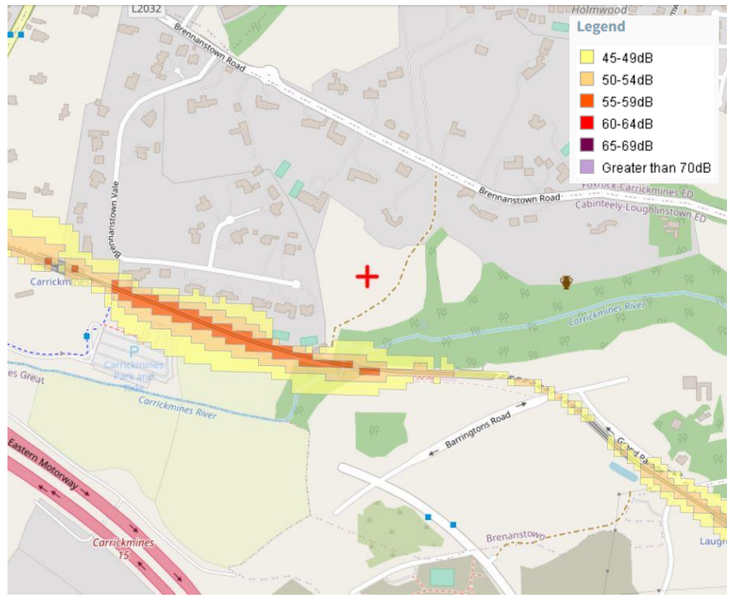

Figure 8.13 EPA Round 3 Noise Map of Lnight for Rail Traffic

Assumed Façade Noise Levels for Assessment Purposes

It is noted that the noise survey was undertaken during Covid-19 lockdown conditions and that the primary noise source, i.e. traffic noise, was not at "normal" levels due to reduced traffic flows and activity in the immediate area surrounding the development site. In order to allow for robust assessment, it has been assumed that a 50% reduction in traffic flows is prevalent surrounding the development site during the noise survey. A correction of +3 dB will be added to measured noise levels for the purposes of the façade assessment.

Based on a review of the survey data, available noise mapping and consideration of the movement restrictions, the following noise levels are assumed to be incident on the façades of the development:

Façade / Parameter	Octave Band Centre Frequency (Hz)						$L_{Aeq,\,T}$ dB
	125	250	500	1k	2k	4k	
Southern: Daytime L_{Aeq}	52	54	53	53	49	49	57
Southern: Night-time L_{Aeq}	47	54	53	50	44	33	54
Southern: Night-time L_{Amax}	74	65	67	65	60	48	69
Northern: Daytime L_{Aeq}	59	51	51	51	51	46	56
Northern: Night-time L_{Aeq}	42	43	41	43	35	19	45
Northern: Night-time L_{Amax}	68	59	61	59	54	42	63

Table 8.13 Assumed Noise Level at Southern and Northern façades

8.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The development description is as follows:

The development will comprise a 'Build to Rent' (BTR) apartment development consisting of 8 no. blocks ranging in height up to 10 storeys (including lower ground floor) providing 534 no. apartments. This will result in 30 no studio, 135 no. 1 -beds, 318 no. 2-beds & 51 no. 3-beds. All residential units provided with associated private balconies/terraces to the north/south/east/west elevations. The BTR development will also include Resident Support Facilities & Resident Services & Amenities (total floor area c.1,700 sq.m) including flexible spaces including entertainment rooms, meeting rooms, parcel rooms, media rooms, lounge and workspaces, gyms and studio, chef's kitchen and dining area. The development also includes a creche (c.334 sq.m), and a retail unit (c.318 sq.m). Provision of 419 no. car parking spaces, 1,226 no. cycle parking spaces and 26 no. motorcycle spaces. Vehicular/pedestrian/cyclist accesses from Brennanstown Road. Improvement works to the Brennanstown Road will also be completed. Additional pedestrian access to the Brennanstown Luas Stop. All associated site development works, open spaces, landscaping, boundary treatments, plant areas, waste management areas, cycle parking areas, and services provision (including ESB substations).

The potential noise and vibration impact on the surroundings are considered for both the construction and operational phases of this development.

During the construction phase the main site activities will include site clearance, foundation works, building construction, road works, and landscaping. This phase has the greatest potential noise and vibration impacts on its surrounding environment, however this phase will be of short-term impact.

During the operational phase of the development, the primary source of outward noise in the operational context relates to any changes in traffic flows along the local road network and building services noise associated with development spaces.

The potential associated with each phase is assessed in the following sections.

8.5 POTENTIAL IMPACTS

Construction Phase

Construction Noise

The largest noise and vibration impact of the proposed development will occur during the construction phase due to the operation of various plant machinery and HGV movement to, from and around the site. However, the construction phase can be classed as a short-term phase (approximately three years in duration).

The nearest residential noise-sensitive locations to the site are the residential properties within the 'blue line' of the site, and also those to the north, east and west of the site, each of which is approximately 25m from a proposed building. Based on the results of the baseline noise surveys undertaken at UN1, UN2 and AT2, daytime noise level in the environs of the propertied is estimated to be between 50 to 55 dB $L_{Aeq,T}$.

Thresholds for significant noise from construction can be determined by referring to Table 8.1 (BS 5228-1) and the baseline ambient noise levels, as outlined in the assessment criteria section. The daytime significance threshold for construction noise at the site is set at 65 dB $L_{Aeq,T}$. A night-time threshold is not included as construction work will not be taking place at night.

BS 5228-1 contains noise level data for various construction machinery. The noise levels relating to site clearance, ground excavation and loading lorries (dozers, tracked excavators and wheeled loaders) reach a maximum of 81 dB $L_{Aeq,T}$ at a distance of 10 m. For this assessment, a worst-case scenario is assumed of 3 no. such items with a sound pressure level (SPL) of 81 dB at 10 m operating simultaneously along the closest works boundary. This would result in a total noise level of 86 dB at 10 m and an equivalent combined sound power level of 114 dB L_{WA}. This worst-case scenario is the typical assumption made for developments of this size, on the basis that it is unlikely that more than 3 no. items of such plant/equipment would be operating simultaneously in such close proximity to each other.

Guidance on the approximate attenuation achieved by barriers surrounding the site is also provided in BS 5228-1. It states that when the top of the plant is just visible to the receiver over the noise barrier, an approximate attenuation of 5 dB can be assumed, while a 10 dB attenuation can be assumed when the noise screen completely hides the sources from the receiver.

The latter scenario can be assumed in this case due to the proximity of the noise-sensitive locations, i.e. a barrier height will be chosen so as to completely hide the source. Table 8.14 shows the potential noise levels calculated at various distances based on the assumed sound power level and attenuation provided by the barrier of 10 dB.

Description of Noise Source	Sound Power Level (dB Lw(A))	Calculated noise levels at varying distances (dB LAeq,T)				
		10	20	30	50	100
3 no. items each with SPL of 81 dB at 10 m operating simultaneously.	114	76	70	66	62	56

Table 8.14 Noise Impact Scale – Operational Noise Sources

The calculated noise levels in Table 8.14 show that there is potential for the maximum permissible daytime noise level to be exceeded at distances up to 30 m from the works. This indicates that additional mitigation measures will be required to prevent likely significant impacts at residential properties. These measures are detailed in Section 8.8.

Construction Vibration

Potential for vibration impacts during the construction phase programme are likely to be limited given the ground breaking, piling and excavations required. There is potential for piling to be used for building and basement foundations for apartment buildings. For the purposes of this assessment the expected vibration levels during piling assuming augured or bored piles have been determined through reference to published empirical data. The British Standard BS 5228 – Part 2: Vibration, publishes the measured magnitude of vibration of rotary bored piling using a 600mm pile diameter for bored piling into soft ground over rock, (Table D.6, Ref. No. 106):

- 0.54 mm/s at a distance of 5 m, for auguring;
- 0.22 mm/s at a distance of 5 m, for twisting in casing;
- 0.42 mm/s at a distance of 5m, for spinning off, and;
- 0.43 mm/s at a distance of 5 m, for boring with rock auger.

Considering the low vibration levels at very close distances to the piling rigs, vibration levels at the nearest buildings are not expected to pose any significance in terms of cosmetic or structural damage. In addition, the range of vibration levels is typically below a level which would cause any disturbance to occupants of nearby buildings.

In this instance, taking account of the distance to the nearest sensitive off-site buildings, vibration levels at the closest neighbouring buildings are expected to be orders of magnitude below the limits set out in Table 8.3 to avoid any cosmetic damage to buildings. Vibration levels are also expected to be below a level that would cause disturbance to building occupants, as set out in Table 8.4. The potential vibration impact during the construction phase if of short-term, neutral and imperceptible impact

Operational Phase

Once the development is operational, the potential noise impacts to the surrounding environment are minimal. The residential aspect of the development is not expected to generate any significant noise sources over and above those which form part of the existing environment at neighbouring residential areas (road traffic noise, estate vehicle movements, children playing etc.) and hence no significant impact is expected from this area of the development site.

The main potential noise impact associated with the proposed development is considered therefore to relate to the generation of additional traffic to and from the site as a result of the new residential and commercial buildings. Potential noise impacts also relate to operational plant serving the commercial and apartment buildings, where relevant.

Once operational, there are no vibration sources associated with the development site.

Additional Vehicular Traffic on Surrounding Roads

Traffic flows associated with the operational phase of the proposed development have been provided Waterman Moylan. Information on development related traffic onto the existing road network has been used to determine the predicted change in noise levels in the vicinity of a number of roads in the area surrounding the proposed development for the opening year 2026 and design year of 2041. The information is provided for both the Do Nothing scenario (i.e. the proposed development is not built) and the Do Something scenario which assumes the full development is constructed and operational.

Table 8.15 and 8.16 summarise the calculated change in noise levels along the assessed road links associated with the addition of development related traffic.

Link	Description	2026 Do Nothing (AADT)	2026 Do Something (AADT)	Calculated Change in Noise Levels, dB
Jct 1 - Arm A	Grange Cross Road	4,435	4,736	0.3
Jct 1 - Arm B	Brennanstown	3,780	4,958	1.2
Jct 1 - Arm C	Glenamuck Road N	8,873	9,411	0.3
Jct 1 - Arm D	Brighton Road	3,211	3,392	0.2
Jct 2 - Arm A	Carrickmines Ave	793	793	0.0
Jct 2 - Arm B	Brennanstown Road (E)	3,189	4,367	1.4
Jct 2 - Arm C	Brennanstown Road (W)	1,391	2,404	2.4
Jct 3 - Arm A	Brennanstown Road (W)	3,136	4,150	1.2
Jct 3 - Arm B	Brennanstown Road (E)	3,030	4,209	1.4
Jct 3 - Arm C	Brennanstown Vale	192	192	0.0
Jct 4- Arm A	Brennanstown Wood	752	752	0.0
Jct 4 - Arm B	Brennanstown Road (E)	2,379	3,557	1.7

Jct 4 - Arm C	Manor House (Driveway)	6	6	0.0
Jct 4 - Arm D	Brennanstown Road (W)	2,958	3,971	1.3
Jct 5 - Arm A	Apollo/Appledore.	22	22	0.0
Jct 5 - Arm B	Brennanstown Road (E)	2,495	2,676	0.3
Jct 5 - Arm C	Barrington Tower	2,089	3,476	2.2
Jct 5 - Arm D	Brennanstown Road (W)	388	1,401	5.6

Table 8.15 Change in Traffic Noise Levels for Opening Year 2026

Link	Description	2041 Do Nothing (AADT)	2041 Do Something (AADT)	Calculated Change in Noise Levels, dB
Jct 1 - Arm A	Grange Cross Road	4,985	5,286	0.3
Jct 1 - Arm B	Brennanstown	4,146	5,324	1.1
Jct 1 - Arm C	Glenamuck Road N	9,932	10,471	0.2
Jct 1 - Arm D	Brighton Road	3,597	3,778	0.2
Jct 2 - Arm A	Carrickmines Ave	894	894	0.0
Jct 2 - Arm B	Brennanstown Road (E)	3,480	4,659	1.3
Jct 2 - Arm C	Brennanstown Road (W)	1,474	2,487	2.3
Jct 3 - Arm A	Brennanstown Road (W)	3,440	4,453	1.1
Jct 3 - Arm B	Brennanstown Road (E)	3,301	4,480	1.3
Jct 3 - Arm C	Brennanstown Vale	217	217	0.0
Jct 4- Arm A	Brennanstown Wood	770	770	0.0
Jct 4 - Arm B	Brennanstown Road (E)	2,634	3,813	1.6
Jct 4 - Arm C	Manor House (Driveway)	7	7	0.0
Jct 4 - Arm D	Brennanstown Road (W)	3,239	4,252	1.2
Jct 5 - Arm A	Apollo/Appledore.	25	25	0.0
Jct 5 - Arm B	Brennanstown Road (E)	2,746	2,927	0.3
Jct 5 - Arm C	Barrington Tower	2,353	3,740	2.0
Jct 5 - Arm D	Brennanstown Road (W)	1,401	1,427	0.1

Table 8.16 Change in Traffic Noise Levels for Design Year 2041

The assessment has indicated that traffic volume increases are negligible when added to the existing road network. The calculated change in traffic noise of 3dB(A) or less along all link roads in the immediate vicinity of the development site except the road link name Junction 5 – Arm D which is discussed below. Reference to Table 10.5 confirms that a change in noise level of less than 3dB(A) is not significant.

In respect of Junction 5 – Arm D, the although the change in noise level in the opening year, examination of the traffic flow parameters of 1401 vehicles AADT, 1% HGV and a speed of 50 km/h indicates the noise level at 10m from the road edge shows that the expected noise level is of the order of 52 dB L_{den}, which is of the same order of the measured noise levels at unattended survey location UN2.

In summary, the predicted increase in noise levels associated with the addition of development related traffic along the surrounding road network is an imperceptible impact of long-term, neutral effect.

Building Services

Once operational, there will be building services plant items required to serve the commercial and residential aspect of the development. These will typically be limited to heating and cooling plant and extract units, depending on the building design and user requirements. The plant items are mainly at basement level and at roof levels.

The exact layout or type of building services plant has not yet been established, therefore it is not possible to calculate noise levels to the surrounding environment. In this instance, is it best practice to set appropriate noise limits that will inform the detailed design during the selection and layout of building services for the development. Plant items will be selected, designed and located so that there is no negative impact on sensitive receivers within the development itself. The cumulative operational noise level from building services plant at the nearest noise sensitive location within the development (e.g. apartments, etc.) will be designed/attenuated to meet the relevant BS 4142 noise criteria for day and night-time periods as set out in this assessment. Based on the baseline noise data collected for this assessment it is considered an appropriate design criterion is the order of 40 dB $L_{Aeq,15min}$. This limit is set in order to achieve acceptable internal noise levels within residential spaces based on prevailing noise levels in the area.

Taking into account that sensitive receivers within the development are much closer than off-site sensitive receivers, then 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.

In respect of basement carpark ventilation plant, due to their location at ground level within the site, there is the potential for noise to affect residential units within the proposed development itself. Where required, additional attenuation will be incorporated into the design such that the noise level from the proposed fans does not exceed 40 dB(A) at 3m from the basement ventilation louvres in order to protect residential amenity of the spaces.

Again, taking into account that sensitive receivers within the development are much closer than off-site sensitive receivers, then 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 INWARD NOISE IMPACT ASSESSMENT

ProPG Stage 1 – Noise Risk Assessment

Methodology

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 8.14 presents the basis of the initial noise risk assessment; it provides appropriate risk categories for a range of continuous noise levels either measured and/or predicted on site.

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

Paragraph 2.9 of ProPG states that:

> *"The noise risk assessment may be based on measurements or prediction (or a combination of both) as appropriate and should aim to describe noise levels over a "typical worst case" 24 hour day either now or in the foreseeable future."*
>
> *"The risk assessment should not include the impact of any new or additional mitigation measures that may subsequently be included in development proposals for the site and proposed as part of a subsequent planning application. In other words, the risk assessment should include the acoustic effect of any existing site features that will remain (e.g. retained buildings, changes in ground level) and exclude the acoustic effect of any site features that will not remain (e.g. buildings to be demolished, fences and barriers to be removed) if development proceeds."*

Giving consideration to the measured and predicted noise levels presented in the previous sections the initial site noise risk assessment has concluded that the level of risk across the site varies from low to medium across the site.

ProPG states the following with respect to low, medium and high risks:

Low Risk	At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.
Medium Risk	As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development.
High Risk	High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice.

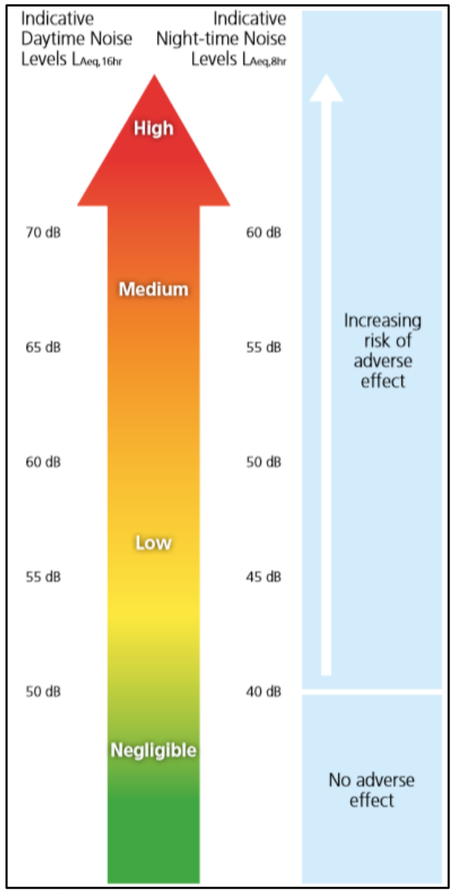

Figure 8.14 ProPG Stage 1 - Initial Noise Risk Assessment

Given the above it can be concluded that the development site may be categorised as '*low to medium*' and as such an Acoustic Design Strategy will be required to demonstrate that suitable care and attention has been applied in mitigating and minimising noise impact to such an extent that an adverse noise impact will be avoided in the final development. It should be noted that ProPG states the following with regard to how the initial site noise risk is to be used,

> *"2.12 It is important that the assessment of noise risk at a proposed residential development site is not the basis for the eventual recommendation to the decision maker. The recommended approach is intended to give the developer, the noise practitioner, and the decision maker an early indication of the likely initial suitability of the site for new residential development from a noise perspective and the extent of the acoustic issues that would be faced. Thus, a site considered to be high risk will be recognised as presenting more acoustic challenges than a site considered as low risk. A site*

> *considered as negligible risk is likely to be acceptable from a noise perspective and need not normally be delayed on noise grounds. A potentially problematical site will be flagged at the earliest possible stage, with an increasing risk indicating the increasing importance of good acoustic design."*

Therefore, following the guidance contained in ProPG does not preclude residential development on sites that are identified as having medium or high-risk noise levels. It merely identifies the fact that a more considered approach will be required to ensure the developments on the higher risk sites are suitable designed to mitigate the noise levels. The primary goal of the approach outlined in ProPG is to ensure that the best possible acoustic outcome is achieved for a particular site.

ProPG Stage 2 – Acoustic Design Statement

Element 1 – Good Acoustic Design Process

ProPG Guidance

In practice, good acoustic design should deliver the optimum acoustic design for a particular site without adversely affecting residential amenity or the quality of life or occupants or compromising other sustainable design objectives. It is important to note that ProPG specifically states that good acoustic design is not equivalent to overdesign or "gold plating" of all new development but that it seeks to deliver the optimum acoustic environment for a given site.

Section 2.23 of the ProPG outlines the following checklist for Good Acoustic Design (GAD):

- Check the feasibility of relocating, or reducing noise levels from relevant sources;
- Consider options for planning the site or building layout;
- Consider the orientation of proposed building(s);
- Select construction types and methods for meeting building performance requirements;
- Examine the effects of noise control measures on ventilation, fire regulation, health and safety, cost, CDM (construction, design and management) etc;
- Assess the viability of alternative solutions; and,
- Assess external amenity area noise.

In the context of the proposed development, each of the considerations listed above have been addressed in the following subsections.

Application of GAD Process to Proposed Application

Relocation or Reduction of Noise from Source

The main site roads are not under the control of the developer and therefore it is beyond the scope of this development to introduce any noise mitigation at source.

Planning, Layout and Orientation

Although the site is quite constrained, consideration has been given to the location of both the buildings and external amenity areas. In the first instance, a primary consideration was to maximise the distance between the busy roads and the buildings, in so far as possible. Where this cannot be accommodated additional façade noise attenuation measures will be incorporated into the design.

The orientation of the site is such that the buildings themselves screen the common external amenity areas associated with the development.

Select Construction Types for meeting Building Regulations

Masonry constructions will be used in constructing the external walls of the development. This construction type offers high levels of sound insulation performance. However, as is typically the case the glazed elements and ventilation will be the weakest elements in the façade in terms of sound insulation performance.

Consideration will therefore be given to the provision of upgraded glazing and mechanical ventilation. The proposal here will be to provide dwelling units with glazed elements that have good acoustic insulation properties so that when the windows are closed the noise levels internally are good.

Impact of noise control measures on fire, health and safety etc:

The good acoustic design measures that have been implemented on site, e.g. locating properties away from the road and placing outdoor space on the quiet side of buildings, are considered to be cost neutral and do not have any significant impact on other issues.

Assess Viability of Alternative Solutions:

Due to the height and location of the proposed buildings it is considered that any acoustic screens along the boundary of the site to attenuate traffic noise would be ineffective.

Assess External Amenity Area Noise:

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

"The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB $L_{Aeq,16hr}$."

Noise levels across external areas (i.e. courtyards) associated with the development are discussed in the appropriate section below.

Summary:

Considering the constraints of the site, in so far as possible and without limiting the extent of the development area, the principles of Good Acoustic Design have been applied to the development. In terms of viable alternatives to acoustic treatment of façade elements, there are no further options for mitigation outside of proprietary acoustic glazing and mechanical ventilation.

Element 2 – Internal Noise Guidelines

Internal Noise Criteria

Element 2 of the ProPG document sets out recommended internal noise targets derived from BS 8233 and WHO's Community Noise Guidelines. The recommended indoor ambient noise levels are set out in Table 8.6 and are based on annual average data, that is to say they omit occasional events such as New Year's Eve.
Giving consideration to the external noise levels, it will be necessary to use acoustic glazing and mechanical ventilation to meet the recommended internal noise levels.

Proposed Façade Treatment
The British Standard BS EN 12354-3: 2000: Building acoustics – Estimation of acoustic performance of buildings from the performance of elements – Part 3: Airborne sound insulation against outdoor sound provides a calculation methodology for determining the sound insulation performance of the external envelope of a building. The method is based on an elemental analysis of the building envelope and can take into account both the direct and flanking transmission paths.

The Standard allows the acoustic performance of the building to be assessed taking into account the following:

- Construction type of each element (i.e. windows, walls, etc.);
- Area of each element;
- Shape of the façade, and;
- Characteristics of the receiving room.

The principles outlined in BS EN 12354-3 are also referred to in BS8233 and Annex G of BS8233 provides a calculation method to determine the internal noise level within a building using the composite sound insulation performance calculated using the methods outlined in BS EN 12354-3. The methodology outlined in Annex G of BS8233 has been adopted here to determine the required performance of the building facades.

Glazing

As is the case in most buildings, the glazed elements of the building envelope are typically the weakest element from a sound insulation perspective. In this instance it has been calculated that the various facades are to be provided with glazing that, when closed, achieve the minimum sound insulation performance as set out in Table 8.17

SRI (dB) per Octave Band Centre Frequency (Hz)						Nominal Rw (dB)
125	250	500	1k	2k	4k	
24	20	25	35	38	35	31

Table 8.17 Sound Insulation Performance Requirements for Glazing, SRI (dB)

Test data should be sought from the supplier of the glazing at detailed design stage to ensure that the acoustic specification is met.

It is important to note that the acoustic performance specifications detailed herein are minimum requirements which apply to the overall glazing system. In the context of the acoustic performance specification the 'glazing system' is understood to include any and all of the component parts that form part of the glazing element of the façade, i.e. glass, frames, seals, openable elements etc.

The assessment has demonstrated that the recommended internal noise criteria can be achieved through consideration of the proposed façade elements at the design stage. The calculated glazing specifications are preliminary and are intended to form the basis for noise mitigation at the detailed design stage. Consequently, these may be subject to change as the project progresses.

Wall Construction

In general, all wall constructions (i.e. block work or concrete) offer a high degree of sound insulation, much greater than that offered by the glazing systems. Therefore, noise intrusion via the wall construction will be minimal. The calculated internal noise levels across the building façade have assumed a minimum sound reduction index of 63 dB Rw for this construction.

Ventilation

The ventilation strategy for the development will be in accordance with Part F of the Building Regulations and will be finalised at the detail design stage. Options which will be considered to achieve compliance with background ventilation requirements will be adjustable hit and miss acoustic ventilators or trickle vents built into the façade or window frames respectively. It is recommended that the wall vents be specified to achieve a sound insulation performance of 36 dB $D_{n,e,w}$. This specification can be achieved by a range of proprietary vents in either through frame trickle vent or through wall vents.

Internal Noise Levels

Taking into account the external façade levels and the specified building envelope, the internal noise levels have been calculated. In all instances the good internal noise criteria are achieved for daytime and night-time periods.

Element 3 – External Amenity Area Noise Assessment

In terms of the external amenity areas and courtyards proposed with the development, the typical noise levels in the open areas between the buildings is expected to be of the order of 65 dB L_{Aeq}. This noise level is above the ideal range of recommended range of noise levels from ProPG of between 50 – 55dB $L_{Aeq,16h}$r. However, the noise levels remain below the threshold set out in the Dún Laoghaire Rathdown County Council Noise Action Plan 2018 – 2023 where a daytime level above 70 dB(A) is considered undesirably high.

Element 4 – Assessment of Other Relevant Issues

Element 4 gives consideration to other factors that may prove pertinent to the assessment, the items that are defined in the document that are relevant here are:

- 4(i) compliance with relevant national and local policy
- 4(ii) magnitude and extent of compliance with ProPG

Each is discussed in turn below.

Compliance with Relevant National and Local Policy

There are no National policy documents relating to the acoustic design of residential dwellings. Locally the Dún Laoghaire Rathdown County Council Noise Action Plan 2018 – 2023 specifies that the guidance contained within ProPG should be used in assessing the noise impact on new residential developments. This Acoustic Design Statement has been prepared in compliance with the requirements of ProPG and therefore complies with the requirements of local policy.

Magnitude and Extent of Compliance with ProPG

As discussed within this report the following conclusions have been drawn with regards to the extent of compliance with ProPG:

- All dwellings as part of the development have been designed to achieve the good level of internal noise levels specified within ProPG.
- All shared external amenity areas have been shown to have an external noise level that complies with the recommended criterion set out in ProPG.

Based on the preceding sections it is concluded that the proposed development is in full compliance with the requirements of ProPG.

Acoustic Design Statement Conclusion

An initial site noise risk assessment has been carried out on the proposed residential development. The assessment has classified the development site as having a range of noise risks associated ranging from low to medium risk. This was determined through a combination of measurements of noise levels on site and through review of the EPA Noise Maps.

Further discussion is presented in terms of the likely noise impact of both the external and internal areas of the proposed development. It has been found that the majority of the inhabitants will have access to a quiet external area that is screened by the development itself from road traffic noise. All habitable rooms will achieve a good internal noise environment with the appropriate acoustic glazing and mechanical ventilation.

8.7 Potential Cumulative Impacts

The baseline measured baseline noise levels include noise contributions from the M50, the Luas, and other existing traffic in the surrounding area. In particular, this information is used in the assessment of inward noise impact on the proposed development.

The traffic data used in Section 8.5 includes the effect of the growth of existing traffic over time, the traffic flows due to the proposed development plus the vehicle flows attributable to the approved Brennanstown Wood and the approved Doyle's Nurseries developments.

Other operational noise sources i.e. the building services plant are local to the site and no other nearby developments will have an influence on their impact.

8.8 MITIGATION MEASURES

Construction Phase

Noise

The contract documents will clearly specify the construction noise criteria included in this chapter which the construction works must operate within. The Contractor undertaking the construction of the works will be obliged to take specific noise abatement measures and comply with the recommendations of BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites - Noise and the European Communities (Noise Emission by Equipment for Use Outdoors) Regulations, 2001. These measures will ensure that:

- No plant used on site will be permitted to cause an ongoing public nuisance due to noise;
- The best means practicable, including proper maintenance of plant, will be employed to minimise the noise produced by on site operations;
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the contract;
- Compressors will be attenuated models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers;
- Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use;
- Any plant, such as generators or pumps that is required to operate outside of normal permitted working hours will be surrounded by an acoustic enclosure or portable screen;

BS 5228 -1:2009+A1 2014 includes guidance on several aspects of construction site practices, which include, but are not limited to:

- Selection of quiet plant
- Control of noise sources
- Screening
- Hours of work
- Liaison with the public

Further comment is offered on these items in the following paragraphs, however specific control measures relating to construction activities undertaken by the contractor will be set out within the Construction Environmental Management Plan (CEMP) to be prepared in advance of the works. An Outline Construction Environmental Management Plan (OCEMP) has been prepared as part of this application to address the key environmental impacts and sets out the key environmental controls. In relation to noise and vibration control the OCEMP includes outline best practice measures from BS 5228 (2009 +A1 2014). These are also discussed in the following sections.

Noise control measures that will be considered include the selection of quiet plant, enclosures and screens around noise sources, limiting the hours of work and noise monitoring. The contractor will be required to conduct construction noise predictions prior to works taking place and put in place the most appropriate noise control measures depending on the level of noise reduction required at any one location.

Selection of Quiet Plant

The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. The least noisy item of plant will be selected wherever possible. Should a particular item of plant already on the site be found to generate high noise levels, the first action will be to identify whether or not said item can be replaced with a quieter alternative.

For static plant such as compressors and generators used at work areas such as construction compounds etc., the units will be supplied with manufacturers' proprietary acoustic enclosures where possible.

In order to reduce noise levels during the works phases with highest noise levels (site clearance, demolition, ground breaking etc.) when occurring along the closest boundaries, the contractor will evaluate the choice of excavation, breaking or other working method taking into account various ground conditions and site constraints. Where possible, where alternative lower noise generating equipment that would economically achieve, in the given ground conditions, equivalent structural / excavation / breaking results, these will be selected to minimise potential disturbance.

The decision regarding the excavation techniques, rock breaking, crushing etc. to be used on a site will normally be governed by other engineering, environmental constraints. In these instances, it may not be possible for technical reasons to replace a noisy process by a quieter alternative. Even if it is possible, the adoption of a quieter method may prolong the overall process, the net result being that the overall disturbance to the community will not necessarily be reduced.

General Comments on Noise Control at Source

If replacing a noisy item of plant is not a viable or practical option, consideration will be given to noise control "at source". This refers to the modification of an item of plant, or the application of improved sound reduction methods in consultation with the supplier or the best practice use of equipment and materials handling to reduce noise.

- For mobile plant items such as cranes, dump trucks, excavators and loaders, the installation of an acoustic exhaust and/or maintaining enclosure panels closed during operation can reduce noise levels by up to 10 dB. Mobile plant will be switched off when not in use and not left idling;
- For piling plant, noise reduction can be achieved by enclosing the driving system in an acoustic shroud. For steady continuous noise, such as that generated by diesel engines, it is possible to reduce the noise emitted by fitting a more effective exhaust silencer system or utilising an acoustic canopy to replace the normal engine cover;
- For percussive tools such as pneumatic concrete breakers, a number of noise control measures include fitting muffler or sound reducing equipment to the breaker 'tool' and ensuring any leaks in the air lines are sealed. Erection of localised screens around breaker or drill bit when in operation in close proximity to noise sensitive boundaries are other suitable forms of noise reduction;
- For all materials handling, the contractor will ensure that best practice site noise control measures are implemented including ensuring that materials are not dropped from excessive heights and drop chutes/dump trucks are lined with resilient materials, where relevant.
- Where compressors, generators and pumps are located in areas in close proximity to noise sensitive properties/ areas and have potential to exceed noise criterion, these will be surrounded by acoustic lagging or enclosed within acoustic enclosures providing air ventilation;
- Resonance effects in panel work or cover plates can be reduced through stiffening or application of damping compounds; rattling and grinding noises can be controlled by fixing resilient materials in between the surfaces in contact;
- Demountable enclosures can also be used to screen operatives using hand tools and may be moved around site as necessary;
- All items of plant will be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.

Screening

Typically screening is an effective method of reducing the noise level at a receiver location and can be used successfully as an additional measure to other forms of noise control. The effectiveness of a noise screen will depend on the height and length of the screen, its mass, and its position relative to both the source and receiver.

The length of the screen should in practice be at least five times the height, however, if shorter sections are necessary then the ends of the screen will be wrapped around the source. BS 5228 -1:2009+A1 states that on level sites the screen should be placed as close as possible to either the source or the receiver. The construction of the barrier will be such that there are no gaps or openings at joints in the screen material. In most practical situations the effectiveness of the screen is limited by the sound transmission over the top of the barrier rather than the transmission through the barrier itself. In practice, screens constructed of materials with a mass per unit of surface area greater than 10 kg/m^2 will give adequate sound insulation performance.

Construction noise calculations have assumed a partial line of sight (-5dB) is achieved using a solid 2.4m high standard construction site hoarding. It will be a requirement for works occurring in proximity to the closest noise sensitive locations (NSL1) that the line of sight is further blocked such that a reduction of at least 10dB is achieved between the noise sensitive façade and construction activities. A reduction of this order can be achieved using a higher perimeter screen or using localised screening around specific items of plant.

Annex B of BS 5228-1:2009+A1:2014 (Figures B1, B2 and B3) provide typical details for temporary and mobile acoustic screens, sheds and enclosures that can be constructed on site from standard materials. In addition, careful planning of the site layout will also be considered. The placement of temporary site buildings such as offices and stores between the site and sensitive locations can provide a good level of noise screening during the phasing of works.

Hours of Work

Construction noise impacts will be controlled through strict working hours. In line with the Constriction Environmental Management Plan: "Site development and building works will only be carried out between the hours of 0800 to 1800 Mondays to Fridays inclusive and between 0800 and 1400 hours on Saturdays There will be no construction works carried out on Sundays or public holidays. Deviation from these times will only take place when written approval is granted by DLRCC in exceptional circumstances"

Consideration will be given to the scheduling of activities in a manner that reflects the location of the site and the nature of neighbouring properties. Each potentially noisy event/activity will be considered on its individual merits and scheduled according to its noise level, proximity to sensitive locations and possible options for noise control.

Liaison with the Public

Clear forms of communication will be established between the contractor and noise sensitive areas in proximity so that residents or building occupants are aware of the likely duration of activities likely to generate higher noise or vibration.

The duration of piling, excavation, breaking and other high noise or vibration activities works is usually short in relation to the length of construction work as a whole, and the amount of time spent working near to sensitive areas can represent only a part of the overall period. Subjective impacts during these phases can be significantly reduced if timelines and potential impacts are known in advance.

A designated noise liaison officer will be appointed to site during construction works. All noise complaints will be logged and followed up in a prompt fashion by the liaison officer.

All construction works will be required to operate within the Construction Noise Limits Outlined in Table 8.1 of the EIAR. The contractor will be required to take specific noise abatement measures and comply with the recommendations of BS 5228-1:2009+A1:2014

Vibration

On review of the likely vibration levels associated with construction activities, it is concluded that the construction of the proposed development will not give rise to vibration that is either significantly intrusive or capable of giving rise to structural or cosmetic damage to adjacent buildings.

In the case of vibration levels giving rise to human discomfort, in order to minimise such impacts, the following measures shall be implemented during the construction period:

- A clear communication programme will be established to inform adjacent building occupants in advance of any potential intrusive works which may give rise to vibration levels likely to exceed perceptible levels. The nature and duration of the works will be clearly set out in all communication circulars;
- Alternative less intensive working methods and/or plant items shall be employed, if significant thresholds are exceeded;
- Appropriate vibration isolation shall be applied to plant, if significant thresholds are exceeded.

Barrington Tower is a protected structure which is to be retained, restored and re-used within the proposed development. Where proposed works have the potential to be at or to exceed the vibration limit values at the tower base, monitoring will be undertaken at the protected structure.

All construction works will be required to operate within the Construction Vibration Limits outlined in Table 8.3 of the EIAR.

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.

Building Services Plant

Taking into account that sensitive receivers within the development are much closer than off-site sensitive receivers, once the relevant noise criterion (i.e. 40 dB $L_{Aeq,15min}$ at noise sensitive locations within the proposed development itself) is achieved within the development it is expected that there will be no negative impact at sensitive receivers off site, and therefore no further mitigation required.

Inward Noise Impact

At detailed design stage, a glazing acoustic performance specification and vent specifications such as those in section 8.6 will ensure suitable internal noise levels within the living spaces.

No mitigation measures are required in respect of noise in external amenity areas.

8.9 RESIDUAL IMPACTS

This section describes the degree of environmental change that will occur after the proposed mitigation measures have taken effect.

Construction Phase

During the construction phase of the project there is the potential for short-term noise effects on nearby noise sensitive properties due to noise emissions from site activities. The application of binding noise limits and hours of operation, along with implementation of appropriate noise and vibration control measures, will ensure that noise and vibration impact is kept to a minimum as far as practicable.

Likely noise and vibration effects during the construction phase will be local, negative, short-term and moderate.

Operational Phase

Building Services Plant

Noise levels associated with operational plant will be designed to be within the adopted day and night-time noise limits at the nearest noise sensitive properties once the design criteria in Section 8.3 are adopted. Assuming the operational noise levels do not exceed the adopted design goals, the resultant residual noise effects from this source will be of negative, not significant, long-term impact.

Additional Vehicular Traffic on Surrounding Roads

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 effects from noise contribution of increased traffic is considered to be of neutral, imperceptible and long-term effect to nearby noise sensitive locations.

8.10'DO NOTHING' SCENARIO

In the absence of the proposed development being constructed, the noise environment at the nearest noise sensitive locations and within the development site will remain largely unchanged resulting in a neutral and local impact in the long-term.

8.11 WORST CASE SCENARIO

The likelihood of a significant adverse noise or vibration impact on the environment as a result of a major accident or natural disaster is extremely unlikely and would have minor consequences for both human health and environmental effects.

8.12 MONITORING & REINSTATEMENT

During the demolition and construction phase, noise and vibration monitoring shall be carried out by the contractor to ensure that the recommended threshold levels set out in Table 8.1 or any conditioned noise and vibration limits are not exceeded.

Noise monitoring will be conducted in accordance with the International Standard ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise and be located a distance of greater than 3.5m away from any reflective surfaces, e.g. walls, in order to ensure a free-field measurement without any influence from reflected noise sources.

Vibration monitoring will be conducted in accordance with BS 7385-1 (1990) Evaluation and measurement for vibration in buildings — Part 1: Guide for measurement of vibrations and evaluation of their effects on buildings or BS 6841 (1987) Guide to Measurement and Evaluation of Human Exposure to Whole-Body Mechanical Vibration and Repeated Shock.

Noise or vibration monitoring is not required once the development is operational.

8.13 DIFFICULTIES IN COMPILING INFORMATION

No difficulty was encountered in the preparation of this Chapter

8.14 REFERENCES

- EPA Guidelines on the Information to be contained in Environmental Impact Statements, (EPA, 2002);
- EPA Advice Notes on Current Practice (in the preparation of Environmental Impact Statements), (EPA, 2003);
- EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports, (Draft August 2017);
- EPA Advice Notes for Preparing Environmental Impact Statements, (Draft, September 2015);
- BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise.
- BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2 – Vibration.
- BS 7385-2:1993 Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration;
- British Standard BS 4142: 2014+A1:2019: Methods for Rating and Assessing Industrial and Commercial Sound.
- Design Manual for Roads and Bridges, 2011;
- ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise.
- World Health Organisation Environmental Noise Guidelines for the European Region, 2018;
- Calculation of Road Traffic Noise, UK Department of Transport, HMSO, 1988.

9 AIR AND CLIMATE

9.1 INTRODUCTION

This chapter assesses the likely air quality and climate impacts associated with the proposed strategic housing development at 'Barrington Tower', Brennanstown Road, Dublin 18. The development will comprise a 'Build to Rent' (BTR) apartment development consisting of 8 no. blocks. The BTR development will also include Resident Support Facilities, Resident Services and Amenities. The development includes a creche and a retail unit, car and cycle parking spaces and all associated site development works. A full description of the development can be found in Chapter 3.

This chapter was completed by Ciara Nolan, a Senior Environmental Consultant in the air quality section of AWN Consulting Ltd. She holds an MSc. (First Class) in Environmental Science from University College Dublin and has also completed a BSc. in Energy Systems Engineering. She is an Associate Member of both the Institute of Air Quality Management (AMIAQM) and the Institution of Environmental Science (AMIEnvSc). She has been active in the field of air quality for 5 years, with a primary focus on consultancy. She has prepared air quality and climate impact assessments for numerous EIARs for a range of projects including commercial, residential, industrial, pharmaceutical and data centre developments.

9.2 METHODOLOGY

Criteria for Rating of Impacts

Ambient Air Quality Standards

In order to reduce the risk to health from poor air quality, national and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values or "Air Quality Standards" are health or environmental-based levels for which additional factors may be considered. For example, natural background levels, environmental conditions and socio-economic factors may all play a part in the limit value which is set (see Table 9.1 and Appendix 9.1).

Air quality significance criteria are assessed on the basis of compliance with the appropriate standards or limit values. The applicable standards in Ireland include the Air Quality Standards Regulations 2011, which incorporate EU Directive 2008/50/EC, which has set limit values for a number of pollutants. The limit values for NO_2, PM_{10} and $PM_{2.5}$, are relevant to this assessment as these are traffic related pollutants (see Table 9.1). Although the EU Air Quality Limit Values are the basis of legislation, other thresholds outlined by the EU Directives are used which are triggers for particular actions (see Appendix 9.1).

With regards to larger dust particles that can give rise to nuisance dust, there are no statutory guidelines regarding the maximum dust deposition levels that may be generated during the construction phase of a development in Ireland. Furthermore, no specific criteria have been stipulated for nuisance dust in respect of this development.

With regard to dust deposition, the German TA-Luft standard for dust deposition (non-hazardous dust) (German VDI, 2002) sets a maximum permissible emission level for dust deposition of 350 mg/(m^2*day) averaged over a one year period at any receptors outside the site boundary. Recommendations from the Department of the Environment, Heritage & Local Government (DEHLG, 2004) apply the Bergerhoff limit of 350 mg/(m^2*day) to the site boundary of quarries. This limit value can also be implemented with regard to dust impacts from construction of the proposed development.

Pollutant	Regulation [Note 1]	Limit Type	Value
Nitrogen Dioxide	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	200 µg/m^3
		Annual limit for protection of human health	40 µg/m^3
		Critical level for protection of vegetation	30 µg/m^3 NO + NO_2
Particulate Matter (as PM_{10})	2008/50/EC	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50 µg/m^3
		Annual limit for protection of human health	40 µg/m^3
Particulate Matter (as $PM_{2.5}$)	2008/50/EC	Annual limit for protection of human health	25 µg/m^3

Note 1 EU 2008/50/EC – Clean Air For Europe (CAFÉ) Directive replaces the previous Air Framework Directive (1996/30/EC) and daughter directives 1999/30/EC and 2000/69/EC

Table 9.1 Air Quality Standards Regulations

Climate Agreements

Ireland is party to both the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. The Paris Agreement, which entered into force in 2016, is an important milestone in terms of international climate change agreements and includes an aim of limiting global temperature increases to no more than 2°C above pre-industrial levels with efforts to limit this rise to 1.5°C. The aim is to limit global GHG emissions to 40 gigatonnes as soon as possible whilst acknowledging that peaking of GHG emissions will take longer for developing countries. Contributions to GHG 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 in the Paris Agreement on elevating adaption onto the same level as action to cut and curb emissions.

In order to meet the commitments under the Paris Agreement, the EU enacted *Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No. 525/2013* (the Regulation). The Regulation aims to deliver, collectively by the EU in the most cost-effective manner possible, reductions in GHG emissions from the Emission Trading Scheme (ETS) and non-ETS sectors amounting to 43% and 30%, respectively, by 2030 compared to 2005. Ireland's obligation under the Regulation is a 30% reduction in non-ETS greenhouse gas emissions by 2030 relative to its 2005 levels.

In 2015, the Climate Action and Low Carbon Development Act 2015 (No. 46 of 2015) (Government of Ireland, 2015) was enacted (the Act). The purpose of the Act was to enable Ireland '*to pursue, and achieve, the transition to a low carbon, climate resilient and environmentally sustainable economy by the end of the year 2050*' (3.(1) of No. 46 of 2015). This is referred to in the Act as the '*national transition objective*'. The Act made provision for, *inter alia*, a national adaptation framework. In addition, the Act provided for the establishment of the Climate Change Advisory Council with the function to advise and make recommendations on the preparation of the national mitigation and adaptation plans and compliance with existing climate obligations.

The first Climate Action Plan (CAP) was published by the Irish Government in June 2019 (Government of Ireland, 2019a). The Climate Action Plan 2019 outlined the current status across key sectors including Electricity, Transport, Built Environment, Industry and Agriculture and outlined the various broadscale measures required for each sector to achieve ambitious decarbonisation targets. The 2019 CAP also detailed the required governance arrangements for implementation including carbon-proofing of policies, establishment of carbon budgets, a strengthened Climate Change Advisory Council and greater accountability to the Oireachtas. The Government published the second Climate Action Plan in November 2021 (Government of Ireland, 2021a). The plan contains similar elements as the 2019 CAP and aims to set out how Ireland can reduce our greenhouse gas emissions by 51% by 2030 (compared to 2018 levels) which is in line with the EU ambitions, and a longer-term goal of to achieving net-zero emissions no later than 2050. The 2021 CAP outlines that emissions from the Built Environment sector must be reduced to 4 -5 $MtCO_2e$ by 2030 in order to meet our climate targets. This will require further measures in addition to those committed to in the 2019 CAP. This will include phasing out the use of fossil fuels for the space and water heating of buildings, improving the fabric and energy of our buildings, and promoting the use of lower carbon alternatives in construction.

Following on from Ireland declaring a climate and biodiversity emergency in May 2019 and the European Parliament approving a resolution declaring a climate and environment emergency in Europe in November 2019, the Government approved the publication of the General Scheme for the Climate Action (Amendment) Bill 2019 in December 2019 (Government of Ireland 2019b) followed by the publication of the Climate Action and Low Carbon Development (Amendment) Act 2021 (No. 32 of 2021) (hereafter referred to as the 2021 Climate Act) in July 2021 (Government of Ireland, 2021b). The 2021 Climate Act was prepared for the purposes of giving statutory effect to the core objectives stated within the CAP.

The purpose of the 2021 Climate Act is to provide for the approval of plans '*for the purpose of pursuing the transition to a climate resilient, biodiversity rich and climate neutral economy by no later than the end of the year 2050'*. The 2021 Climate Act will also '*provide for carbon budgets and a decarbonisation target range for certain sectors of the economy*'. The 2021 Climate Act defines the carbon budget as '*the total amount of greenhouse gas emissions that are permitted during the budget period*'. The 2021 Climate Act removes any reference to a national mitigation plan and instead refers to both the Climate Action Plan, as published in 2019, and a series of National Long Term Climate Action Strategies. In addition, the Environment Minister shall request each local authority to make a '*local authority climate action plan'* lasting five years and to specify the mitigation measures and the adaptation measures to be adopted by the local authority.

Construction Phase Methodology

Air Quality

The assessment focuses on identifying the existing baseline levels of PM_{10} and $PM_{2.5}$ in the region of the proposed development by an assessment of EPA monitoring data. Thereafter, the impact of the construction phase of the development on air quality was determined by a qualitative assessment of the nature and scale of dust generating construction activities associated with the proposed development.

Construction phase traffic also has the potential to impact air quality and climate. The UK DMRB guidance (UK Highways Agency, 2019), 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. The use of the UK guidance is recommended by the TII (2011) in the absence of specific Irish guidance, this approach is considered best practice and can be applied to any development that causes a change in traffic.

- Annual average daily traffic (AADT) changes by 1,000 or more;
- Heavy duty vehicle (HDV) AADT changes by 200 or more;
- A change in speed band;
- A change in carriageway alignment by 5m or greater.

The construction stage traffic will not increase by 1,000 AADT or 200 HDV AADT and therefore does not meet the above scoping criteria. As a result a detailed air assessment of construction stage traffic emissions has been scoped out from any further assessment as there is no potential for significant impacts to air quality.

Climate

The impact of the construction phase of the development on climate was determined by a qualitative assessment of the nature and scale of greenhouse gas generating construction activities associated with the proposed development.

Operational Phase Methodology

Air Quality

The air quality assessment has been carried out following procedures described in the publications by the EPA (2015; 2017) and using the methodology outlined in the guidance documents published by the UK Highways Agency (2019a) and UK Department of Environment Food and Rural Affairs (DEFRA) (2016; 2018). Transport Infrastructure Ireland (TII) reference the use of the UK Highways Agency and DEFRA guidance and methodology in their document *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* (2011). This approach is considered best practice in the absence of Irish guidance and can be applied to any development that causes a change in traffic.

In 2019 the UK Highways Agency DMRB air quality guidance was revised with *LA 105 Air Quality* replacing a number of key pieces of guidance (HA 207/07, IAN 170/12, IAN 174/13, IAN 175/13, part of IAN 185/15). This revised document outlines a number of changes for air quality assessments in relation to

road schemes, but can be applied to any development that causes a change in traffic. Previously the DMRB air quality spreadsheet was used for the majority of assessments in Ireland with detailed modelling only required if this screening tool indicated compliance issues with the EU air quality standards. Guidance from Transport Infrastructure Ireland (TII, 2011) recommends the use of the UK Highways Agency DMRB spreadsheet tool for assessing the air quality impacts from road schemes. However, the DMRB spreadsheet tool was last revised in 2007 and accounts for modelled years up to 2025. Vehicle emission standards up to Euro V are included but since 2017, Euro 6d standards are applicable for the new fleet. In addition, the model does not account for electric or hybrid vehicle use. Therefore, this a somewhat outdated assessment tool. The LA 105 guidance document states that the DMRB spreadsheet tool may still be used for simple air quality assessments where there is unlikely to be a breach of the air quality standards. Due to its use of a "dirtier" fleet, vehicle emissions would be considered to be higher than more modern models and therefore any results will be conservative in nature and will provide a worst-case assessment.

The 2019 UK Highways Agency DMRB air quality revised guidance *LA 105 Air Quality* states that modelling should be conducted for NO_2 for the base, opening and design years for both the do minimum (do nothing) and do something scenarios. Modelling of PM_{10} is only required for the base year to demonstrate that the air quality limit values in relation to PM_{10} are not breached. Where the air quality modelling indicates exceedances of the PM_{10} air quality limits in the base year then PM_{10} should be included in the air quality model in the do minimum and do something scenarios. Modelling of $PM_{2.5}$ is not required as there are currently no issues with compliance with regard to this pollutant. The modelling of PM_{10} can be used to show that the project does not impact on the $PM_{2.5}$ limit value as if compliance with the PM_{10} limit is achieved then compliance with the $PM_{2.5}$ limit will also be achieved. Historically modelling of carbon monoxide (CO) and benzene was required however, this is no longer needed as concentrations of these pollutants have been monitored to be significantly below their air quality limit values in recent years, even in urban centres (EPA, 2021a). The key pollutant reviewed in this assessment is NO_2. Concentrations of PM_{10} have been modelled for the base year to indicate that there are no potential compliance issues. Modelling of operational NO_2 concentrations has been conducted for the do nothing and do something scenarios for the opening year (2026) and design year (2041).

The TII guidance (2011) states that the assessment must progress to detailed modelling if:

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

The UK DMRB scoping criteria outlined above has been used in the current assessment to determine the road links required for inclusion in the modelling assessment. Sensitive receptors within 200m of impacted road links are included within the modelling assessment. Pollutant concentrations are calculated at these sensitive receptor locations to determine the impact of the proposed development in terms of air quality. The guidance states a proportionate number of representative receptors which are located in areas which will experience the highest concentrations or greatest improvements as a result of the proposed development are to be included in the modelling (UK Highways Agency, 2019a). The TII guidance (2011) defines sensitive receptor locations as: residential housing, schools, hospitals, places of worship, sports centres and shopping areas, i.e. locations where members of the public are likely to be regularly present. A total of five high sensitivity residential receptors (R1 – R5) were included in the modelling assessment and are detailed in Figure 9.1.

The following model inputs are required to complete the assessment using the DMRB spreadsheet tool: road layouts, receptor locations, annual average daily traffic movements (AADT), percentage heavy goods vehicles (%HGV), annual average traffic speeds and background concentrations. 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 document *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* (2011) details a methodology for determining air quality impact significance criteria for road schemes which can be applied to any project that causes a change in traffic. The degree of impact is determined based on both the absolute and relative impact of the proposed development. The TII significance criteria are outlined in Appendix 10 of the TII guidance and have been adopted for the proposed development. The significance criteria are based on NO_2 and PM_{10} as these pollutants are most likely to exceed the annual mean limit values (40 µg/m^3).

<u>Conversion of NO_x to NO_2</u>

NO_X ($NO + NO_2$) is emitted by vehicles exhausts. The majority of emissions are in the form of NO, however, with greater diesel vehicles and some regenerative particle traps on HGV's the proportion of NO_X emitted as NO_2, rather than NO is increasing. With the correct conditions (presence of sunlight and O_3) emissions in the form of NO, have the potential to be converted to NO_2.

Transport Infrastructure Ireland states the recommended method for the conversion of NOx to NO_2 in "*Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes*" (2011). The TII guidelines recommend the use of DEFRAs NOx to NO_2 calculator (2020) which was originally published in 2009 and is currently on version 8.1. This calculator (which can be downloaded in the form of an excel spreadsheet) accounts for the predicted availability of O_3 and proportion of NOx emitted as NO for each local authority across the UK. O_3 is a regional pollutant and therefore concentrations do not vary in the same way as concentrations of NO_2 or PM_{10}.

The calculator includes Local Authorities in Northern Ireland and the TII guidance recommends the use of 'Armagh, Banbridge and Craigavon' as the choice for local authority when using the calculator. The choice of Craigavon provides the most suitable relationship between NO_2 and NO_x for Ireland. The "All Non-Urban UK Traffic" traffic mix option was used.

<u>Update to NO_2 Projections using DMRB</u>

In 2011 the UK DEFRA published research (Highways England, 2013) on the long term trends in NO_2 and NO_X for roadside monitoring sites in the UK. This study marked a decrease in NO_2 concentrations between 1996 and 2002, after which the concentrations stabilised with little reduction between 2004 and 2010. The result of this is that there now exists a gap between projected NO_2 concentrations which UK DEFRA previously published and monitored concentrations. The impact of this 'gap' is that the DMRB

screening model can under-predict NO_2 concentrations for predicted future years. Subsequently, the UK Highways Agency published an Interim advice note (IAN 170/12) in order to correct the DMRB results for future years. This methodology has been used in the current assessment to predict future concentrations of NO_2 as a result of the proposed development.

Traffic Data Used in Modelling Assessment

Traffic flow information was obtained from Waterman Moylan consulting Engineers on 07/03/2022 for the purposes of this assessment. Data for the Do Nothing and Do Something scenarios for the base year 2021, opening year 2026 and design year 2041 were provided. The traffic data is detailed in Table 9.2. Only road links that met the DMRB scoping criteria and that were within 200m of receptors were included in the modelling assessment. Background concentrations have been included as per Section 9.3 of this chapter based on available EPA background monitoring data (EPA, 2021a).

This traffic data has also been used in the operational stage climate impact assessment.

Link No.	Road Name	Speed (kph)	% HGV	Base	Do Nothing		Do Something	
				2021	2026	2041	2026	2041
1	Brennanstown	50	3.00%	2,673	3,780	4,146	4,958	5,324
2	Brennanstown Road (E)	50	3.00%	2,127	3,189	3,480	4,367	4,659
3	Brennanstown Road (W)	50	12.00%	607	1,391	1,474	2,404	2,487
4	Brennanstown Road (W)	50	3.00%	2,217	3,136	3,440	4,150	4,453
5	Brennanstown Road (E)	50	3.00%	1,981	3,030	3,301	4,209	4,480
6	Brennanstown Road (E)	50	2.00%	1,866	2,379	2,634	3,557	3,813
7	Brennanstown Road (W)	50	3.00%	2,049	2,958	3,239	3,971	4,252
8	Barrington Tower	50	0.00%	1,927	2,089	2,353	3,476	3,740
9	Brennanstown Road (W)	50	1.00%	1	388	388	1,401	1,427

Table 9.2 Traffic Data used in Air & Climate Modelling Assessments

Figure 9.1 Approximate Location of Receptors used in Local Air Quality Modelling Assessment

Climate

Ireland has annual GHG targets which are set at an EU level and need to be complied with in order to reduce the impact of climate change. Impacts to climate as a result of GHG emissions are assessed against the targets set out by the EU under *Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No. 525/2013.* Which has set a target of a 30% reduction in non-ETS sector emissions by 2030 relative to 2005 levels.

As per the EU guidance document *Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment* (European Commission, 2013) the climate baseline is first established by reference to EPA data on annual GHG emissions (see Section 9.3). Thereafter the impact of the proposed development on climate is determined. Emissions from road traffic associated with the proposed development have the potential to emit carbon dioxide (CO_2) which will impact climate.

The UK Highways Agency has published an updated DMRB guidance document in relation to climate impact assessments *LA 114 Climate* (UK Highways Agency, 2019b). The following scoping criteria are used to determine whether a detailed climate assessment is required for a proposed project during the

operational stage. During the operational phase, if any of the road links impacted by the proposed development meet the below criteria then further assessment is required.

- A change of more than 10% in AADT;
- A change of more than 10% to the number of heavy duty vehicles; and
- A change in daily average speed of more than 20 km/hr.

There are a number of road links that will experience an increase of 10% or more in the AADT. These road links have been included in the detailed climate assessment (see Table 9.2).The impact of the proposed development at a national / international level has been determined using the procedures given by Transport Infrastructure Ireland (2011) and the methodology provided in Annex D in the UK Design Manual for Roads and Bridges (UK Highways Agency, 2007). The assessment focused on determining the resulting change in emissions of carbon dioxide (CO_2). The Annex provides a method for the prediction of the regional impact of emissions of these pollutants from road schemes and can be applied to any project that causes a change in traffic. The inputs to the air dispersion model consist of information on road link lengths, AADT movements and annual average traffic speeds (see Table 9.2).

The EU guidance (2013) also states indirect GHG emissions as a result of a development must be considered, this includes emissions associated with energy usage. In addition to the EU guidance, the Institute of Environmental Management and Assessment (IEMA) guidance note on 'Assessing Greenhouse Gas Emissions and Evaluating their Significance' (IEMA, 2022) states that "*the crux of significance regarding impact on climate is not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050"*. Mitigation has taken a leading role within the guidance compared to the previous edition published in 2017. Early stakeholder engagement is key and therefore mitigation should be considered from the outset of the project and continue throughout the project's lifetime in order to maximise GHG emissions savings.

The Energy & Sustainability Statement prepared by O'Connor Sutton Cronin (OCSC) in relation to this development has been reviewed and used to inform the operational phase climate assessment. This report outlines a number of measures in relation to energy usage from the proposed development primarily in relation to heat and electricity. In addition, a number of measures have been incorporated into the overall design of the development to reduce the impact to climate where possible, in line with the objectives of the IEMA guidance (2022).

9.3 RECEIVING ENVIRONMENT

Meteorological Data

A key factor in assessing temporal and spatial variations in air quality is the prevailing meteorological conditions. Depending on wind speed and direction, individual receptors may experience very significant variations in pollutant levels under the same source strength (i.e. traffic levels) (WHO, 2006). Wind is of key importance in dispersing air pollutants and for ground level sources, such as traffic emissions, pollutant concentrations are generally inversely related to wind speed. Thus, concentrations of pollutants derived from traffic sources will generally be greatest under very calm conditions and low wind speeds when the movement of air is restricted. In relation to PM_{10}, the situation is more complex due to the range of sources of this pollutant. Smaller particles (less than $PM_{2.5}$) from traffic sources will be dispersed more rapidly at higher wind speeds. However, fugitive emissions of coarse particles ($PM_{2.5}$ - PM_{10}) will actually increase at higher wind speeds. Thus, measured levels of PM_{10} will be a non-linear function of wind speed.

The nearest representative weather station collating detailed weather records is Dublin Airport meteorological station, which is located approximately 19 km north of the site. Dublin Airport met data has been examined to identify the prevailing wind direction and average wind speeds over a five-year period (see Figure 9.2). For data collated during five representative years (2017 – 2021), the predominant wind direction is westerly to south-westerly with a mean wind speed of 5.3 m/s over the 30-year period 1990 - 2010 (Met Eireann, 2022).

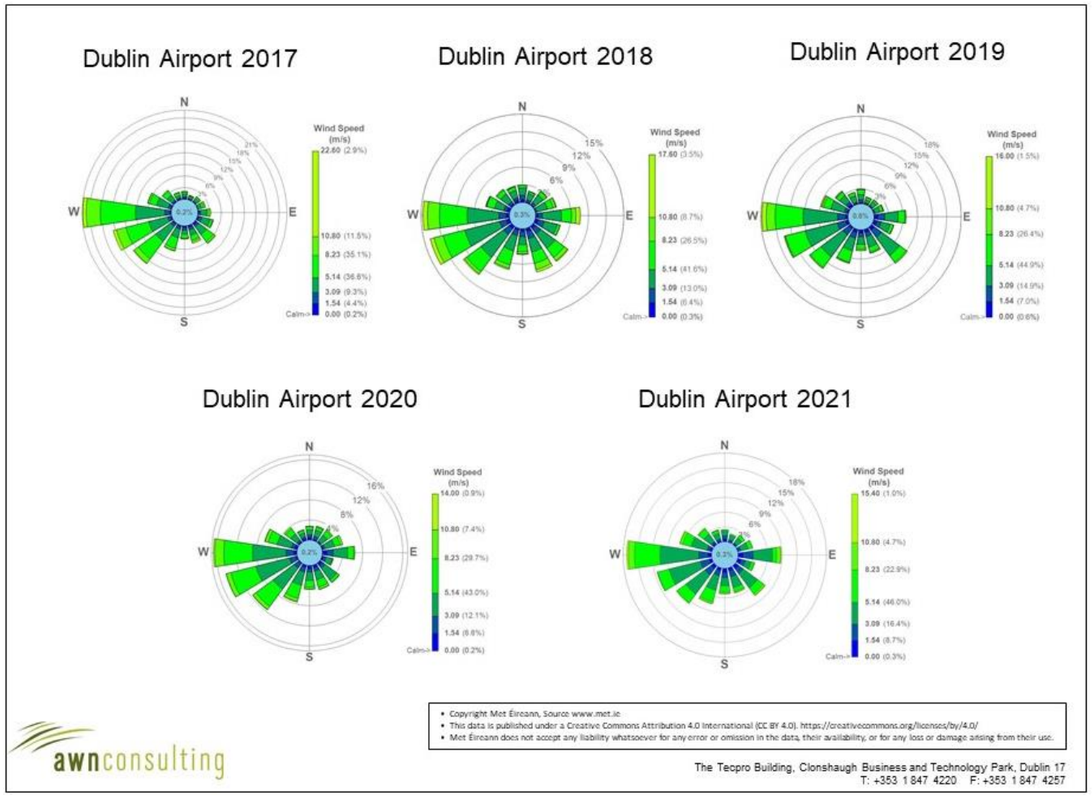

Figure 9.2 Dublin Airport Windrose 2017 – 2021

Baseline Air Quality

Air quality monitoring programs have been undertaken in recent years by the EPA. The most recent annual report on air quality in Ireland is "*Air Quality In Ireland 2020*" (EPA, 2021a). 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, 2022).

As part of the implementation of the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011), as amended, four air quality zones have been defined in Ireland for air quality management and assessment purposes (EPA, 2022). Dublin is defined as Zone A and Cork as Zone B. Zone C is composed of 23 towns

with a population of greater than 15,000. The remainder of the country, which represents rural Ireland but also includes all towns with a population of less than 15,000, is defined as Zone D.

In terms of air monitoring and assessment, the proposed development site is within Zone A (EPA, 2022). 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.).

In 2020 the EPA reported (EPA, 2021a) that Ireland was compliant with EU legal air quality limits at all locations, however this was largely due to the reduction in traffic due to Covid-19 restrictions. The EPA *Air Quality in Ireland 2021* report details the effect that the Covid-19 restrictions had on air monitoring stations, which included reductions of up to 50% at some monitoring stations which have traffic as a dominant source. The report also notes that CSO figures show that while traffic volumes are still slightly below 2019 levels, they have significantly increased since 2020 levels. 2020 concentrations are therefore predicted to be an exceptional year and not consistent with long-term trends. For this reason, they have not been included in the baseline section and previous long-term data has been used to determine baseline levels of pollutants in the vicinity of the proposed development.

Long-term NO_2 monitoring was carried out at the Zone A urban background locations of Rathmines, Dún Laoghaire, Swords and Ballyfermot for the period 2015 - 2019 (EPA, 2021a). Long term average concentrations are significantly below the annual average limit of 40 µg/m^3, average results range from 13 – 22 µg/m^3 for the suburban background locations. The NO_2 annual average for this five year period suggests an upper average limit of no more than 19 µg/m^3 (Table 9.3) for the urban background locations. Based on the above information, a conservative estimate of the current background NO_2 concentration for the region of the proposed development is 19 µg/m^3.

Station	Averaging Period Note 1	Year				
		2015	2016	2017	2018	2019
Rathmines	Annual Mean NO_2 (µg/m^3)	18	20	17	20	22
	Max 1-hr NO_2 (µg/m^3)	106	102	116	138	183
Dun Laoghaire	Annual Mean NO_2 (µg/m^3)	16	19	17	19	15
	Max 1-hr NO_2 (µg/m^3)	103	142	153	135	104
Swords	Annual Mean NO_2 (µg/m^3)	13	16	14	16	15
	Max 1-hr NO_2 (µg/m^3)	170	206	107	112	108
Ballyfermot	Annual Mean NO_2 (µg/m^3)	16	17	17	17	20
	Max 1-hr NO_2 (µg/m^3)	142	127	148	217	124

Note 1 Annual average limit value - 40 µg/m^3 (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).
1-hour limit value - 200 µg/m^3 (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).

Table 9.3 Trends In Zone A Air Quality - Nitrogen Dioxide (NO2)

Continuous PM_{10} monitoring was carried out at five Zone A locations from 2015 - 2019, Ballyfermot, Rathmines, Dún Laoghaire, Tallaght and Phoenix Park. These showed an upper average limit of no more than 16 µg/m^3 (Table 9.4). Levels range from 9 - 16 µg/m^3 over the five year period with at most 9 exceedances (in Rathmines) of the 24-hour limit value of 50 µg/m^3 in 2019 albeit 35 exceedances are permitted per year (EPA, 2021a). Based on the EPA data, a conservative estimate of the current background PM_{10} concentration in the region of the proposed development is 15 µg/m^3.

Station	Averaging Period Note 1	Year				
		2015	2016	2017	2018	2019
Ballyfermot	Annual Mean PM_{10} (µg/m^3)	12	11	12	16	14
	24-hr Mean > 50 µg/m^3 (days)	3	0	1	0	7
Dún Laoghaire	Annual Mean PM_{10} (µg/m^3)	13	13	12	13	12
	24-hr Mean > 50 µg/m^3 (days)	3	0	2	0	2
Tallaght	Annual Mean PM_{10} (µg/m^3)	14	14	12	15	12
	24-hr Mean > 50 µg/m^3 (days)	4	0	2	1	3
Rathmines	Annual Mean PM_{10} (µg/m^3)	15	15	13	15	15
	24-hr Mean > 50 µg/m^3 (days)	5	3	5	2	9
Phoenix Park	Annual Mean PM_{10} (µg/m^3)	12	11	9	11	11
	24-hr Mean > 50 µg/m^3 (days)	2	0	1	0	2

Note1 Annual average limit value - 40 µg/m^3 (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).
Daily limit value - 50 µg/m^3 (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).

Table 9.4 Trends In Zone A Air Quality - PM10

Average $PM_{2.5}$ levels in Rathmines over the period 2015 - 2019 ranged from 8 - 10 µg/m^3, with a $PM_{2.5}/PM_{10}$ ratio ranging from 0.53 – 0.68 (EPA, 2021a). Based on this information, a conservative ratio of 0.7 was used to generate an existing $PM_{2.5}$ concentration in the region of the development of 10.5 µg/m^3.

Background concentrations for the Opening Year 2026 and Design Year of 2041 have been calculated for the local air quality assessment. These have used current estimated 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* (2011) and the UK Department for Environment, Food and Rural Affairs LAQM.TG(16) (2018).

Climate Baseline

Anthropogenic emissions of greenhouse gases in Ireland included in the EU 2020 strategy are outlined in the most recent review by the EPA which details provisional emissions up to 2020 (EPA, 2021b). The data published in 2021 states that Ireland will exceed its 2020 annual limit set under the EU's Effort Sharing Decision (ESD), 406/2009/EC1 by an estimated 6.73 Mt. For 2021, total national greenhouse gas emissions are estimated to be 57.70 million tonnes carbon dioxide equivalent (Mt CO_2eq) with 44.38 MtCO_2eq of emissions associated with the ESD sectors for which compliance with the EU targets must be met. Agriculture is the largest contributor in 2021 at 37.1% of the total, with the transport sector accounting for 17.9% of emissions of CO_2.

GHG emissions for 2020 are estimated to be 3.6% lower than those recorded in 2019. Emission reductions have been recorded in 6 of the last 10 years. However, compliance with the annual EU targets has not been met for five years in a row. Emissions from 2016 – 2020 exceeded the annual EU targets by 0.29 MtCO_2eq, 2.94 MtCO_2eq, 5.57 MtCO_2eq,6.85 MtCO_2eq and 6.73 MtCO_2eq respectively. Agriculture is consistently the largest contributor to emissions with emissions from the transport and energy sectors being the second and third largest contributors respectively in recent years.

The EPA 2020 GHG Emissions Projections Report for 2020 – 2040 (EPA, 2021c) notes that there is a long-term projected decrease in greenhouse gas emissions as a result of inclusion of new climate mitigation policies and measures that formed part of the National Development Plan (NDP) which was published in

2018 and the Climate Action Plan published in 2019. Implementation of these are classed as a "*With Additional Measures scenario*" for future scenarios. A change from generating electricity using coal and peat to wind power and diesel vehicle engines to electric vehicle engines are envisaged under this scenario. While emissions are projected to decrease in these areas, emissions from agriculture are projected to grow steadily due to an increase in animal numbers. However, over the period 2013 to 2020 Ireland is projected to cumulatively exceed its compliance obligations with the EU's Effort Sharing Decision (Decision No. 406/2009/EC) 2020 targets by approximately 12.2MtCO_2eq under the "With Existing Measures" scenario and under the "With Additional Measures" scenario. The projections indicate that Ireland can meet its non-ETS EU targets over the period 2021 – 2030 assuming full implementation of the Climate Action Plan and the use of the flexibilities available (EPA, 2021c).

9.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development involves a strategic housing development at 'Barrington Tower', Brennanstown Road, Dublin 18. The development will comprise a 'Build to Rent' (BTR) apartment development consisting of 8 no. blocks. The BTR development will also include Resident Support Facilities, Resident Services and Amenities. The development includes a creche and a retail unit, car and cycle parking spaces and all associated site development works. A full description of the development can be found in Chapter 3.

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

9.5 POTENTIAL IMPACTS

Construction Phase

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. While construction dust tends to be deposited within 350 m of a construction site, the majority of the deposition occurs within the first 50 m. The extent of any dust generation depends on the nature of the dust (soils, peat, sands, gravels, silts etc.) and the nature of the construction activity. In addition, the potential for dust dispersion and deposition depends on local meteorological factors such as rainfall, wind speed and wind direction. A review of Dublin Airport meteorological data (see Section 9.3) indicates that the prevailing wind direction is westerly to south-westerly and wind speeds are generally moderate in nature. In addition, dust generation is considered negligible on days where rainfall is greater than 0.2 mm. A review of historical 30 year average data for Dublin Airport indicates that on average 191 days per year have rainfall over 0.2 mm (Met Eireann, 2022) and therefore it can be determined that over 50% of the time dust generation will be reduced.

The proposed development can be considered moderate in scale and therefore there is the potential for significant dust soiling 50 m from the source (TII, 2011) (Table 9.5). There are a number of high sensitivity residential receptors bordering the site to the west, north and east, some of which are within 50 m. In the absence of mitigation there is the potential for significant, negative, short-term impacts to nearby sensitive receptors as a result of dust emissions from the proposed development.

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

Source: Appendix 8: Assessment of Construction Impacts taken from "*Guidelines for the treatment of Air Quality During the Planning & Construction of National Road Schemes*" (TII, 2011)

Table 9.5 Assessment Criteria for the Impact of Dust Emissions from Construction Activities with Standard Mitigation in Place

There is also the potential for traffic emissions to impact air quality in the short-term over the construction phase. Particularly due to the increase in HGVs accessing the site. The construction stage traffic has been reviewed and a detailed air quality assessment has been scoped out as none of the road links impacted by the proposed development satisfy the DMRB assessment criteria in Section 9.2. It can therefore be determined that the construction stage traffic will have an imperceptible, neutral and short-term impact on air quality.

Climate

There is the potential for a number of greenhouse gas emissions to atmosphere during the construction of the development. Construction vehicles, generators etc., may give rise to CO_2 and N_2O emissions. The Institute of Air Quality Management document *Guidance on the Assessment of Dust from Demolition and Construction* (IAQM, 2014) states that site traffic and plant is unlikely to make a significant impact on climate. Therefore, the potential impact on climate is considered to be imperceptible, neutral and short-term.

Human Health

Dust emissions from the construction phase of the proposed development have the potential to impact human health through the release of PM_{10} and $PM_{2.5}$ emissions. As per Table 9.5 PM_{10} emissions can occur within 25 m of the site for a development of this scale. There are a number of high sensitivity receptors bordering the site to the west, north and east, a small number of which are within 15m of the site boundary. Therefore, in the absence of mitigation there is the potential for slight, negative, short-term impacts to human health as a result of the proposed development.

Operational Phase

Air Quality

The potential impact of the proposed development has been assessed by modelling emissions from the traffic generated as a result of the development. The impact of NO_2 emissions for the opening and design years was predicted at the nearest sensitive receptors to the development. This assessment allows the significance of the development, with respect to both relative and absolute impacts, to be determined.

Transport Infrastructure Ireland's document *Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes* (2011) detail a methodology for determining air quality impact significance criteria for road schemes and this can be applied to any development that causes a change in traffic. 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.

The results of the assessment of the impact of the proposed development on NO_2 in the opening year 2026 are shown in Table 9.6 and for design year 2041 are shown in Table 9.7. The annual average concentration is in compliance with the limit value at all worst-case receptors in 2026 and 2041 Concentrations of NO_2 are at most 52% of the annual limit value in 2026 and 2041. In addition, the hourly limit value for NO_2 is 200 µg/m^3 and is expressed as a 99.8th percentile (i.e. it must not be exceeded more than 18 times per year). The maximum 1-hour NO_2 concentration is not predicted to be exceeded in any modelled year (Table 9.8).

The impact of the proposed development on annual mean NO_2 concentrations can be assessed relative to "Do Nothing (DN)" levels. Relative to baseline levels, there are predicted to be some imperceptible to small increased in NO_2 concentrations at receptors R1 – R5. Concentrations will decrease by at most 0.74 µg/m^3 in 2026 and by 0.83 µg/m^3 in 2041 at receptor R2. Using the assessment criteria outlined in Appendix 10 of the TII guidance (TII, 2011) the impact of the proposed development in terms of NO_2 is considered negligible. Therefore, the overall impact of NO_2 concentrations as a result of the proposed development is long-term, negative and imperceptible at the worst-case receptors assessed.

Concentrations of PM_{10} were modelled for the baseline year of 2021. The modelling showed that concentrations were in compliance with the annual limit value of 40 µg/m^3 at all receptors assessed, therefore, further modelling for the opening and design years was not required. Concentrations reached at most 0.16 µg/m^3. When a background concentration of 15 µg/m^3 is included the overall impact is 38% of the annual limit value at the worst case receptor.

The impact of the proposed development on ambient air quality in the operational stage is considered long-term, localised, negative and imperceptible and therefore, no mitigation is required.

Receptor	Opening Year 2026				
	DN	DS	DS-DN	Magnitude	Description
R1	20.4	20.8	0.39	Imperceptible Increase	Negligible
R2	20.2	21.0	0.74	Small Increase	Negligible
R3	20.2	20.6	0.39	Imperceptible Increase	Negligible
R4	19.9	20.2	0.32	Imperceptible Increase	Negligible
R5	19.4	19.8	0.32	Imperceptible Increase	Negligible

Table 9.6 Predicted Annual Mean NO2 Concentrations – Opening Year 2026 (µg/m3)

Receptor	Design Year 2041				
	DN	DS	DS-DN	Magnitude	Description
R1	19.9	20.4	0.44	Small Increase	Negligible
R2	19.8	20.6	0.83	Small Increase	Negligible
R3	19.8	20.2	0.44	Small Increase	Negligible
R4	19.3	19.7	0.36	Imperceptible Increase	Negligible
R5	18.8	19.2	0.38	Imperceptible Increase	Negligible

Table 9.7 Predicted Annual Mean NO2 Concentrations – Design Year 2041 (µg/m3)

Receptor	Opening Year 2026		Design Year 2041	
	DN	DS	DN	DS
R1	71	73	70	71
R2	71	73	69	72
R3	71	72	69	71
R4	70	71	68	69
R5	68	69	66	67

Table 9.8 Predicted 99.8th percentile of Daily Maximum 1-hour NO2 Concentrations (µg/m3)

Climate

Climate change has the potential to alter weather patterns and increase the frequency of rainfall in future years. As a result of this there is the potential for flooding related impacts on site in future years. However, adequate attenuation and drainage have been provided for to account for increased rainfall in future years as part of the design of this development. Therefore, the impact will be long-term, localised, neutral and imperceptible.

There is also the potential for increased traffic volumes to impact climate. The predicted concentrations of CO_2 for the future years of 2026 and 2041 are detailed in Table 9.9. These are significantly less than the 2026 and 2030 targets set out under EU legislation (targets beyond 2030 are not available). It is predicted that in 2026 the proposed development will increase CO_2 emissions by 0.00013% of the EU 2026 target. Similarly low increases in CO_2 emissions are predicted to occur in 2041 with emissions increasing by 0.00015% of the EU 2030 target. Therefore, the potential climate impact of the proposed development is considered negative, long-term and imperceptible.

The proposed development has been designed to reduce the impact to climate where possible. A number of measures have been incorporated into the design to ensure the operational phase emissions are minimised. These are outlined fully within the Energy & Sustainability Statement prepared by OCSC and are summarised below.

The development will be a Nearly Zero Energy Building (NZEB) in accordance with the 2021 Part L requirements. Each building will have a Building Energy Rating (BER) of A3 as a minimum. The proposed

development will be designed to reduce the waste generation, where possible, by using locally sourced materials and materials with a recycled content, where possible. Recycling and reuse of materials will be promoted, if practicable. In addition, the proposed development will incorporate measures to reduce water usage through the appropriate selection of low consumption sanitary fittings, leak detection systems and water monitoring facilities. The following measures will be incorporated into the proposed development to achieve a more energy efficient (i.e. less carbon intensive) design:

- High performance U-values;
- Improved air tightness;
- Improved thermal transmittance and thermal bridging;
- Use of natural daylight where possible and energy efficient light fittings;
- Use of natural ventilation where possible or high efficiency mechanical ventilation;
- A Building Energy Management System will be installed to monitor the use of all major systems within the buildings;
- Combined Heat & Power (CHP, Air source heat pumps, Exhaust air heat pumps, and VRF heat pumps are being considered as part of the renewable energy technologies; and
- Solar photovoltaic panels are being considered for the proposed development, where practicable.

The proposed development is located in an area with a number of alternative sustainable travel options such as Dublin Bus routes, Luas and a car-sharing site. Developing in an area with good public transport nodes will help to reduce the requirement for occupants to need personal motor cars and, thus, reduce travel-related GHG emissions. The proposed development is in close proximity to a number of bus routes and the Luas as well as a car-sharing site. It is also proposed to incorporate bicycle parking spaces within the proposed development to promote the use of sustainable transport. In addition, it is proposed to include electric vehicle (EV) charging spaces and infrastructure for additional charging spaces. Overall these measures will aid in reducing the impact to climate during the operational phase of the proposed development.

Year	Scenario	CO_2 (tonnes/annum)
2026	Do Nothing	102
	Do Something	152
2041	Do Nothing	111
	Do Something	162
Increment in 2026		50.7 Tonnes
Increment in 2041		50.9 Tonnes
Emission Ceiling (kilo Tonnes) 2026		**37,869** Note 1
Emission Ceiling (kilo Tonnes) 2030		**33,381** Note 1
Impact in 2026 (%)		0.00013 %
Impact in 2041 (%)		0.00015 %

Note 1 Target under *Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013*

Table 9.9 Climate Impact Assessment

Human Health

Traffic related air emissions have the potential to impact air quality which can affect human health. However, air dispersion modelling of traffic emissions has shown that levels of all pollutants are below the ambient air quality standards set for the protection of human health. It can be determined that the impact to human health during the operational stage is long-term, neutral and imperceptible and therefore, no mitigation is required.

9.6 POTENTIAL CUMULATIVE IMPACTS

According to the IAQM guidance (2014) should the construction phase of the proposed development coincide with the construction of any other permitted developments within 350m of the site then there is the potential for cumulative dust impacts to nearby sensitive receptors which includes the residential properties surrounding the site to the north, east and west. A review of recent planning permissions for the area was conducted and it was found that there were a small number of relevant sites for which cumulative impacts may occur should their construction phase and that of the proposed development overlap. These include numerous developments within the Cherrywood Strategic Development Zone to the direct south-east of the site and a strategic housing development at Brennanstown Road, Dublin 18 to the north-west of the site (planning ref. ABP30161418).

The dust mitigation measures outlined in Appendix 9.2 will be applied throughout the construction phase of the proposed development which will avoid significant cumulative impacts on air quality. With appropriate mitigation measures in place, the predicted cumulative impacts on air quality associated with the construction phase of the proposed development are deemed short-term, negative and imperceptible.

According to the IAQM guidance (2014) site traffic, plant and machinery are unlikely to have a significant impact on climate. Therefore, cumulative impacts are not predicted.

Cumulative impacts have been incorporated into the traffic data supplied for the operational stage air and climate modelling assessments where such information was available. The results of the modelling assessment (section 9.5) show that there is a long-term, negative and imperceptible impact to air quality and climate during the operational stage.

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 9.2. In summary the measures which will be implemented will include:

- Prior to demolition blocks should be soft striped inside buildings (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).
- During the demolition process, water suppression should be used, preferably with a hand-held spray. Only the use of cutting, grinding or sawing equipment fitted or used in conjunction with a suitable dust suppression technique such as water sprays/local extraction should be used.
- Drop heights from conveyors, loading shovels, hoppers and other loading equipment should be minimised, if necessary fine water sprays should be employed.
- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic.
- Any road that has the potential to give rise to fugitive dust must be regularly watered, as appropriate, during dry and/or windy conditions.
- Vehicles exiting the site shall make use of a wheel wash facility where appropriate, prior to entering onto public roads.
- Vehicles using site roads will have their speed restricted, and this speed restriction must be enforced rigidly. On any un-surfaced site road, this will be 20 kph.
- Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary.
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.
- During movement of materials both on and off-site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions.

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

Climate

Impacts to climate during the construction stage are predicted to be imperceptible however, good practice measures can be incorporated to ensure potential impacts are lessened. These include:

- Prevention of on-site or delivery vehicles from leaving engines idling, even over short periods.
- Ensure all plant and machinery are well maintained and inspected regularly.
- Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site.

Operational Phase

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

9.8 PREDICTED IMPACTS

Construction Phase

Air Quality

Once the dust minimisation measures outlined in Section 9.7 and Appendix 9.2 are implemented, the impact of the proposed development in terms of dust soiling will be short-term, negative, localised and imperceptible at nearby receptors.

Climate

According to the IAQM guidance (2014) site traffic, plant and machinery are unlikely to have a significant impact on climate. Therefore the predicted impact is short-term, neutral and imperceptible.

Human Health

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

Operational Stage

Air Quality

Air dispersion modelling of operational traffic emissions associated with the proposed development was carried out using the UK DMRB model. The modelling assessment determined that the change in emissions of NO_2 at nearby sensitive receptors as a result of the proposed development will be imperceptible. Therefore, the operational phase impact to air quality is long-term, localised, negative and imperceptible.

Climate

Modelling of operational phase CO_2 emissions as a result of the traffic associated with the proposed development was carried out to determine the impact to climate. It was found that emissions of CO_2 will increase by an imperceptible amount as a result of the proposed development and are significantly below the EU 2026 and 2030 GHG targets. The operational phase impact to climate is long-term, negative and imperceptible. In addition, the proposed development has been designed to reduce the impact to climate where possible during operation (see Section 9.5 and Energy & Sustainability Statement).

Human Health

As the air dispersion modelling has shown that emissions of air pollutants are significantly below the ambient air quality standards which are based on the protection of human health, impacts to human health are long-term, negative and imperceptible.

9.9 'DO NOTHING' SCENARIO

Under the Do Nothing Scenario no construction works will take place and the previously identified impacts of fugitive dust and particulate matter emissions and emissions from equipment and machinery will not occur. Impacts from increased traffic volumes and associated air emissions will also not occur. The ambient air quality at the site will remain as per the baseline and will change in accordance with trends within the wider area (including influences from new developments in the surrounding area, changes in road traffic, etc.). The Do Nothing scenario associated with the operational phase is assessed within Section 9.5 and it was found to be imperceptible. Therefore, this scenario can be considered neutral in terms of both air quality and climate.

9.10 WORST CASE SCENARIO

As part of the air dispersion modelling, worst-case traffic data was used in the assessment which included cumulative traffic associated with other permitted and proposed developments in the vicinity of the proposed development. In addition, conservative background concentrations were used in order to ensure a robust assessment. Thus, the predicted results of the operational stage assessment are worst-case.

9.11 MONITORING & REINSTATEMENT

Construction Phase

Monitoring of construction dust deposition along the site boundary to nearby sensitive receptors during the construction phase of the proposed development is recommended to ensure mitigation measures are working satisfactorily. This can be carried out using the Bergerhoff method in accordance with the requirements of the German Standard VDI 2119. The Bergerhoff Gauge consists of a collecting vessel and a stand with a protecting gauge. The collecting vessel is secured to the stand with the opening of the collecting vessel located approximately 2m above ground level. The TA Luft limit value is 350 mg/(m^2*day) during the monitoring period of 30 days (+/- 2 days).

Operational Phase

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

9.12 DIFFICULTIES IN COMPILING INFORMATION

There were no difficulties encountered when compiling this assessment.

9.13 REFERENCES

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UK Highways Agency (2019a) UK Design Manual for Roads and Bridges (DMRB), Volume 11, Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 1 LA 105 Air quality

UK Highways Agency (2019b) UK Design Manual for Roads and Bridges (DMRB) Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 14 LA 114 Climate

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

World Health Organisation (2006) Air Quality Guidelines - Global Update 2005 (and previous Air Quality Guideline Reports 1999 & 2000)

10 LANDSCAPE AND VISUAL

10.1 INTRODUCTION

This chapter assesses the potential effects of the proposed development on the landscape and views/visual amenity in the receiving environment.

The chapter was prepared by Richard Butler (B LArch, MSc Sp Planning, MILI, MIPI) of Model Works Ltd. Richard has degrees in landscape architecture and planning and is a member of the Irish Landscape Institute and the Irish Planning Institute. He has over 20 years' experience in development and environmental planning, specialising in Landscape/Townscape and Visual Impact Assessment (LVIA).

10.2 METHODOLOGY

The chapter was prepared with reference to the Landscape Institute's *Guidelines for Landscape and Visual Impact Assessment*, 2013 (GLVIA) and the EPA draft *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*, 2017. The methodology, terminology and assessment criteria are explained below.

Key Principles of the GLVIA

Use of the Term 'Effect' vs 'Impact'

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

Assessment of Both 'Landscape' and 'Visual' Effects

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

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

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

Methodology for Assessment of Landscape Effects

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

Landscape Sensitivity

The sensitivity of the landscape is a function of its land use, patterns and scale, visual enclosure and the distribution of visual receptors, and the value placed on the landscape. The nature and scale of the development in question is also taken into account, as are any trends of change, and relevant policy. Five categories are used to classify sensitivity (see Table 10.1).

Sensitivity	Description
Very High	Areas where the landscape exhibits very strong, positive character with valued elements, features and characteristics that combine to give an experience of unity, richness and harmony. The landscape character is such that its capacity to accommodate change 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 landscape exhibits strong, positive character with valued elements, features and characteristics. The landscape character is such that it has limited/low capacity to accommodate change. 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 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 policy at local or county level and the principle management objective may be to consolidate landscape character or facilitate appropriate, necessary change.
Low	Areas where the landscape has few valued elements, features or characteristics and the character is weak. The character is such that it has capacity for change; where development would make no significant change or would make a positive change. Such landscapes are generally unrecognised in policy and the principle management objective may be to facilitate change through development, repair, restoration or enhancement.
Negligible	Areas where the landscape exhibits negative character, with no valued elements, features or characteristics. The character is such that its capacity to accommodate change is high; where development would make no significant change or would make a positive change. Such landscapes include derelict industrial lands, as well as sites or areas that are designated for a particular type of development. The principle management objective for the area is to facilitate change in the landscape through development, repair or restoration.

Table 10.1 Categories of Landscape Sensitivity

Note on definitions used in this assessment

The definitions of the classifications in Table 10.1 (landscape sensitivity), 10.2 (magnitude of landscape change), 10.5 (viewpoint sensitivity) and 10.6 (magnitude of visual change) are not taken from either the GLVIA or the EPA Draft *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*, 2017.

Both of these guidance documents require that classifications of sensitivity and magnitude of change (such as high, medium, low, etc.) be used in the assessment process (see EPA Draft Guidelines Figure 3.5

and GLVIA Box 3.1, Paragraph 3.26 and Figure 3.5), but neither guidance document provides definitions for such classifications.

The GLVIA specifically avoids being prescriptive in this this regard (GLVIA paragraph 1.20): *"The guidance concentrates on principles while also seeking to steer specific approaches where there is a general consensus on methods and techniques. It is not intended to be prescriptive, in that it does not provide a detailed 'recipe' that can be followed in every situation. It is always the primary responsibility of any landscape professional carrying out an assessment to ensure that the approach and methodology adopted are appropriate to the particular circumstances."* (emphasis added)

The EPA's Draft Guidelines state (Section 3, p.49): *"While guidelines and standards help ensure consistency, the professional judgement of competent experts plays a role in the determination of significance. These experts may place different emphases on the factors involved. As this can lead to differences of opinion, the EIAR sets out the basis of these judgements so that the varying degrees of significance attributed to different factors can be understood."* (emphasis added)

The GLVIA and EPA Draft Guidelines thus require that the factors used in arriving at significance conclusions (i.e. sensitivity and magnitude) should be explained in the EIAR, but the guidelines do not provide the explanations themselves.

It is for this reason that the definitions in Tables 10.1, 10.2, 10.5 and 10.6 are provided. These definitions have been developed and refined by various LVIA practitioners, including the chapter author, over decades of practice. They are not standard, i.e. the classifications/definitions used in this assessment may differ from those used by other practitioners. However, the author considers them to be reasonable and appropriate for the purpose of classifying the significance of landscape/townscape and visual impacts. The same definitions have been used in many previous LVIA reports/chapters prepared by the author and accepted by the planning authorities.

Magnitude of Landscape Change

Magnitude of change is a factor of the scale, extent and degree of change imposed on the landscape by a development, with reference to its key elements, features and characteristics (also known as 'landscape receptors'). Landscape receptors include individual aspects of the landscape, e.g. the topography, urban grain or mix of building typologies, which may be directly changed by the development. The surrounding landscape character areas are also receptors whose character may be altered by these changes. Five categories are used to classify magnitude of change (see Table 10.2).

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

Table 10.2 Categories of Magnitude of Landscape Change

Significance of Effects

To classify the significance of effects the magnitude of change is measured against the sensitivity of the landscape using Table 10.3 and Figure 10.1 as a guide. The significance classification matrix (Table 10.3) is derived from the EPA's *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*, 2017 (specifically Figure 3.5 of the Guidelines - Figure 10.1 below). In addition to this guidance the assessor uses professional judgement informed by their expertise, experience and common sense to arrive at a classification of significance that is reasonable and justifiable. There are seven classifications of significance, namely: (1) imperceptible, (2) not significant, (3) slight, (4) moderate, (5) significant, (6) very significant, (7) profound.

		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*
	Med-ium	*Very Significant to Significant*	*Significant*	*Moderate*	*Slight*	*Not Significant*
	Low	*Moderate*	*Moderate to Slight*	*Slight*	*Not significant*	*Imperceptible*
	Negli g-ible	*Slight*	*Slight to Not Significant*	*Not significant*	*Imperceptible*	*Imperceptible*

Table 10.3 Guide to Classification of Significance of Landscape and Visual Effects

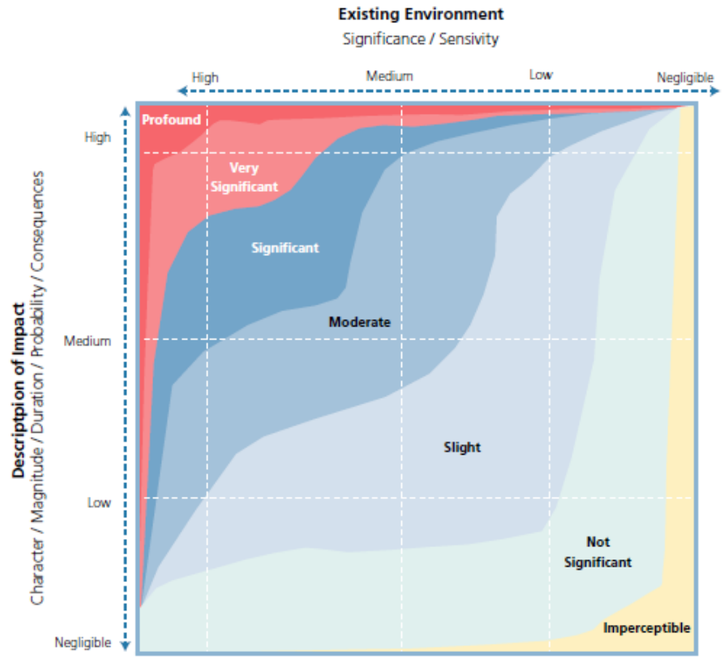


Figure 10.1 'Chart showing typical classifications of the significance of impacts' (Source: Figure 3.5 of the EPA's Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, 2017)

The impact significance classifications are taken from the EPA Draft Guidelines, which define the classifications as follows (Table 10.4):

Sensitivity	Description
Imperceptible	An effect capable of measurement but without significant consequences.
Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound	An effect which obliterates sensitive characteristics.

Table 10.4 Impact Significance Classifications

Methodology for Assessment of Visual Effects

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

Sensitivity of the Viewpoint/Visual Receptor

Viewpoint sensitivity is a function of two main considerations:

- Susceptibility of the visual receptor to change. This depends on the occupation or activity of the people experiencing the view, and the extent to which their attention is focussed on the views or visual amenity they experience at that location. Visual receptors most susceptible to change include residents at home, people engaged in outdoor recreation focused on the landscape (e.g. trail users), and visitors to heritage or other attractions and places of community congregation where the setting contributes to the experience. Visual receptors less sensitive to change include travellers on road, rail and other transport routes (unless on recognised scenic routes), people engaged in outdoor recreation or sports where the surrounding landscape does not influence the experience, and people in their place of work or shopping where the setting does not influence their experience.
- Value attached to the view. This depends to a large extent on the subjective opinion of the visual receptor but also on factors such as policy and designations (e.g. scenic routes, protected views), or the view or setting being associated with a heritage asset, visitor attraction or having some other cultural status (e.g. by appearing in arts).

Five categories are used to classify a viewpoint's sensitivity (see Table 10.5).

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

Low	Views that have no valued feature or characteristic, and where the composition and character are such that there is capacity for change. This category also includes views experienced by people involved in activities with no particular focus on the landscape. For such views the principle management objective is to facilitate change that does not detract from visual amenity or enhances it.
Negligible	Views that have no valued feature or characteristic, or in which the composition may be unsightly (e.g. in derelict landscapes). For such views the principle management objective is to facilitate change that repairs, restores or enhances visual amenity.

Table 10.5 Categories of Viewpoint Sensitivity

Magnitude of Change to the View

Classification of the magnitude of change takes into account the size or scale of the intrusion of development into the view (relative to the other elements and features in the composition, i.e. its relative visual dominance), the degree to which it contrasts or integrates with the other elements and the general character of the view, and the way in which the change will be experienced (e.g. in full view, partial or peripheral view, or in glimpses). It also takes into account the geographical extent of the change, as well as the duration and reversibility of the visual effects. Five categories are used to classify magnitude of change to a view (Table 10.6) Five categories are used to classify magnitude of change to a view (refer to 'Note on definitions used in this assessment' on page 10.1):

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 10.6 Categories of Magnitude of Visual Change

Significance of Visual Effects

As for landscape effects, to classify the significance of visual effects, the magnitude of change to the view is measured against the sensitivity of the viewpoint, using the guide in Table 10.3 above.

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 landscape to a degree, but particularly for visual effects, this is an inherently subjective exercise. This is because landscape 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 landscape or view may vary.

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

Photomontage Methodology

The verified photomontages were produced by Model Works Ltd. The photomontage methodology is based on the Landscape Institute advice note 01/11 *Photography and Photomontage in Landscape and Visual Impact Assessment*. The method has five main steps:

- Photography
- Survey
- 3D Modelling and Camera Matching
- Rendering and Finishing of Photomontages
- Presentation
- Presentation

Photography

Date, Time and Conditions: The photography is timed so that the scene conditions, weather conditions and sun position allow - as far as possible - for a clear and representative baseline photograph to be captured. The date and time of each photograph are recorded so that the sun position can be accurately portrayed in the photomontage.

Camera: The photographs are taken using a Canon EOS5D Mark II camera with a 21 mega pixel sensor and image resolution of 5616 x 3744 pixels. At each viewpoint the camera was positioned on a tripod with the lens 1.65m above ground level (the level of the average adult's eyes), directed at the site and levelled in the horizontal and vertical axes.

Lenses: Prime lenses (fixed focal length with no zoom function) are used as this ensures that the image parameters for every photograph are the same and that all photographs taken with the same lens are comparable. For close-up to middle distant views a 24mm prime lens is normally usually used. This lens captures a field of view of 73 degrees. This relatively wide field of view is preferred for the purpose of

Landscape and Visual Impact Assessment as it shows more of the context landscape surrounding a site. For distant viewpoints a 50mm prime lens may be used, capturing a 39 degree horizontal field of view.

Survey

The coordinates of each viewpoint/camera position, including the elevation, are recorded using a survey grade GPS receiver, the Trimble Geo7X, which is accurate to within 1cm. For each viewpoint, the coordinates of several static objects in the view are also surveyed (e.g. lamp posts, bollards, corners of buildings, etc.). The coordinates of these 'markers' are used as reference points later in the process, to ensure that the direction of view of the cameras in the 3D model matches the direction of view of the photographs.

3D Model and Camera Matching

Creation of 3D Model: Using the information contained in the design team's drawings, a 3D model of the proposed development is built in the software package Autodesk 3DS Max. The 3D model is georeferenced to a survey drawing of the site and receiving environment.

3D Camera Positions: The surveyed camera positions and the markers for each view are inserted into the 3D model, with information on the focal length of the lens attributed to each camera. For each camera/view, the date and time is set to match those of the original photograph. This ensures that the direction of sunlight and shadows in the 3D model match those of the photographs.

Camera Matching: The photographs are then inserted as backdrops to the views of each camera in the 3D model. The direction of view of the cameras in the 3D model are matched with the direction of view of the photographs using the surveyed markers. This ensures that the camera positions, the direction of the views and the focal length of the cameras in the 3D model are accurate, so that the proposed development appears in the correct position and scale when montaged into the photographs.

Rendering of 3D Model and Finishing of Photomontages

For each view a render of the development is generated. This is the process of creating a photo-realistic image of the 3D model, as seen from each camera position, with sunlight and shadow applied to the model. The render of the development is then inserted into the photograph to create the photomontage. This involves masking (or cutting out) those parts of the render that are obscured by objects in the foreground of the photograph, and masking distant objects behind the render – so that the render fits seamlessly into the photograph.

Presentation

The individual photomontages are presented on A3 pages in landscape format in the accompanying booklet (Appendix 10.1). For each photomontage, the viewpoint number, location description, and the date and time of photography are provided on the page.

10.3 RECEIVING ENVIRONMENT

Site Location and Landscape Overview

The site is located on the southern side of Brennanstown Road in the evolving suburban environment of Cabinteely and Brennanstown, at the interface between these existing neighbourhoods and the Cherrywood Strategic Development Zone (SDZ) which extends to the south, south east and south west, bounded by the M50 motorway (see Figure 10-2).

Until recently the Cabinteely and Brennanstown areas were characterised by mostly large, detached and semi-detached houses, many of these on very large plots. Many of the houses were located and designed to take advantage of the topography, which affords views over Druid's Glen (the valley of the Carrickmines Stream) towards the Dublin Mountains to the south.

Since the turn of the century a combination of factors have set in motion a change in character in the area. These include (a) the development of the Luas green line (which passes the southern boundary of the site, with the Brennanstown stop only 100m from the site entrance), (b) the designation and ongoing development of the Cherrywood SDZ, and (c) a shift in planning policy towards a policy of compact growth, as part of the response to the climate change and biodiversity crises (to make more efficient use of urban land, infrastructure and services). The area's access to Dublin by the Luas, the N11 and the M50 are further drivers for densification of the Cabinteely and Brennanstown areas.

Figure 10-2 shows the site in the wider context of Cabinteely and Brennanstown, Cherrywood and Carrickmines. It shows the site's position adjacent to the Brennanstown Luas stop, and its proximity to both the M50 and the N11. The emerging Cherrywood town centre is to the southeast, with Carrickmines to the south west.

This site is a prime example of both the previous character of the area, and the reasons for the ongoing change. The 3.81 ha land parcel is effectively a brownfield site (being zoned Residential, and partly in residential use) but it is occupied by only two houses. It is also only minutes' walk from the Brennanstown Luas stop and a short distance from the future Lehaunstown and Priorsland 'village centres' (neighbourhood/urban cores) in Cherrywood, and lies adjacent to one of the main public open spaces in the Cherrywood SDZ, namely Druid's Glen.

The Site

The site is comprised of two residential properties (no longer occupied) and two adjacent fields, on the south side of Brennanston Road, between the road and the Luas line which forms the boundary of the Cherrywood SDZ.

The land slopes down from Brennanstown Road towards the south, towards the Carrickmines Stream which passes to the south in a densely wooded valley (known as Druid's Glen). The gradient increases towards the south and the topography is one of the key characteristics of the site. The gardens of the disused residential properties that comprise the more elevated part of the site, alongside Brennanstown Road, are densely vegetated, particularly around their boundaries. There are also belts of vegetation along the east, west and south boundaries of the field that makes up the southern part of the site.

A key feature of the site is Barrington's Tower, which is attached to a disused 20th century house (see Figure 10-4 below). The tower was built in 1810 by John Barrington of Glendruid House (located a short distance to the east), serving as a viewing tower over Druid's Glen, and designed to resemble an Irish tower house. Although heavily modified (re-purposed for residential use), the tower is a protected structure.

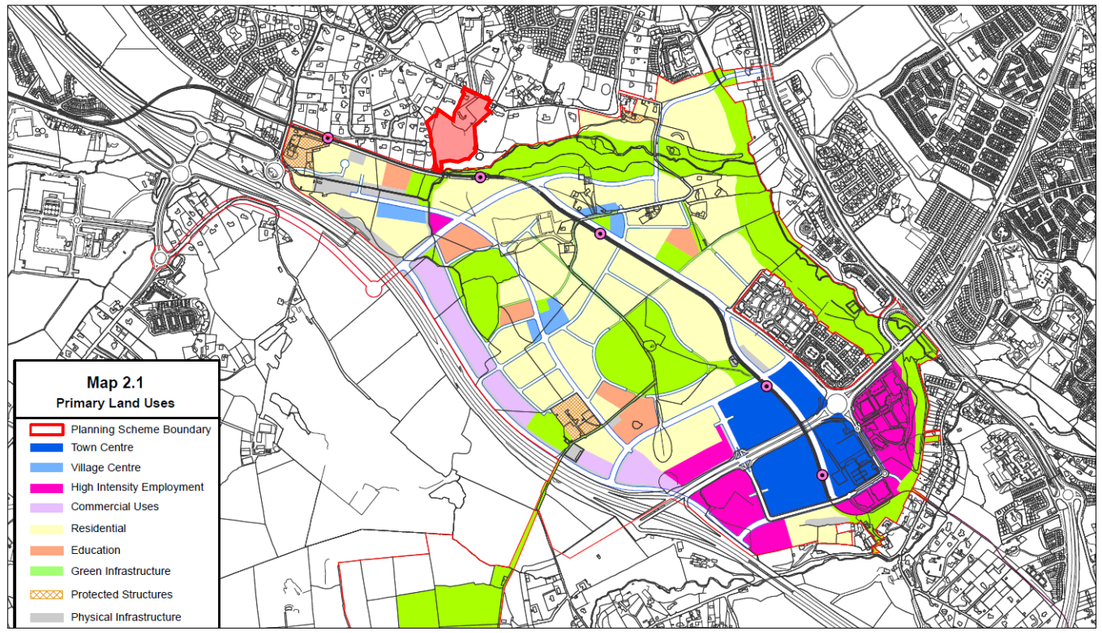


Figure 10.2 Site location in relation to the Cherrywood SDZ, which along with the Luas green line has initiated a fundamental change in the landscape character of the site context (Source: cherrywood Planning Scheme)

Figure 10.3 The site and immediate environs

Figure 10.4 Barrington's Tower attached to a disused house on the site

Figure 10.5 A view from the field within the site, showing the castellated top of the tower protruding above garden vegetation

Site Boundaries and Adjacent Lands/Development

- North: Brennanstown Road passes along the northern boundary of the site. This is a narrow road enclosed by high boundary walls and mature trees along much of its length. The site boundary to the road includes a low stone wall along one stretch, and an overgrown hedgerow along another. To the north across the road are several large, single-dwelling properties typical of the area.
- East: The east site boundary is shared with two single dwelling residential properties, one of which is very large (itself stretching from Brennanstown Road to Druid's Glen). There is a dense belt of vegetation, including many mature trees, along most of the east boundary.
- South: The southern boundary of the site runs along the edge of an area zoned F (open space), which forms part of Druid's Glen and includes the historic private burial ground/vault of the Barrington family. The trees in this area of open space are preserved. A short stretch of the southern boundary runs along the Luas line (and the boundary of Cherrywood SDZ). This provides direct access from the site to the as yet un-opened Brennanstown Luas stop.
- West: The western site boundary is shared with several residential properties, which either front Brennantown Road or are part of the Brennanstown Vale estate to the west of the site. There is a dense belt of vegetation, including many mature trees, inside the walls along the west boundary.

Figure 10.6 The view towards the site from the Brennanstown Luas stop, with the trees of Druid's Glen between the Luas platform and the southern site boundary

Key Elements and Character Areas in the Surrounding Landscape - Potential Receptors of Landscape and Visual Change

Brennanstown Road Area

To the east and west of the site, along both sides of Brennanstown Road, are mostly large houses in generally densely vegetated gardens. Many of the houses have high boundary walls and/or vegetation, which restricts visibility across the low density suburban landscape, including lateral views from Brennanstown Road itself.

Figure 10.7 A typical view along Brennanstown Road to the east of the site

There are several estates of semi-detached houses on the north side of Brennanstown Road, including Lambourne Wood and Holmwood (both built in the latter half of the 20th century on parts of the former grounds of Brennanstown House. One of the modern estates, Carrickmines Wood, a short distance to the west of the site along Brennanstown Road, includes several three storey apartment blocks along its eastern edge (closest to the site). This was the first significant change in density in the area.

Adjacent to Carrickmines Wood, between the estate and the site (but separated from the site by several remaining large residential properties) is the site of Brennanstown Wood (Ref. ABP-30161418). This is a large, mixed density development of houses and apartment buildings of up to five storeys (incl. lower basement level), currently under construction. This represents a further densification of development along the Brennanstown Road corridor.

The occupants of the dwellings along the road, and the users of Brennanstown Road, are the largest group of potential receptors of change on the site. The neighbouring houses to the east, west and north are most sensitive due to their proximity.

Figure 10.8 A view towards the site from Brennanstown Road outside of the Brennanstown Wood development site

Figure 10.9 The Brennanstown Wood development under construction in 2021, c. 150m from the site. This illustrates the change in character taking place along Brennanstown Road in the vicinity of the site

Brennanstown Vale

Brennanstown Vale is a neighbourhood of large houses on very large plots to the west of the site, between the site and Glenamuck Road North. Four of the properties share a boundary with the site and the occupants of these houses are sensitive potential receptors of landscape and visual change on the site.

Figure 10.10 A view towards the site from a street in Brennanstown Vale just to the west of the site. This illustrates the screening effect of the trees inside the site boundary and in the gardens of Brennanstown Vale, even in winter

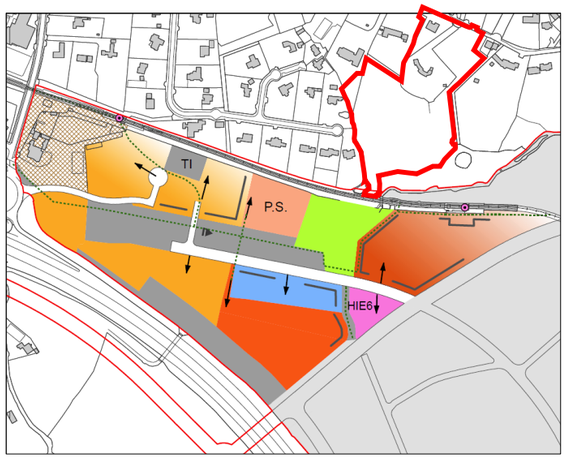
Cherrywood Strategic Development Zone

Immediately to the south of the site, and extending to the east and west, is the 360 ha Cherrywood SDZ (see Figure 10-2 above). This is a major new mixed use, mixed density urban district within the metropolitan area. The area is planned to have a polycentric urban structure, including a large town

centre area at its eastern end, and three 'village centres' (Tully, Lehaunstown and Priorsland) towards the west, closer to the site. The policy for Cherrywood's urban form is divided into several 'development areas', three of which are close to the site and warrant consideration in this assessment.

Priorsland Development Area

Directly south of the site, beyond Druid's Glen and the Luas line, is the Priorsland Development Area.



Facing the site is a Res 3 zoned residential site (allowing apartment buildings of up to four storeys), with a 'principal frontage' indicated at the Brennanstown Luas stop (i.e. facing the site across the Luas line and the wooded valley). West of the residential site, also facing the site across the Luas line, is an area of open space. The Priorsland area also includes a 'village centre', a high intensity employment site, a school site, and further to the west lower density residential use.

Figure 10.11 Aerial photograph of the wide receiving environment showing the diverse and changing character of the area

Lehaunstown Development Area

To the south east of the site, beyond the Druid's Glen open space and ecological corridor, and beyond Barrington's Road, is the Lehaunstown Development Area.

This is a key future urban core within the Cherrywood district. It is located on the Luas line and Grand Parade (the spine road through Cherrywood), with the 'village centre' surrounded by Res 3 and Res 4 zoned lands. The Planning Scheme allows for buildings of up to five storeys in this area with an 'upward modifier' (two additional storeys) in the centre near the Luas stop.

10.3.1.1.1 Druid's Glen Development Area

To the east of the site, separated from the site by several large, single dwelling properties also on the north side of Druid's Glen, is the Druid's Glen Development Area.

This is a lower density zone, incorporating Glendruid House (protected structure), which is to be retained as part of the area's development.

The Area West and South of the M50

To the south west, beyond Cherrywood and the M50, the land rises into the foothills of the Dublin Mountains. For the most part the M50 forms the dividing line between the Dublin urban area and the rural hinterland, although there are pockets of urban character beyond the M50, for example at Carrickmines.

Apart from Carrickmines (where planning permission has been granted for a 22 storey residential building - see ABP ref. TA06D.309026, https://www.golflaneshd2020.ie/) the landscape west of the M50 can be described as peri-urban in character (i.e. incorporating both rural and urban-generated elements/characteristics). The elevation of the area affords views east towards the coastline and the Irish Sea. The evolving urban area, bounded by the M50, features in these views, including the areas of Cherrywood, Cabinteely and Brennanstown, Glenageary, Ballybrack, Loughlinstown and Killiney. Views from the mountains to the coastline are protected in the Dun Laoghaire Rathdown County Development Plan 2016-2022.

The mountains are a key element of views from Brennanstown, Cabinteely and Cherrywood and lend these areas a particular character and visual amenity. This amenity combined with the site's southern aspect and its proximity to Druid's Glen generates significant residential amenity potential. This is reinforced by the site's position adjacent to the Luas stop and the future Priorsland village centre.

Figure 10.12 Aerial photo showing the position of the site within the urban landscape east of the M50, with the peri-urban landscape of the Dublin Mountains footslopes to the south and west of the motorway

Figure 10.13 A view south from the site over Druid's Glen, the Luas line and Priorsland development area towards the Dublin Mountains

10.4 RELEVANT POLICY

Dun Laoghaire Rathdown County Development Plan 2022-2028

Zoning

The site is zoned Objective A, *"To provide residential development and/or protect and improve residential amenity".*

Creation of a Compact and Connected County

Table 1.4 of the Development Plan sets out the Five Strategic County Outcomes of the Plan, including the following Strategic Outcome: *"Creation of a Compact and Connected County: One of the best ways to transition to a climate resilient County is to consolidate development within the existing urban footprint thus making best use of land. Sustainable planning policy has long been underpinned by the matching of land use and transport policies so that denser development takes place close to good quality public transport options and supporting services. This will allow those living, working and visiting the County easy access to amenities and services by way of high-quality public transport and the softer modes of walking and cycling."* (emphasis added)

Quality Design and Placemaking

"Placemaking is supported through high quality urban design, aimed at supporting and creating vibrant, distinctive, safe and accessible public spaces which promotes and facilitates social interaction. In this regard, good placemaking is a key component to promoting the creation and maintenance of sustainable residential communities. High quality design of all housing options also supports the creation of quality public spaces. High quality and inclusive urban design will aid in creating healthy, attractive and accessible places to live for all residents, employees and visitors and to the County... (emphasis added)

"Urban design involves the design of buildings, groups of buildings, spaces and landscapes and establishing the processes that make successful development possible. Urban design encompasses the way places work as well as how they look. The Council is committed to ensuring that good urban design principles are applied in the design and planning of existing and new development areas...

"Adhering to good urban design principles can help ensure the delivery of high quality environments with a clear and interesting urban structure, the conservation of architectural heritage and townscape, the promotion of high standards of architectural design for new buildings and the reinforcement of local identity, pride and 'sense of place'."

Residential Density and Building Height

Policy Objective PHP18 states: *"It is a Policy Objective to:*

- *Promote compact urban growth through the consolidation and re-intensification of infill/brownfield sites.*
- *Encourage higher residential densities provided that proposals provide for high quality design and ensure a balance between the protection of existing residential amenities and the established character of the surrounding area, with the need to provide for high quality sustainable residential development."* (emphasis added)

Citing the 'Sustainable Residential Development in Urban Areas' Guidelines and the accompanying 'Urban Design Manual', the Development Plan states (p.81):

"Where a site is located within circa 1 kilometre pedestrian catchment / 10 minute walking time of a rail station, Luas line, Core/Quality Bus Corridor and/or 500 metres / 5 minute walking time of a Bus Priority Route, and/or 1 kilometre / 10 minute walking time of a Town or District Centre, higher densities at a minimum of 50 units per hectare (net density) will be encouraged...

"As a general rule the minimum default density for new residential developments in the County (excluding lands on zoning Objectives 'GB', 'G' and 'B') shall be 35 units per hectare (net density)...

"This density may not be appropriate in all instances but should be applied particularly in relation to 'greenfield' sites or larger 'A' zoned areas. Higher density schemes should offer an exemplary quality of life for existing and future residents in terms of design and amenity." (emphasis added)

Constraints to Higher Density (Development Plan p.81-)

"Consideration in relation to densities and layout may be given where proposals involve existing older structures that have inherent vernacular and/or streetscape value and where retention would be in the interests of visual and residential amenity and sustaining the overall character of the area. Some dispensation in relation to separation distances, open space requirements and density considerations may be appropriate."

"In some circumstances higher residential density development may be constrained by Architectural Conservation Areas (ACA) and Candidate Architectural Conservation Areas (cACA) designations, Protected Structures and other heritage designations. To enhance and protect ACA's, cACA's, Heritage Sites, Record of Monuments and Places, Protected Structures and their settings, new residential development will be required to minimise any adverse effect in terms of height, scale, massing and proximity. There may be some specific areas of the County where higher densities, which would normally be encouraged by virtue of proximity of the site to high public transport corridors, cannot realistically be achieved as a consequence of other infrastructural shortcomings – such as the capacity of the local road network. The number of such sites would, however, be limited."

"In older residential areas, infill will be encouraged while still protecting the character of these areas. Any new communities and additional residential units shall have regard to the character of the area and site context. All new development in established residential areas shall be designed to the highest standards, integrate well into the existing streetscape and be capable of adapting to changing household requirements." (emphasis added)

Policy Objective PHP20 states: *"Protection of Existing Residential Amenity: It is a Policy Objective to ensure the residential amenity of existing homes in the Built Up Area is protected where they are adjacent to proposed higher density and greater height infill developments."* (emphasis added)

- *"On all developments with a units per hectare net density greater than 50, the applicant must provide an assessment of how the density, scale, size and proposed building form does not represent over development of the site. The assessment must address how the transition from low density to a higher density scheme is achieved without it being overbearing, intrusive and without negatively impacting on the amenity value of existing dwellings particularly with regard*

to the proximity of the structures proposed. The assessment should demonstrate how the proposal respects the form of buildings and landscape around the site's edges and the amenity enjoyed by neighbouring uses.

- *On all developments with height proposals greater than 4 storeys the applicant should provide a height compliance report indicating how the proposal conforms to the relevant Building Height Performance Based Criteria "At District/Neighbourhood/Street level" as set out in Table 5.1 in Appendix 5.*
- *On sites abutting low density residential development (less than 35 units per hectare) and where the proposed development is four storeys or more, an obvious buffer must exist from the rear garden boundary lines of existing private dwellings.*
- *Where a proposal involves building heights of four storeys or more, a step back design should be considered so as to respect the existing built heights."* (emphasis added)

Existing Trees and Hedgerows (Section 12.8.11)

"New developments shall be designed to incorporate, as far as practicable, the amenities offered by existing trees and hedgerows. New developments shall, also have regard to objectives to protect and preserve trees and woodlands (as identified on the County Development Plan Maps)".

"The retention of existing planted site boundaries will be encouraged within new developments, particularly where it is considered that the existing boundary adds positively to the character/visual amenity of the area." (emphasis added)

Development within the Grounds of a Protected Structure (Section 12.11.2.3)

"Any proposed development within the curtilage, attendant grounds, or in close proximity to a Protected Structure, has the potential to adversely affect its setting and amenity. The overall guiding principle will be an insistence on high quality in both materials, and design, which both respects and complement the Protected Structure, and its setting...

"Any development must be consistent with conservation policies and the proper planning and sustainable development of the area. Considering recent changes to National Policy, (including the 20128 DHPLG, 'Urban Development and Building Heights Guidelines for Planning Authorities', a balance must be struck between allowing compact development, while protecting the Architectural heritage and historic building stock within the County". (emphasis added)

Views and Prospects (Section 8.4.5)

"DLR contains many sites and vantage points from which scenic views over areas of great natural beauty, local landmarks, historic landscapes, adjoining Counties, and the City of Dublin may be obtained. In addition, the County also contains important prospects i.e. prominent landscapes or areas of special amenity value, or special interest which are widely visible from the surrounding area. Specific Views and Prospects for protection have been identified in the Plan and are considered when assessing planning applications."

Policy Objective GIB6 states: *"Views and Prospects: It is a Policy Objective to preserve, protect and encourage the enjoyment of views and prospects of special amenity value or special interests, and to prevent development, which would block or otherwise interfere with Views and/or Prospects."*

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." (emphasis added)

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." (emphasis added)

Urban Development and Building Height Guidelines for Planning Authorities

The Guidelines state: "*Reflecting the National Planning Framework strategic outcomes in relation to compact urban growth, the Government considers that there is significant scope to accommodate anticipated population growth and development needs, whether for housing, employment or other purposes, by building up and consolidating the development of our existing urban areas… Therefore, these guidelines require that the scope to consider general building heights of at least three to four storeys, coupled with appropriate density, in locations outside what would be defined as city and town centre areas, and which would include suburban areas, must be supported in principle at development plan and development management levels…*

"A key objective of the NPF is therefore to see that greatly increased levels of residential development in our urban centres and significant increases in the building heights and overall density of development is not only facilitated but actively sought out and brought forward by our planning processes and particularly so at local authority and An Bord Pleanála levels." (emphasis added)

In Section 3.2 of the Guidelines, 'development management criteria' are set out to guide the evaluation of development proposals for buildings taller than the prevailing heights in the area: *"In the event of making a planning application, the applicant shall demonstrate to the satisfaction of the Planning Authority/ An Bord Pleanála, that the proposed development satisfies the following criteria:*

At the scale of the relevant city/town:

- *"The site is well served by public transport with high capacity, frequent service and good links to other modes of public transport.*
- *Development proposals incorporating increased building height, including proposals within architecturally sensitive areas, should successfully integrate into/ enhance the character and public realm of the area, having regard to topography, its cultural context, setting of key*

landmarks, protection of key views. Such development proposals shall undertake a landscape and visual assessment, by a suitably qualified practitioner such as a chartered landscape architect.
- *On larger urban redevelopment sites, proposed developments should make a positive contribution to place-making, incorporating new streets and public spaces, using massing and height to achieve the required densities but with sufficient variety in scale and form to respond to the scale of adjoining developments and create visual interest in the streetscape."* (emphasis added)

At the scale of district/neighbourhood/street:
- *"The proposal responds to its overall natural and built environment and makes a positive contribution to the urban neighbourhood and streetscape.*
- *The proposal is not monolithic and avoids long, uninterrupted walls of building in the form of slab blocks with materials / building fabric well considered.*
- *The proposal enhances the urban design context for public spaces and key thoroughfares and inland waterway/ marine frontage, thereby enabling additional height in development form to be favourably considered in terms of enhancing a sense of scale and enclosure...*
- *The proposal makes a positive contribution to the improvement of legibility through the site or wider urban area within which the development is situated and integrates in a cohesive manner.*
- *The proposal positively contributes to the mix of uses and/ or building/ dwelling typologies available in the neighbourhood."* (emphasis added)

10.5 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

Development Description

The proposed development consists of a strategic housing development and planning permission is sought for a period of five years. The key elements of the proposal are as follows:

Residential

The proposed development provides 534 no. residential units as follows:
- 30 no. studios (5.6%)
- 135 no. 1 beds (25.3%)
- 318 no. 2 beds (59.6%)
- 51 no. 3 beds (9.5%)

The 534 no. units provide a residential density of 140 uph.

The units will be provided in 8 blocks ranging up to 10 storeys in height. All of these units have associate private space in the form of terraces or balconies which will look east/west/ north/ south. 50.7% of the proposed units are dual aspect.

Block AB provides 40 no. units and is 5 storeys. Block CD provides 32 no. units and is 5 storeys in height. Block E provides 68 no. units and ranges in height from 5 – 8 storeys (including the lower ground floor). Block F provides 96 no. units and ranges in height from 9 – 10 storeys (including the lower ground floor). Block G provides 89 no. units and ranges in height from 7 -8 storeys (including the lower ground floor). Block H provides 99 no. units and is 9 storeys in height. Block I provides 48 no. units and ranges in height from 5 to 6 storeys (including lower ground floor). Block J provides 62 no. units and ranges in height from 5 to 6 storeys (including lower ground floor).

Additional Facilities

In addition to residential units, the proposed development also provides a retail unit and a creche. The convenience retail unit, measuring 337sqm, and the creche, measuring 340 sqm, is located on the ground floor of Block CD.

Communal Facilities

Two residential amenity spaces will be provided. One on the ground floor of Block E, measuring 646sqm, and the second on the ground floor of Block I, measuring 850sqm. The residential amenities will include flexible spaces including entertainment rooms, meeting rooms, parcel rooms, media rooms, lounge and workspaces, gyms and studio, chef's kitchen and dining area.

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

Site Development Works

As part of the planning application, it is proposed to demolish the existing habitable dwelling "Winterbrook", and the derelict, former dwelling attached to Barrington Tower on the site.

It is also proposed to demolish the existing wall along Brennanstown Road to the north of the site. The stone from the wall will be used in the landscaping to the north of the site.

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

10.5.1 Aspects of the Proposal Most Relevant to its Potential Landscape and Visual Impacts

The proposed development can be divided into three distinct areas:
- Northern area beside Brennanstown Road;
- Central open space area incorporating Barrington's Tower;
- Southern high density residential area.

10.5.1.1 Northern Area Beside Brennanstown Road

The elevated northern part of the site with frontage to Brennanstown Road is occupied by Blocks A-B and C-D. These are both five storey buildings with linear rectangular plan forms, positioned perpendicular to Brennanstown Road so that they present their short facades to the road. In addition to presenting their short facades to the road, the buildings are set well back from the road (13.5m+) behind a wide landscaped corridor which includes a line of trees. This set-back, permeable built frontage is intended to avoid excessive built enclosure of the road. The photomontages for Viewpoints 02, 03, 04 and 05 prove this to be effective. The positioning of the buildings has also been determined by two additional objectives:

a) To ensure a wide separation distance between Block C-D and the existing house to the east of the site. To this end the proposed access road from Brennanstown Road is positioned inside the east boundary, so that – along with a planted woodland strip inside the boundary – the access road

will form an effective spatial buffer between the neighbouring house and the new five storey building on the site.

b) To form an open space corridor from Brennanstown Road between the two buildings to Barrington's Tower, framing a view of the tower from the road. The opening of a view of the tower from the road is a key objective of the proposal, to lend character and identity to the new neighbourhood and to introduce a previously hidden cultural heritage asset to the public realm.

Figure 10.14 Excerpt of the proposed landscape masterplan showing the northern part of the proposal

The proposed Blocks A-B and C-D have uncomplicated orthogonal/cubic forms. The linear blocks are each divided into two volumes, with a central connecting element forming small courtyards mid-way in the long elevations. Recessed balconies are used at the corners of each volume further articulate the massing. The buildings are clad in buff brick, with patterned brickwork in the ground floor facades to strengthen the base visually.

The 13.5m corridor between the buildings and Brennanstown Road (which would be upgraded to include a footpath) includes strips of shrub and meadow planting and a tree line inside the boundary wall and railing. This treatment is intended to soften the built frontage and provide privacy to the lower floor apartments. The strong green edge would also complement the historic character of Brennanstown Road.

10.5.1.2 Central open space incorporating Barrington's Tower

The two clusters of buildings, i.e. Blocks A-B and C-D fronting Brennanstown Road and Blocks E-J in the southern part of the site, are separated by a large central open space extending across the full width of the site. This space features (a) the restored Barrington's Tower in a large raised circular bed of ornamental planting, (b) two playgrounds in addition to a dedicated play space for the creche, (c) a large lawn kick-about area, (c) extensive meadow and woodland areas, and (d) numerous seating and informal gathering places. The scale and diversity of this central park are important aspects of the proposal. It would provide a valuable amenity for the residents and a suitable setting for the restored Barrington's Tower.

Figure 10.15 Photomontage showing the set-back, permeable built frontage to Brennanstown Road, the separation distance of Block C-D from the nearest house to the east, and the wide green strip including trees in front of the buildings to soften their presence on the road. Note the central vertical recess in the long east elevation and the corner recessed balconies to articulate the massing.

Figure 10.16 CGI view showing the restored Barrington's Tower forming the focal point in the central parkland area

10.5.1.3 Southern Area Overlooking Druid's Glen and the Luas Line

The southern part of the site is where the opportunity lies for a large-scale residential development. This area is some 160m (east-west) by 150m (north-south) in extent. It provides direct access to the Brennanstown Luas stop and Druid's Glen public open space, and is a short distance from the future Priorsland urban core. The land slopes steeply down towards Druid's Glen, with a southerly aspect and views towards the Dublin Mountains, and benefits from the screening of the tall trees in the adjacent valley. There are no houses immediately to the east of this part of the site, while to the west there are a small number of properties along the site's interface with the Brennanstown Wood estate.

In this part of the site a cluster of six L-shaped buildings is proposed, ranging from 6-10 no. storeys. The building height increases as the elevation drops (see Figure 10.18), so that the tallest volumes are along the southern boundary overlooking Druid's Glen. Blocks I and J inside the western boundary are lower (5-6 storeys) to limit their visual impact on Brennanstown Vale to the west.

Figure 10.17 Excerpt of the proposed landscape masterplan showing the southern part of the proposal

The buildings are predominantly clad in brick, with certain courtyard elevations rendered. The top floors of the taller buildings (Blocks E-H) are set back and rendered, to soften their profile and break up the massing in views from the surroundings. Large windows and expressed balconies add to the articulation of the facades.

Figure 10.18 Section-elevation showing the increase in building height across the site from north (right) to south, using the slope to accommodate the increase in height

Figure 10.19 Section-elevation showing the step down in height towards the west site boundary and the nearest houses in Brennanstown Vale

A key consideration in the proposal was the potential visual impact on the houses of Brennanstown Vale to the west. It is proposed to retain a wide belt of existing vegetation inside the west boundary, and to supplement this with additional tree planting for further screening. Similar planting is proposed around the southern boundary to supplement the woodland in Druid's Glen. A footpath leads out of the south west corner of the site, giving access to the Brennanstown Luas stop, located 100m from the site entrance.

Figure 10.20 CGI view from the south west entrance to the site showing the 5-6 storey Block I (the nearest proposed building to an existing house in Brennanstown Vale), and the taller (9 storey) Block H to the right overlooking Druid's Glen

10.6 POTENTIAL IMPACTS – VIEWS/VISUAL AMENITY

10.6.1 Construction Phase

During construction the site and immediate environs would be heavily disturbed by construction activities, the transport and storage of materials and equipment, and the incremental growth of the buildings on site. The magnitude of change to the views in the immediate environs would be high, reducing with distance from the site.

The sensitivity of the visual receptors ranges from medium (e.g. road users) to high (e.g. residents of existing homes in the area). Therefore, the visual effects will range in significance from 'slight' to 'significant' (these effects are individually identified for the representative viewpoints in Table 10.8 below). Construction is inherently and unavoidably unsightly, therefore the effects on visual amenity will be negative. However the effects would be temporary and in the operational phase the effects are predicted to be generally neutral or positive.

10.6.2 Operational Phase

21. no. viewpoints (see maps, Figures 10.21 and 10.22 below) were selected for detailed assessment of the potential visual effects informed by verified photomontages. The viewpoints were selected to address the key elements, areas and sensitivities in the receiving environment, as well as to provide photomontages from a range of angles and distances.

The assessment of the individual viewpoints below should be read in conjunction with the verified photomontages provided in Appendix 10.1, Volume 2 of the EIAR. For the methodology and the criteria and terms used, refer to Tables 10.1-10.6. Where relevant, commentary is provided on the potential cumulative visual effects with projects that are permitted or proposed in the site's vicinity.

Figure 10.21 Viewpoints for visual effects assessment – Local views

Figure 10.22 Viewpoints for visual effects assessment – All views

Viewpoints 01 to 06 are positions along Brennanstown Road, approaching the site from east and west, and along the site frontage. Viewpoints 03 and 05 represent neighbouring residential properties in addition to road users.

10.6.2.1 Viewpoint 01 – Brennanstown Road 200m east of the site

Existing View: This viewpoint was selected to test the visibility of the proposed development from a distance along Brennanstown Road to the east of the site. Along this stretch the road is so aligned that it frames the view directly towards the site. However, a combination of high boundary walls and vegetation restricts visibility of the surrounding landscape (both lateral and ahead along the road). Viewpoint sensitivity: Medium.

Proposed View: Due to the screening effect of the roadside walls and vegetation the proposed development would not be visible. Magnitude of change: None.

Significance and Quality of Visual Effects: No effect.

Cumulative Effects: n/a.

Viewpoint 02 – Brennanstown Road 70m east of the site

Existing View: The view is taken from a position further west along the road towards the site. The character of the road corridor remains the same, with a combination of high boundary walls and vegetation on both sides of the road generating a high degree of visual enclosure. Viewpoint sensitivity: Medium.

Proposed View: A row of tall, dense evergreen trees would be removed from the roadside in the middle distance and in their place the two new apartment buildings, Blocks A and C, would present their short elevations to the road. The proposed buildings are lower than the trees to be removed, and set back further from the road, so the net effect would be to reduce the visual enclosure on the approach to the site. Magnitude of change: Low-Medium.

Significance and Quality of Visual Effects: Slight-Moderate, neutral. The significance of the effects would derive from the change in character (the introduction of a new development typology to the road corridor) more so than the prominence of the buildings. Seen in isolation, the introduction of the apartment buildings to the road corridor would constitute a significant shift in character. However, the change is not unprecedented; the similarly scaled Brennanstown Wood development (see Figure 10.9 above) is a short distance ahead along the road. The development would thus contribute to an ongoing trend of change.

Cumulative Effects: n/a.

10.6.2.2 Viewpoint 03 – Brennanstown Road near north east corner of the site

Existing View: This view is taken from a position opposite the entrance to the neighbouring residential property on Brennanstown Road - to show (a) the appearance of the development as road users arrive alongside the site, and (b) the relationship of the new buildings to the neighbouring house. The existing view shows that the tall, dense row of evergreen trees along the site's road frontage is visually oppressive. The trees create excessive enclosure and contribute to an 'unkempt' appearance along this stretch of the road. Viewpoint sensitivity: High (the high sensitivity classification is due to the viewpoint being representative of the neighbouring house in addition to the typically less sensitive road users).

Proposed View: The view would be dramatically changed by the removal of the boundary wall and vegetation, the introduction of Blocks A-B and C-D to the road corridor, and the new junction on Brennanstown Road giving access to the development. Block C-D is closest to the neighbouring house, separated from it by a belt of new woodland planting with a meadow fringe and the 'streetscape' of the site access road (see Figure 10.23 below). The green belt and road function effectively as a buffer between the neighbouring house and the five storey apartment building, avoiding an overly abrupt transition or dominance of the smaller building. The urbanising effect of the buildings is strengthened by the café in the ground floor of Block C beside the site entrance, and by the formalised boundary treatment/planting along Brennanstown Road. The wide planted strip between the road and the buildings has the treble effect of (a) maintaining a green/vegetated road edge, (b) softening/screening the built frontage, and (c) providing privacy to the lower floor apartments. Magnitude of change: High.

Figure 10.23 Excerpt of proposed landscape master plan showing the landscaped strip inside the east boundary and along Brennanstown Road

Significance and Quality of Visual Effects: Very significant, neutral. The development would dramatically change the character of the landscape in view, 'tidying' and urbanising the appearance of the road corridor. This would contribute to the ongoing shift in character along Brennanstown Road, which was instigated by the Luas line and Cherrywood SDZ and is reflected in developments such as Brennanstown Wood. The proposed view shows that while the landscape context of the neighbouring residential property would be fundamentally altered, the embedded mitigation measures to protect the neighbouring house (Block C-D being separated from the house by a woodland belt on the boundary and the internal access road) would be effective in avoiding dominance of the house by the new building.

Cumulative Effects: n/a.

Viewpoint 04 – Brennanstown Road opposite proposed pedestrian entrance

Existing View: This is a lateral view from Brennanstown Road mid-way along the site boundary. The view is currently blocked by the tall, overgrown vegetation beside a disused gateway. Viewpoint sensitivity: Medium.

Proposed View: The view shows how the pedestrian entrance and path, flanked by Blocks A-B and C-D, are positioned to frame the view of Barrington's Tower, thus (a) making the tower visible from the public realm, and (b) lending character and identity to the new neighbourhood. The buildings are set back from the road behind a stone wall and railing and a wide landscaped strip including a mixed tree line. Between the two buildings, the broad linear space is aligned so that the historic tower is the focal point, with the view of the tower framed by an avenue of trees of slender, upright form. The buildings are uncomplicated in form and façade design so as not to distract from the tower. There is however reference to the tower in the cut stone ground floors of the buildings. The tower can be seen in the central green space beyond Blocks A-B and C-D, with Blocks E and G in the distance forming a backdrop. Magnitude of change: Very high.

Significance and Quality of Visual Effects: Significant positive. The development would transform the Brennanstown Road streetscape as it passes the site, in line with the ongoing trend of change in the vicinity. In addition to introducing a considered and attractive composition of built form and landscaping to the road corridor, the development would open a framed view of the restored Barrington's Tower from the public road, enhancing visual amenity while contributing to the protection of cultural heritage.

Cumulative Effects: n/a.

10.6.2.3 Viewpoint 05 – Brennanstown Road near north west corner of the site, approaching from the west

Existing View: This view represents road users and also a house diagonally across the road from the site (out of view to the left, behind the roadside vegetation). The existing view shows the unkempt vegetation along the site boundary contributing to a high degree of visual enclosure along the road corridor. Due to the locally low density of development and the vegetation the road has a nearly rural appearance but it should be recognised that Brennanstown Road is entirely within the urban environment; the viewpoint is a minute's walk from Brennanstown Wood and less than five minutes (the walk across the site) from Brennanstown Luas stop and the Priorsland village centre in the Cherrywood SDZ. Viewpoint sensitivity: Medium (the viewpoint represents neighbouring residential properties in addition to road users. However, the medium sensitivity classification takes account of the existing vegetation that buffers the houses from the visual effects of development on the site).

Proposed View: The view would be dramatically changed by the removal of the boundary vegetation and the introduction of Blocks A-B and C-D to the road corridor. The buildings are set back from the road behind a stone wall and railing and a wide landscaped strip including a mixed tree line. The trees have the treble effect of (a) maintaining the green road edge, (b) softening/screening the built frontage, and (c) providing privacy to the lower floor apartments. Magnitude of change: High.

Significance and Quality of Visual Effects: Moderate and positive. The development would contribute to the ongoing shift in character along Brennanstown Road. While the road corridor would be urbanised along this stretch (on one side, as it has elsewhere), its verdant character would to some extent be retained/reflected in the evolved landscape, with the wide landscaped strip (resulting from the setback of the buildings from the road) complementing the architecture of the buildings.

Cumulative Effects: n/a.

10.6.2.4 Viewpoint 06 – Brennanstown Road 300m west of the site

Existing View: This viewpoint was selected to test the visibility of the proposed development from a distance along the road to the west of the site. In the foreground to the left is the boundary wall of Carrickmines Wood, a mixed density residential development. Ahead to the left, behind the wall and trees, the five storey apartment building of Brennanstown Wood (under construction at the time of photography) is discernible. Across the road from the two modern developments are a row of houses in large, densely vegetated gardens, representing the former character of the area. Viewpoint sensitivity: Medium.

Proposed View: Due to the screening effect of the vegetation in the intervening landscape the proposed development would not be visible. Magnitude of change: None.

Significance and Quality of Visual Effects: No effect.

Viewpoints 01 to 06 show that the visual effects of the proposed development would be significant for only a short stretch of Brennanstown Road – a distance of approximately 200m as the road approaches

and passes by the site. Outside of this stretch it would have very limited direct visual effects, i.e. it would not be visible (or would be only barely visible), although by its presence along the road it would contribute to the ongoing change in landscape character. It is also notable that there are few other visual receptors (other than the road users) to the north of the site. Due to the low development density there are only a small number of houses across the road from the site and these benefit from large, densely vegetated gardens which screen the surrounding landscape from view. Therefore, overall, the visual effects of the proposed development on the area to the north of the site would be limited.

Cumulative Effects: n/a.

The following viewpoints, Nos. 07 to 10, are taken from various positions in Brennanstown Vale to the west of the site (see Figure 10.21 above).

10.6.2.5 Viewpoint 07 – Brennanstown Vale, distant view to west, upslope

Existing View: The view is taken from the Brennanstown Vale access road in an elevated position up the hillside, where a view towards the site is afforded between two houses. Viewpoint sensitivity: High.

Proposed View: Due to the topography and the vegetation in the intervening landscape the proposed development would not be visible. Magnitude of change: None.

Significance and Quality of Visual Effects: No effect.

Cumulative Effects: n/a.

Viewpoint 08 – Brennanstown Vale, mid-distant view to west

Existing View: The view is taken from a cul-de-sac near the centre of Brennanstown Vale, from which a number of the properties are accessed. Several of the houses can be seen protruding above the boundary walls and hedges. A notable feature of the view is the line of tall trees (Eucalyptus sp.) which are on a boundary within Brennanstown Vale (there is another house/property behind these trees, between the visible houses and the western site boundary). Viewpoint sensitivity: High.

Proposed View: Due to the topography and the vegetation in the intervening landscape the proposed development would not be visible. Magnitude of change: None.

Significance and Quality of Visual Effects: No effect.

Cumulative Effects: n/a.

Viewpoint 09 – Brennanstown Vale, distant view to west, lower road

Existing View: The Brennanstown Vale access road drops down the side of the hill before turning east, with this lower road framing a view towards the site. This view is taken from a position towards the western end of this lower road (and should be considered in conjunction with Viewpoint 10 which is towards the eastern end of the road, closer to the site). The existing view shows that visibility of the surrounding landscape is restricted by the street trees and garden vegetation in Brennanstown Vale. The photograph was taken in early spring before the deciduous trees came into leaf, and even then the view is heavily filtered by the bare tree canopies. Viewpoint sensitivity: High.

Proposed View: Due to the vegetation in the intervening landscape the proposed development would not be visible. Magnitude of change: Negligible.

Significance and Quality of Visual Effects: Imperceptible, neutral. In certain conditions (and only in winter) the proposed Block I may be discernible in the distance beyond the end of the street. It would have no material effect on the character or quality of the view however.

Cumulative Effects: n/a.

Viewpoint 10 – Brennanstown Vale, close-up to west, lower road

Existing View: The Brennanstown Vale access road ends in a cul-de-sac near the south west corner of the site (see Figure 10.24 below). Viewpoint 10 is the view from the road approaching the cul-de-sac. It represents road users, but also the residential properties in this area directly to the west of the site. The existing view shows the screening effect of the vegetation within Brennanstown Vale and along the site boundary in winter with the deciduous trees out of leaf. In summer the trees would form a solid screen. (It should be noted that the houses themselves are typically less enclosed by trees (than the road is), so views from the houses would be less restricted. However, the views from the houses are typically directed south towards the Dublin Mountains, and not east towards the site.) Viewpoint sensitivity: High.

Proposed View: In the view from the road the proposed buildings, Blocks I and J, would be discernible through the tree canopies in winter, and screened from view in the summer. Views from the residential properties neighbouring the site would experience a higher magnitude of change (as they are closer to the site), despite the screening/filtering effect of the retained vegetation and proposed supplementary planting. Magnitude of change: Low-High.

Significance and Quality of Visual Effects: Significant neutral. The introduction of the large new apartment buildings in the immediate vicinity of the houses would reduce the visual amenities of the neighbouring properties. This is an inevitable outcome of compact growth policy which calls for high density development on infill sites in the urban environment where the infrastructure and services – particularly public transport – are available to support it. The subject site presents such an opportunity. It should also be noted that further change in the receiving environment is due to take place with the implementation of the Cherrywood Planning Scheme, specifically the Priorsland Development Area directly to the south across the Luas Line.

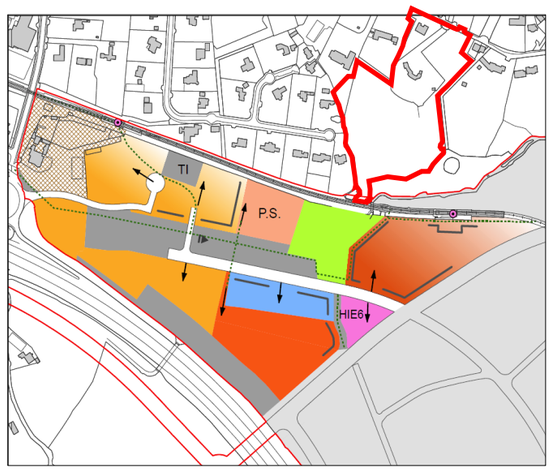


Figure 10.24 The Cherrywood Planning Scheme map for the Priorsland Development Area to the south of the site and Brennanstown Vale, across the Luas line

Furthermore, while views east from the properties would be negatively affected, the following should be considered (refer to Figure 10.25 below): (a) The houses are positioned and designed to derive maximum amenity benefit from the views south towards the Dublin Mountains (just as the proposed development is); the proposed development would be peripheral to these views. (b) The new buildings are separated from the houses by c. 30m+ and located to the side (as opposed to in front of or behind the houses), i.e. outside of the principal views from the houses. (c) A large volume of mature vegetation including tall trees would be retained along both sides of the boundary, and a large number of new trees are proposed to further screen and soften the buildings in views from the neighbouring properties.

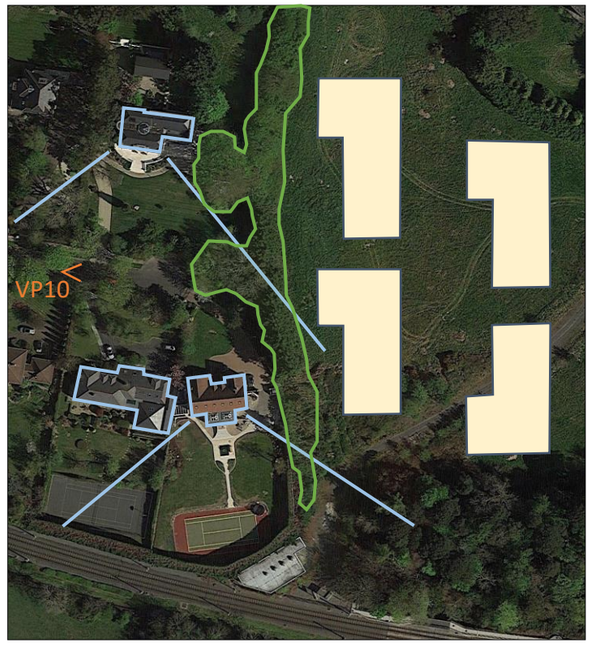


Figure 10.25 Annotated aerial photograph and excerpt from the proposed landscape masterplan showing the relationship of the proposed Blocks I and J to the neighbouring Brennanstown Vale properties

Cumulative Effects: n/a.

Viewpoints 07 to 10 address the potential visual effects on Brennanstown Vale to the west of the site. The photomontages show that only the properties closest to the site would be significantly affected. The properties removed from the site benefit from the screening effect of the trees that characterise the neighbourhood.

Viewpoint 11 – Carrickmines Luas car park (future Priorsland development plot)

Existing View: The park-and-ride facility beside the Carrickmines Luas stop is located in the western part of the Priorsland Development Area. The Cherrywood Planning Scheme indicates that the area occupied by the car park is to be developed for residential use in future. Currently the car park is surrounded on all sides by trees. These hide the Luas line which passes to the north of the of the car park, separating the Priorsland Development Area from Brennanstown Vale. Most of the houses in Brennanstown Vale are screened by the trees. Viewpoint sensitivity: Low.

Proposed View: The tops of the proposed buildings would protrude marginally above the tree line in the distance. This would constitute a low magnitude of change in the current scenario. Magnitude of change: Low.

Significance and Quality of Visual Effects: Not significant, neutral. In in the context of a public transport hub in a developing urban area the visibility of a new development would have no significant effect on the character or quality of the view.

Cumulative Effects: n/a.

Viewpoint 12 – Brennanstown Luas stop

Existing View: The Brennanstown Luas stop is built but not yet operational. Trams currently pass through en route between Cherrywood, Carrickmines and the city. In the view towards the site the Luas infrastructure occupies the foreground and the majestic trees of Druid's Glen enclose the view. This can be considered a temporary/interim scenario. Figure 10.24 above shows that the lands to the south of the Luas line (to the left of the track in the view) are designated for Res 3 development, i.e. a high density residential neighbourhood to derive maximum benefit from proximity to the Luas stop and the open space of Druid's Glen. The site has the same locational advantages as these lands. Viewpoint sensitivity: Medium.

Proposed View: The proposed buildings would be screened or heavily filtered by the trees of Druid's Glen resulting in a negligible change at most. Magnitude of change: Negligible.

Significance and Quality of Visual Effects: Not significant, neutral.

Cumulative Effects: n/a.

Viewpoint 13 – Lehaunstown Luas stop

Existing View: A short distance to the east of Brennanstown is the Lehaunstown Luas stop in the future Lehaunstown 'village centre', another of the satellite urban cores of Cherrywood. At this point, east of Barrington's Road, the Luas line forms part of Grand Parade, the central spine road through Cherrywood. This is the view west along the future Grand Parade. The trees of Druid's Glen form a dense bank of vegetation in the distance. Viewpoint sensitivity: Medium.

Proposed View: The proposed buildings would protrude above the Druid's Glen trees in the distance. At this distance and in the complex composition (particularly the foreground) this would constitute a low magnitude of change, although it would cause a shift in character towards an urban condition. Magnitude of change: Low.

Significance and Quality of Visual Effects: Moderate, neutral. Although a relatively minor element in the view, due to its position on the axis of Grand Parade and forming a backdrop to Druid's Glen, the development would contribute to the shift in landscape/townscape character along the spine of the Luas line. This would cause neither an improvement nor a disimprovement in visual amenity.

Cumulative Effects: The cumulative view shows the massing of a proposed development (Reg. Ref. DZ21A/0334) on the L1/L2 development plots in Lehaunstown, fronting Grand Parade. This gives an indication of the likely future character of the area. The Planning Scheme identifies an 'upward modifier' (a building if increased height) across Grand Parade from that development, in approximately the position of the cottage to the right in the view. In the foreground to the right is the area designated for a small village green. In this future cumulative scenario (i.e. an urban core) the proposed development would have limited prominence or effect on the overall character of the landscape/townscape or the visual amenity experienced in Lehaunstown. Its effect would lessen to slight neutral.

Viewpoint 14 – Beckett Park, Castle Street, Cherrywood

Existing View: To the south of Lehaunstown in Cherrywood is the Tully Development Area. This view is taken from the entrance to Beckett Park on Castle Street in the future Tully neighbourhood. This is a lower/mixed density residential area, being further from the Luas stop. As in the view from Lehaunstown, the trees of Druid's Glen form a bank of vegetation in the middle distance, enclosing the Cherrywood area. Viewpoint sensitivity: Medium.

Proposed View: The proposed buildings would protrude above the Druid's Glen trees in the distance, their typology, scale and form suggesting that they mark a place of significance in the evolving landscape/townscape (i.e. the Brennanstown Luas stop and Priorsland village centre, which the development faces across Druid's Glen). Seen in isolation this would constitute a medium magnitude of change. Magnitude of change: Medium.

Significance and Quality of Visual Effects: Moderate, neutral. Due to its distinctly urban typology and scale, its protrusion above the horizon and the juxtaposition with Druid's Glen, the development would cause a notable shift in character towards an urban condition. This is not inappropriate in the context (i.e. the evolving Cherrywood/ Cabinteely/ Carrickmines urban area along the spine of the Luas line).

Cumulative Effects: The cumulative view shows the massing of a masterplan for a landholding incorporating parts of the Tully and Priorsland Development Areas. This gives an indication of the future character of the area (the masterplan is generally compliant with the Planning Scheme in massing and height). It can be seen that built/visual enclosure will be considerably increased as the roll-out of the Planning Scheme progresses. In the future cumulative scenario the proposed development would only be glimpsed through a gap in the Castle Street elevation at a junction. In the evolved urban environment its effect would reduce to slight neutral.

Viewpoint 15 – Tully Church

Specific Objectives PD 27 and PD 28 of the Cherrywood Planning Scheme identify views to be protected or enhanced in the development of the SDZ. Many of the identified views (Section 2.11, page 19 of the Planning Scheme) are views from Tully Church towards features of the wider landscape surrounding Cherrywood. These include the views from Tully church environs towards (a) the coast and marine horizons, (b) Killiney Hill, (c) Carrickgollogan and the Lead Mines chimney, (d) Ticknick, and (e) the Dublin and Wicklow Mountains.

Figure 10.26 The protected views identified by Specific Objectives PD 27 and PD 28 of the Cherrywood Planning Scheme, none of which could be affected by development on the subject site

Figure 10.26 shows that the site lies to the north west of Tully church environs and does not feature in any of the protected views. Therefore, there is no potential for any development on the site to cause harm to any of the protected views. The view from Tully church has however been assessed to establish whether the proposed development would be visible from the church.

Existing View: The view is taken from the graveyard beside the church, looking north west towards the site. A line of trees follows the alignment of Lehaunstown Lane on the Tully ridgeline. These trees and the complex foreground topography largely screen the landscape to the north of Cherrywood (including the site) from view. (In comparison, the views east towards the coastline and west towards the mountains are open/unobstructed.) Viewpoint sensitivity: Medium. (It is recognised that views from Tully church environs are sensitive. However, the site is not within any of the protected 'cones of view', and it must also be recognised that the lands surrounding Tully church environs are mostly designated for development and therefore there is capacity for change.)

Proposed View: The proposed development would be screened by the topography of Tully Hill and the trees along Lehaunstown Lane on the ridgeline, which are to be retained in the lane's conversion into a greenway. Magnitude of change: None.

Significance and Quality of Visual Effects: No effect.

Cumulative Effects: The cumulative view shows the massing of a masterplan for a landholding incorporating parts of the Tully and Priorsland Development Areas. This illustrates the extent to which views from Tully Church environs will change in future as the Planning Scheme is implemented. In that future scenario the proposed development would still have no effect on this view.

Viewpoint 16 – Lehaunstown Lane M50 overpass

Existing View: The view is taken from the overpass over the M50 between Cherrywood and Ticknick where a large sports facility is being developed to cater for the Cherrywood population. In the foreground is the M50 with a belt of maturing trees on the embankment. In the distance to the north along the motorway an urban core including tall buildings can be seen at Leopardstown. To the right, beyond the currently undeveloped Cherrywood SDZ lands, is the wooded hillside of Cabinteely above Druid's Glen (the cranes identify the site of the Brennanstown Wood development). Viewpoint sensitivity: Medium (given the context there is a high capacity for change in the view).

Proposed View: The proposed buildings would be largely screened by the trees of Druid's Glen but the tops of the buildings would be discernible among the tree tops of the wooded hillside of Cabinteely. In the complex panorama this would constitute a negligible to low magnitude of change. Magnitude of change: Negligible-Low.

Significance and Quality of Visual Effects: Slight, neutral. Although a minor element in the view, due to the development's position within the bank of vegetation that forms a backdrop to the Cherrywood area, it would cause a slight change in character. In such a complex view, in which the broad, busy motorway in the foreground dominates, this effect is more theoretical than tangible, and there would be no change in visual amenity.

Cumulative Effects: The cumulative view shows the massing of a permitted development (Reg. Ref. DZ19A/0597) beside the motorway, and further permitted and proposed developments in the Tully and Lehaunstown areas beyond that. In this future scenario in which Cherrywood becomes urban in character the proposed development would recede into the background and its effects would lessen to not significant neutral.

Viewpoint 17 – Heronford Lane

Existing View: The view is taken from the pedestrian path up the hill from the M50 overpass leading to Ticknick. The M50 is hidden by the foreground topography and the elevation provides a panoramic view over Cherrywood and the existing urban areas to the east (e.g. Glenageary, Ballybrack, Loughlinstown), towards the coastline. Howth Head is prominent on the horizon, beyond Dublin Bay. The wooded hillside of Cabinteely above Druid's Glen is also a notable feature in the view, forming a backdrop to the currently undeveloped Cherrywood SDZ lands. Viewpoint sensitivity: Medium.

The Cherrywood Planning Scheme Strategic Environmental Assessment Report states: *"Only two elevated areas offer panoramic views across the Planning Scheme area, the areas around Killiney Hill to the north east and the areas around Ticknick/Rathmichael to the south-west. Viewed from these more distant areas, the Planning Scheme area is perceived in two distinctive contexts as follows:*

- *"When viewed from elevated areas to the north east, the Planning Scheme area will form the foreground to a panorama of hills of ever increasing height that culminate in the skyline formed by the Wicklow mountains;*
- *When viewed from the south-west, the Planning Scheme area will be seen in the context of the fully urbanised suburbs of Carrickmines, Cabinteely, Sallynoggin, Killiney, Ballybrack and Loughlinstown."*

This view is typical and representative of the views from Ticknick/Rathmichael, in which Cherrywood is seen against the backdrop of the 'urbanised suburbs of Carrickmines, Cabinteely, Sallynoggin, Killiney, Ballybrack and Loughlinstown.

Proposed View: The proposed buildings would be largely screened by the trees of Druid's Glen but the tops of the buildings would be discernible among the tree tops of the wooded hillside of Cabinteely. In the complex, panoramic view this would constitute a negligible to low magnitude of change. Magnitude of change: Negligible-Low.

Significance and Quality of Visual Effects: Slight, neutral. Although a minor element in the complex, panoramic view, due to the development's position within the bank of vegetation that forms a backdrop to the Cherrywood area, it would cause a slight change in character. It should be noted that there are already buildings visible among the trees in Cabinteely, and the overall impression of a wooded hillside enclosing the Cherrywood area would not be changed. There would be no significant change in character and no reduction visual amenity.

Cumulative Effects: The cumulative view shows the massing of various permitted and proposed developments in the Tully and Lehaunstown areas in Cherrywood. In this future scenario the proposed development would recede into the background of the very complex view and its effects would lessen to not significant neutral.

Viewpoint 18 – Golf Lane

Existing View: Golf Lane is on the hillside above the M50, to the south west of the site and the Priorsland Development Area. The lane provides access to a golf club on the outskirts of the developing Carrickmines urban area. The elevated position affords a panoramic view over the M50 and the western part of Cherrywood. Beyond the low lying fields of Priorsland across the motorway is the hillside of Cabinteely where the large houses can be seen between the many mature trees. The cranes on the hilltop

indicate the location of the Brennanstown Wood development. In the distance to the right is Killiney Hill and to the right of the hill a part of the Irish Sea is visible. It should be noted that in the foreground, a new road is to be built diverting from Golf Lane, running alongside the M50 (on the near-side) then crossing beneath the motorway to meet Barrington's Road, connecting Cherrywood and Carrickmines. Viewpoint sensitivity: Medium (given the context, i.e. a view over a planned new urban area, there is a high capacity for change in the view).

Proposed View: The proposed buildings would protrude above the treeline on the Cabinteely/Brennanstown hilltop. The lower floors would be screened by vegetation in the intervening landscape but 1-3 no. upper floors would stand clear of the trees. The typology and scale of the buildings would be distinctly urban and the development would suggest a new place of significance in the evolving landscape/townscape. Although occupying a relatively small part of the broad panorama, the protrusion above the horizon elevates the magnitude of change to medium. Magnitude of change: Medium.

Significance and Quality of Visual Effects: Moderate, neutral. Due to its distinctly urban typology and scale and its protrusion above the horizon the development would cause a notable shift in character in the Cabinteely/Brennanstown area - towards a more urban condition. This is not inappropriate in the context (i.e. the evolving Cherrywood/ Cabinteely/Carrickmines urban area along the spine of the Luas line).

Cumulative Effects: The cumulative view shows the massing of a number of permitted and proposed developments in the Lehaunstown and Tully areas in Cherrywood. With the further implementation of the Planning Scheme similar development will take place in Priorsland between the M50 and the Cabinteely/Brennanstown hillside, extending all the way to the left of the field of view. In this future scenario the proposed development would recede somewhat, although its protrusion above the horizon would give it some prominence, and it would function as a marker of the Brennanstown Luas stop in Priorsland village centre. The significance of the effect in that scenario would be slight-moderate neutral.

Viewpoint 19 – Glenamuck Road bridge over the M50

Existing View: The broad M50 motorway corridor is prominent below the bridge to the right of the field of view, and the maturing vegetation on the embankments around the interchange restricts visibility of the surrounding landscape. In the distance along the alignment of the motorway a cluster of cranes indicates the location of the developing Cherrywood town centre. Two cranes to the left indicate the location of the Brennanstown Wood development under construction near the site. Planning permission has been granted for a site beside the motorway, just to the right of the field of view, for a 22 storey residential development (https://www. golflaneshd2020.ie/). This is indicative of the changing character of the area. Viewpoint sensitivity: Low (this is a view from a motorway overpass in a developing urban area; there is considerable capacity for change).

Proposed View: The proposed buildings would protrude above the treeline in the distance. The lower floors would be screened by vegetation in the intervening landscape but 1-3 no. upper floors would stand clear of the trees. Magnitude of change: Low.

Significance and Quality of Visual Effects: Slight, neutral. The typology and scale of the buildings would be distinctly urban, contributing to a shift in character in line with the wider area. Considering the low sensitivity of the viewpoint, the effect on visual amenity would not be significant.

Cumulative Effects: The cumulative view shows the massing of a number of permitted and proposed developments in the town centre, Tully and Lehaunstown areas in Cherrywood. Further development will in time take place in the Priorsland area (closer to the site, and the viewer). In that future scenario, combined with the further development of Carrickmines, the effects of the proposed development would lessen to not significant neutral.

Viewpoint 20 – Druid's Glen Road off the N11

Existing View: This viewpoint was included to test the visibility of the proposed development from a distance to the east, where the N11 passes the Cherrywood area. Druid's Glen Road is a key future thoroughfare in the new urban area, and along the constructed section the road's alignment provides a view towards the site. The view shows the transitional condition of the Cherrywood landscape, with part-constructed infrastructure, operational developments and as yet undeveloped plots. The bank of trees in the distance marks the position of Druid's Glen, and the Dublin Mountains form the horizon. Viewpoint sensitivity: Medium (the landscape is in a transitional condition with a high capacity for change, but there are certain valued elements in the composition such as the Druid's Glen trees and the mountains).

Proposed View: The proposed buildings may protrude very marginally above the distant tree line of Druid's Glen, but they would be barely discernible at this distance. Magnitude of change: Negligible.

Significance and Quality of Visual Effects: Imperceptible, neutral.

Cumulative Effects: n/a.

Viewpoint 21 – Killiney Hill

Existing View: The view west from the Killiney towards the Dublin and Wicklow Mountains is identified in the Cherrywood Planning Scheme SEA Environmental Report as a 'key sensitivity'. The Environmental Report describes the view as follows: *"Panoramic view of the edge of the city meeting the foothills of the Wicklow Mountains with the distant skyline…"* The view from the hilltop is complex, with an elevated suburban landscape in the foreground, a vast low-lying urban area (incorporating the evolving Cherrywood landscape) in the middle distance, and the mountains forming a backdrop. Viewpoint sensitivity: Medium (while the view is highly valued, due to the breadth and complexity of the view there is capacity for change, and change cannot/should not be prevented – apart from any obstruction to the view in the foreground).

Proposed View: The proposed development would be hidden from view. Magnitude of change: None.

Significance and Quality of Visual Effects: No effect.

Cumulative Effects: n/a.

10.7 POTENTIAL IMPACTS – LANDSCAPE CHARACTER

10.7.1 Construction Phase

The construction process would entail the following:

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

During construction the site would be heavily disturbed by the above activities. The magnitude of landscape change would be high, although temporary. Overall, the sensitivity of the landscape can be considered medium (refer to 10.7.2). Taking these factors into account, the construction phase effects on the landscape are predicted to be 'moderate' and negative.

10.7.2 Operational Phase

Landscape Character and Sensitivity to Change

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 landscape 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 judgments based on criteria that can be used to establish landscape value.

- The site is a large, residential-zoned land parcel in the urban/metropolitan environment, adjacent to the Brennanstown Luas stop, the Druid's Glen open space and the future urban core of the Priorsland Development Area in the Cherrywood SDZ.
- Within this context, the site falls into an area - along Brennanstown Road - that until recently was characterised exclusively by a sparse arrangement of large houses mostly on very large plots with numerous mature trees – an environment of distinctly suburban character. In the Brennanstown Road area itself, and when viewed from outside (e.g. from Cherrywood), the low density of development, the tree cover and ridge topography are the key, highly valued characteristics of the area.
- The context of this area was fundamentally altered by the development of the Luas line (including a stop at Brennanstown just outside of the site) and the related designation of the Cherrywood Strategic Development Zone, which extends to the east, west and south of the site. These developments placed the site alongside a public transport corridor and an extensive new/future mixed use town within the metropolitan area - with two urban cores/'village centres' (Priorsland and Lehaunstown) within walking distance of the site.
- These changes to the context instigated changes in the Brennanstown Road area, with the introduction of higher density residential development typologies. Most notable are the Carrickmines Wood and Brennanstown Wood developments to the west of the site. Brennanstown Wood only 150m from the site includes apartment buildings of up to five storeys (incl lower ground level). A development of similar type, the 'Brennanstown Road' development, has been approved in the other direction along Brennanstown Road near Cabinteely.
- The site is thus in a previously low density residential landscape which is now undergoing a process of compact growth/densification in response to the arrival of the Luas line and the ongoing development of the Cherrywood SDZ. The site's scale and its particularly favourable location adjacent to the Brennanstown Luas stop and opposite the future Priorsland village centre are drivers for high density development on the site. This is encouraged by national policy.
- The very low density residential development on the neighbouring lands to the east, west and north, while constituting a sensitivity (higher density development can be seen as threatening to the existing residential amenities) can also be considered an opportunity in that the neighbouring residential properties are few in number. These properties are also characterised by large gardens with tall trees, which provide screening. Another notable characteristic of these properties is the positioning and design of the houses to take advantage of views south towards the Dublin Mountains. The site, which lies to the east or west of the nearest houses, is thus peripheral to the principal views from the houses.
- A notable characteristic of the site is the topography. The land falls steeply to the south, towards Druid's Glen. This fall in the topography presents an opportunity to increase building height towards the southern boundary of the site. This would concentrate the residential density closest to the Luas stop, the Druid's Glen public open space and the future Priorsland village centre.
- The dense belt of tall trees in Druid's Glen to the south and east of the site also generates opportunity (along with the topography) by providing screening of the southern part of the site in views from the south and east (i.e. views from Cherrywood).
- The site has a unique asset in Barrington's Tower. This is a protected structure, but it has been compromised by its incorporation into one of the 20th century houses (now disused) on the site. The tower presents an opportunity for restoration of a cultural/architectural heritage feature, both for the sake of conservation and to lend character and identity to any new development on the site.

Taking the above factors into account the sensitivity of the receiving environment to change of the type proposed can be classified 'medium' (definition[1]: *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*).

Magnitude of Landscape Change

Landscape/townscape character is the product of a number of elements/factors, including (a) topography, (b) urban grain and movement patterns, (c) the land use mix, (d) plot and building

[1] Refer to 'Note on definitions used in this assessment' on page 10.1.

typologies, scale and architecture, (e) public realm/green infrastructure, and (f) perceptual factors. The higher the magnitude of change that a development would cause to one or more of these factors, the greater the significance of its townscape effects is likely to be.

- **Topography**: The topography is a key characteristic of the site and the proposed development responds appreciably to it. The elevated, relatively flat area adjacent to Brennanstown Road would be occupied by the five storey Blocks A-B and C-D. In the larger, southern portion of the site, where the land falls steeply towards Druid's Glen, the building height increases, from seven storeys (Blocks E and G) to nine storeys facing the southern boundary (Blocks F and H, facing the Luas line, Druid's Glen and the Priorsland Development Area. The site topography would be heavily disturbed by the development but ultimately restored/reflected in the new built environment – both in the building height and the terraced open spaces between and around the buildings.
  The visual effects assessment shows that the site's position on the Cabinteely/Brennanstown hillside, combined with the building height, would result in the buildings protruding above the tree line of Druid's Glen in views from the west and south west (e.g. Viewpoints 14, 16 and 18).
- **Land use mix**: The proposed development is compliant with the residential land use objective for the site. It would represent a significant increase in development density in comparison to the immediate environs, but this is (a) in keeping with the trend of change in the wider area (e.g. the Carrickmines Wood, Brennanstown Wood and Brennanstown Road developments, and the future developments in the Priorsland area), and (b) supported by compact growth policy. The concentration of density in the southern part of the site adjacent to the Luas stop, Druid's Glen public open space and the Priorsland Development Area, is a logical response to the opportunity presented by the location. The proposal also includes a retail/cafe use and a creche, supporting the higher density residential use.
- **Urban grain and movement patterns**: The proposed development would establish its own urban grain, of entirely different character to that of the surrounding suburban landscape. This is an inevitable result of the high density typology being introduced to a previously low density suburban area. The development would introduce several new pedestrian routes across the site, between Brennanstown Road and the Brennanstown Luas stop (and onwards into the wider Cherrywood area). The density would generate and encourage pedestrian movement.
- **Plot and building typologies, scale and architecture**:
  - The proposed development would introduce buildings of distinctly urban typology, scale and architecture to an area historically characterised by very low density suburban development. There is precedent in the vicinity for densification (e.g. Carrickmines Wood and Brennanstown Wood) but the development would represent a further step up in building scale/height and density, and due to (a) its position and (b) its larger scale, it would be more widely visible from the surrounding area (e.g. Viewpoints 11, 13, 14, 16-18).
  - A key element of the proposal is the restoration of Barrington's Tower as a stand-alone heritage building in the landscape. The condition of the protected structure would be significantly improved and it would be the focal point and defining feature of the new neighbourhood's open space. The development would also open a view of the tower from Brennanstown Road (refer to Viewpoint 04), i.e. it would become a feature of the public realm/views as well as an internal feature of the new neighbourhood.
- **Public Realm/Green Infrastructure**:
  - While the high density development would substantially increase the building footprint and hard surfacing on the site, it includes a large area of public and communal open space. Existing vegetation along the west, south and east boundaries of the site would be retained and supplemented with new woodland planting to strengthen the framework of woodland around these boundaries – with habitat and visual screening benefits.
  - In contrast to these more naturalistic landscape treatments around the west, south and east boundaries, along Brennanstown Road the proposed landscaping is more formal/urban in character. The wide green roadside strip in front of Blocks A-B and B-C is nonetheless intended to retain/reflect the 'green' character of the road boundary. It would also soften the built frontage and provide privacy to the lower floor apartments facing the road.
  - The more formal landscape treatment extends from the road edge along the open space corridor between Blocks A-B and D-C, creating an avenue-type approach/view to Barrington's Tower.
  - The large, central open space incorporates Barrington's Tower as a focal point. This parkland area also includes two play spaces (in addition to the creche play area), a large lawn kick-about area, several seating/informal gathering areas and extensive ornamental, meadow and woodland planting areas.
  - The courtyards between Blocks E-J are predominantly hard-surfaced, terraced areas although they too incorporate extensive ornamental, buffer, hedgerow and tree planting.
  - Overall, the proposed landscape masterplan adopts the key principles of green infrastructure design, i.e. connectivity and multi-functionality (catering for passive and active recreation), with a focus on habitat creation, visual screening and amenity.
- **Perceptual factors**:
  - The proposed development would create a new high density neighbourhood of appreciable design and material quality (in the buildings and open space areas) and a high level of residential amenities. The restoration of Barrington's Tower and its use as a focal point of the development would lend character and identity to the neighbourhood.
  - Along Brennanstown Road the transition from the existing suburban character to the higher density urban typology would result in a significant but not excessively pronounced change in character – due to (a) the perpendicular alignment of Blocks A-B and C-D to the road (so that the built frontage is permeable), (b) the setback of the buildings from the road and their relatively modest height (avoiding excessive built enclosure), and (c) the wide landscaped strip between the road and the buildings. There is also precedent for development of similar type and scale elsewhere along the road.
  - The cluster of taller buildings in the southern part of the site (Blocks E-J) would result in a more pronounced transition in character, particularly from Brennanstown Vale to the west. This would be moderated by the step down in height to six storeys (Blocks I and J) and the substantial belt of retained and supplemented trees inside the west boundary.
  - Due to the southern cluster of building's massing and height, they would be visible from parts of the wider receiving environment (particularly in views from the south and east, e.g. Viewpoints 11, 13, 14, 16-18). The lower floors would be screened by the surrounding vegetation but the top 1-3 floors would protrude above the treeline. This would cause a shift in character in the wider area, extending the urban character of Cherrywood across Druid's Glen onto the Cabinteely/Brennanstown ridge. While this densification of the area has begun with other developments, the proposed development would make this change more visible.

Overall the potential magnitude of landscape change can be classified 'high' (definition[2]: *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.*).

Significance of Landscape Effects

Measuring the potential magnitude of change against the sensitivity of the receiving environment**, the significance of the landscape effects is predicted to be 'significant'**. The transition in character would be pronounced particularly the in the southern part of the site where a dense cluster of tall buildings (for the context) is proposed. However, there are persuasive drivers for this change (proximity to the Luas, public open space and the Priorsland Development Area) and national policy is supportive. Additionally, the quality of the development would be commensurate with the character of the area. **Therefore, the quality of the landscape effect is classified neutral**.

10.8 POTENTIAL CUMULATIVE IMPACTS

For the purpose of conducting this EIA, the following projects have been identified as having potential for in-combination effects with the proposed development:

- Brennanstown Wood Residential Development
  ABP reference: ABP-301614-18
  Decision: Granted 31st August 2018

  Viscount Securities were granted planning permission for a strategic housing development at Brennanstown Road, Dublin 18 for 136 number residential units, comprising of 98 number apartments and 38 number houses. A 195 square metre creche facility and play area is proposed on the lower ground floor of Block 1. The development includes 227 number car parking spaces at basement / lower ground floor and surface level.

- Doyle's Nursery ('Brennanstown Road' development)
  ABP reference: ABP-305859-20
  Decision: Granted 25th June 2020

  Atlas GP limited were granted planning permission for the Demolition of 'Benoni' and extant single storage buildings, construction of 234 no. apartments, creche and associated site works.

The position of Viewpoint 06, assessed above, was selected to assess whether there is any potential for the proposed development and the Brennanstown Wood Development to be seen simultaneously from Brennanstown Road. There is no potential for such visual impact.

However, there is potential for in-combination *landscape* effects arising from the two permitted developments above and the proposed development. People living or traveling on Brennanstown Road would experience a shift from the previously suburban character to a more urban condition, as a result of the introduction of apartment buildings to the road corridor. The two developments above (in addition to the Carrickmines Wood development beside 'Brennanstown Wood) have initiated this trend of change. The proposed development would reinforce the change.

There is also some potential for these developments to be seen simultaneously from elevated positions in the Dublin Mountains to the south. In such views (panoramic views from elevated positions) the developments would be seen in the context of the wider Dun Laoghaire Rathdown urban area that already exists between the M50 and the coastline. The developments would simply be perceived as part of that vast, diverse urban landscape. There is no potential for negative cumulative visual impact to arise.

In addition to the above developments along Brennanstown Road, a significant change in landscape/townscape character is taking place in the Cherrywood SDZ, which abuts the site, and in Carrickmines nearby. For example in Cherrywood there are several permissions (DZ21A/0399, DZ20A/0552, DZ19A/0597) currently under construction in the Tully Development area, and a large proposal (DZ21A/0334) at FI stage in the Lehaunstown area 230m to the east of the subject site. In Carrickmines, a significant recent planning decision was the decision to permit a 'landmark' 22 storey residential building on a site beside the M50 – on the south/west side of the motorway (i.e. 'outside of' the M50). These developments, along with the emerging Cherrywood town centre area, are all contributing to a consolidation and densification of the urban landscape around the site. This change has been driven by the area's road and Luas connectivity, supported by the national policy of compact growth.

10.9MITIGATION MEASURES

10.9.1 Construction Phase

No mitigation measures are recommended for landscape and visual impact mitigation other than (a) standard best practice construction site management, and (b) implementation of the proposed tree protection measures contained in Appendix 1 of the Tree Survey and Arboricultural Report prepared by The Tree File Ltd.

10.9.2 Operational Phase

The potential landscape and visual effects of the proposal in the operational phase have been classified as positive or neutral. No negative effects have been identified. This is a reflection of the embedded mitigation measures in the design. Therefore no mitigation measures are recommended for landscape and visual effects.

10.10 RESIDUAL IMPACTS

10.10.1 Construction Phase – Landscape Effects

During construction the site and immediate environs would be heavily disturbed by construction activity and the incremental growth of the buildings on site. The magnitude of landscape change would be high, although temporary. Overall, the sensitivity of the landscape can be classified medium (refer to 10.7.2).

[2] Refer to 'Note on definitions used in this assessment' on page 10.1.

Taking these factors into account, the construction phase effects on the landscape are predicted to be 'moderate' and negative.

10.10.2 Operational Phase – Landscape Effects

Landscape Character and Sensitivity to Change

The sensitivity of the receiving environment to change of the type proposed can be classified 'medium' (definition[3]: *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*).

Magnitude of Landscape Change

Landscape character is the product of a number of elements/factors, including (a) topography, (b) urban grain and movement patterns, (c) the land use mix, (d) plot and building typologies, scale and architecture, (e) public realm/green infrastructure, and (f) perceptual factors. The higher the magnitude of change that a development would cause to one or more of these factors, the greater the significance of its landscape effects is likely to be.

Taking account of the impacts on the above elements/factors, the predicted magnitude of landscape change is 'high' (definition[4]: *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*).

Significance of Landscape Effects

Measuring the potential magnitude of change against the sensitivity of the receiving environment**, the significance of the landscape effects is predicted to be 'significant'**. The transition in character would be pronounced particularly the in the southern part of the site where a dense cluster of tall buildings (for the context) is proposed. However, there are persuasive drivers for this change (proximity to the Luas, public open space and the Priorsland Development Area) and national policy encourages compact growth. The implementation of compact growth policy will unavoidably result in changes in landscape character as high density development typologies are introduced to previously low density areas. The quality of the development would be commensurate with the character of the area. **Therefore, the quality of the effect is classified neutral**.

10.10.3 Construction Phase – Visual Effects

The construction phase effects are classified in Table 10.7 below, along with the operation and residual effects. Construction is inherently and unavoidably unsightly, therefore the effects on visual amenity would be negative, although temporary.

10.10.4 Operational Phase – Visual Effects

Since no mitigation measures are recommended the predicted visual impacts are the same as the potential impacts described in Section 10.6 above. The predicted impacts are summarised in the table below.

Viewpoints	Viewpoint Sensitivity	Magnitude of Change	Significance & Quality of Visual Effects		
			Construction (Temporary)	Operation (Permanent)	Residual (Permanent)
01 – Brennanstown Road 200m east of the site	Medium	None	No effect	No effect	No effect
02 – Brennanstown Road 70m east of the site	Medium	Low-Medium	Slight-Moderate negative	Slight-Moderate neutral	Slight-Moderate neutral
03 – Brennanstown Road near north east corner of the site	High	High	Significant negative	Very significant neutral	Very significant neutral
04 – Brennanstown Road opposite proposed pedestrian entrance	Medium	Very high	Significant negative	Significant positive	Significant positive
05 – Brennanstown Road near north west corner of the site	Medium	High	Moderate negative	Moderate positive	Moderate positive
06 – Brennanstown Road 300m west of the site	Medium	None	No effect	No effect	No effect
07 – Brennanstown Vale, distant view to west, upslope	High	None	No effect	No effect	No effect
08 – Brennanstown Vale, mid-distant view to west	High	None	No effect	No effect	No effect
09 – Brennanstown Vale, distant view to west, lower road	High	Negligible	Not significant negative	Imperceptible neutral	Imperceptible neutral
10 – Brennanstown Vale, close-up to west, lower road	High	Low-High	Significant negative	Significant neutral	Significant neutral
11 – Carrickmines Luas car park (future Priorsland development plot)	Low	Low	Not significant negative	Not significant neutral	Not significant neutral
12 – Brennanstown Luas stop	Medium	Negligible	Not significant negative	Not significant neutral	Not significant neutral
13 – Lehaunstown Luas stop	Medium	Low	Moderate negative	Moderate neutral	Moderate neutral
14 - Beckett Park, Castle Street, Cherrywood	Medium	Medium	Moderate negative	Moderate neutral	Moderate neutral
15 – Tully Church	Medium	None	No effect	No effect	No effect

[3] Refer to 'Note on definitions used in this assessment' on page 10.1.

[4] Refer to 'Note on definitions used in this assessment' on page 10.1.

Viewpoints	Viewpoint Sensitivity	Magnitude of Change	Significance & Quality of Visual Effects		
			Construction (Temporary)	Operation (Permanent)	Residual (Permanent)
16 – Lehaunstown Lane M50 overpass	Medium	Negligible-Low	Slight negative	Slight neutral	Slight neutral
17 – Heronford Lane	Medium	Negligible-Low	Slight negative	Slight neutral	Slight neutral
18 – Golf Lane	Medium	Medium	Moderate negative	Moderate neutral	Moderate neutral
19 – Glenamuck Road bridge over the M50	Low	Low	Slight negative	Slight neutral	Slight neutral
20 – Druid's Glen Road off the N11	Medium	Negligible	Imperceptible negative	Imperceptible neutral	Imperceptible neutral
21 – Killiney Hill	Medium	None	No effect	No effect	No effect

Table 10.7 Summary of predicted visual effects.

10.11 'DO NOTHING' SCENARIO

The site would remain as a large, currently unused residential-zoned site within the urban area of Dun Laoghaire Rathdown. There would be no change to the character or visual amenities of the local or wider area. The protected Structure Barrington's Tower would remain in a compromised condition. Given the land use zoning objective for the site and the national policy of compact growth retaining the site in its current usage/condition would constitute an underutilisation of valuable urban land, infrastructure and services.

10.12 WORST CASE SCENARIO

No worst case scenario has been identified.

10.13 MONITORING AND REINSTATEMENT

No monitoring of landscape and visual effects is required other than the monitoring of tree protection measures and soft landscape works after planting to ensure the health and viability of the plants.

10.14 DIFFICULTIES IN COMPILING INFORMATION

No difficulties were encountered in compiling the information for this chapter.

10.15 REFERENCES

- Cherrywood Planning Scheme (December 2018), Dún-Laoghaire Rathdown County Council.
- Dún Laoghaire-Rathdown County Development Plan 2016-2022, Dún Laoghaire-Rathdown County Council.
- Guidelines for Landscape and Visual Impact Assessment, 3rd edition (2013), Landscape Institute and Institute of Environmental Management and Assessment.
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (2017), Environmental Protection Agency.
- National Planning Framework - Ireland 2040 (2018), Government of Ireland.
- Photography and Photomontage in Landscape and Visual Impact Assessment (2011), Landscape Institute.
- SEA Environmental Report for Cherrywood Planning Scheme (April 2014), CAAS Ltd. for Dún Laoghaire-Rathdown County Council.
- Townscape Character Assessment, Technical Information Note 05/2017 (2017), Landscape Institute.
- Urban Design Manual – A Best Practice Guide (2009), Department of Environment, Heritage and Local Government.
- Urban Development and Building Height Guidelines for Planning Authorities (2018), Department of Housing, Planning and Local Government.

11 TRAFFIC AND TRANSPORTATION

11.1 INTRODUCTION

This chapter has been prepared by Waterman Moylan Consulting Engineers for Cairn Homes Properties Ltd. By Emma Caulwell CEng MICE and checked by Joe Gibbons CEng MICE and Director of Waterman Moylan.

This chapter of the Environmental Impact Assessment Report assesses the likely effects of the proposed development in terms of vehicular, pedestrian and cycle access during the construction and operational phases of the proposed development.

The chapter describes: the methodology; the receiving environment at the application site and surroundings; the characteristics of the proposal in terms of physical infrastructure; the potential impact that proposals of this kind would be likely to produce; the predicted impact of the proposal examining the effects of the proposed development on the local road network; and the remedial or reductive measures required to prevent, reduce, or offset any significant adverse effects.

11.2 METHODOLOGY

The following methodology has been adopted for this assessment:

- Review of relevant available information including the Dun Laoghaire Rathdown County Council Development Plan 2016-2022, existing traffic information which included traffic counts commissioned as part of this application which were carried out by IDASO on 10th June 2021 together with traffic assessments undertaken as part of nearby recent planning permissions (Brennanstown Wood ABP 301614-18 and Doyle Nursery Site ABP 305859-19)and other relevant studies (Brennanstown Road Traffic Management Scheme by DLRCC dated August 2016);
- Site visits to gain an understanding of the site access and observe the existing traffic situation. were undertaken on 22 May 2020 and 12 June 2020. The visits were general observation visits to get an appreciation/understanding of the current road conditions, footpath conditions, traffic flows, traffic speeds, pedestrian and cyclist movements.;
- Consultations with Dún Laoghaire-Rathdown County Council to agree the site access arrangements and determine the scope of the traffic analysis required to accompany a planning application. These consultations were undertaken as part of the pre-planning process and included a formal S247 meeting with DLRCC and a tri-partite meeting with both DLRCC and An Bord Pleanala. Following the S247 meeting DLRCC issued an opinion on the pre-application submission and following the Tri-partite meeting, An Bord Pleanala issued an opinion. Both opinions provided guidance on the scheme from a traffic and transportation point of view which primarily related to connectivity to the LUAS and connectivity to the public footpath infrastructure towards Brennanstown Wood;
- Detailed estimation of the transport demand that will be generated by the development. The morning and evening peak times will be addressed as well as an estimation of the construction stage traffic; and
- Assessment of the percentage impact of traffic on local junctions, car parking requirements and accessibility of the site by sustainable modes including walking, cycling and public transport.

11.3 RECEIVING ENVIROMENT

This section reviews the baseline conditions, providing background information for the site in order to determine the significance of any traffic implications. This section also considers the existing accessibility of the site by sustainable modes of transport. Refer to
Figure 11.1 Site Location Map
which shows the location of the site.

Site Location

Figure 11.1 Site Location Map

The site is in Cabinteely, Co. Dublin. It is bounded to the north by Brennanstown Road, to the south by Carrickmines Stream and to the west by Brennanstown Vale. The proposed development is approximately 4.85km from Dún Laoghaire Harbour and 3.24km away from the coastline. Carrickmines Luas Park & Ride is located to the southwest of the proposed development.

Existing Road Network

The proposed development site is located to the south of Brennanstown Road. Brennanstown Road is approximately 1.9km (1,940m) long from a signalised junction between Brennanstown Road / Claremont Road / Glenamuck Road North / Brighton Road and continues east/north connecting to Bothar Bhre via a signalised junction. The road provides access to a large number of single residential units along its extent.

The speed limit along Brennanstown Road north of the site, is 50kph. There are currently no cycling facilities along Brennanstown Road however to the north of the development there are cycling facilities along either side of the N11. There are also additional cycling facilities to the south of the development along Glenamuck Road North continuing northwest onto Ballyogan Road passing Carrickmines Shopping Centre.

Brennanstown Road is a narrow semi-rural single carriageway road with a length of some 1.9 km (1,940 metres) between Glenamuck Road and Old Bray Road.

Baseline Traffic Data

As part of this Traffic and Transport Assessment a review was undertaken of the Traffic and Transportation Assessment (TTA) produced for the nearby SHD planning application on the Doyles Nursery Site to the west of the subject site (Planning Ref ABP-305859-19). This TTA concentrated mainly on the eastern end of Brennanstown Road and included traffic counts on a number of junctions to the east of the subject site which were carried out on 28th February 2019 (before the Covid pandemic). The assessment undertaken in the TTA which was prepared for the Doyles Nursery Site made assumptions of "High Traffic Growth" to allow for the development of other zoned lands in the vicinity which would include the subject site. It was therefore considered that it was not necessary to re-model these junctions as the TTA submitted with the Doyles Nursery Site showed that the junctions would operate within capacity in the future years, i.e. 5 years (2027) and 15 years (2037) after opening. We did however examine the traffic count data for the Brennanstown/Bray Road/Johnstown Road signalised junction which was undertaken in 2019 by the applicants Consulting Engineers. The total traffic flows during the peak hours (AM and PM) through this junction in 2019 were 1081 (AM Peak) and 924 (PM Peak). The traffic generated by the proposed development, which is set out in the TTA and which will utilise this junction was calculated to be less than 5% of the existing traffic and therefore did not require any further assessment. This is set out in the TTA. It was therefore concluded that five junctions in the vicinity of the site should be analysed in order to calculate the expected volume of traffic and assess the impact that traffic will have on the operational capacity of the junctions. The junctions that have been analysed are the following:

- Junction 1 (Existing Signalised): Brennanstown Road / Claremont Road / Glenamuck Road North / Brighton Road
- Junction 2 (Existing Priority): of Brennanstown Road / Carrickmines Wood.
- Junction 3 (Existing Priority): Brennanstown Road / Brennanstown Vale
- Junction 4 (Existing Roundabout): Brennanstown Road / Brennanstown Wood
- Junction 5 (Proposed Signalised): Barrington Tower / Apollo/Appledore.

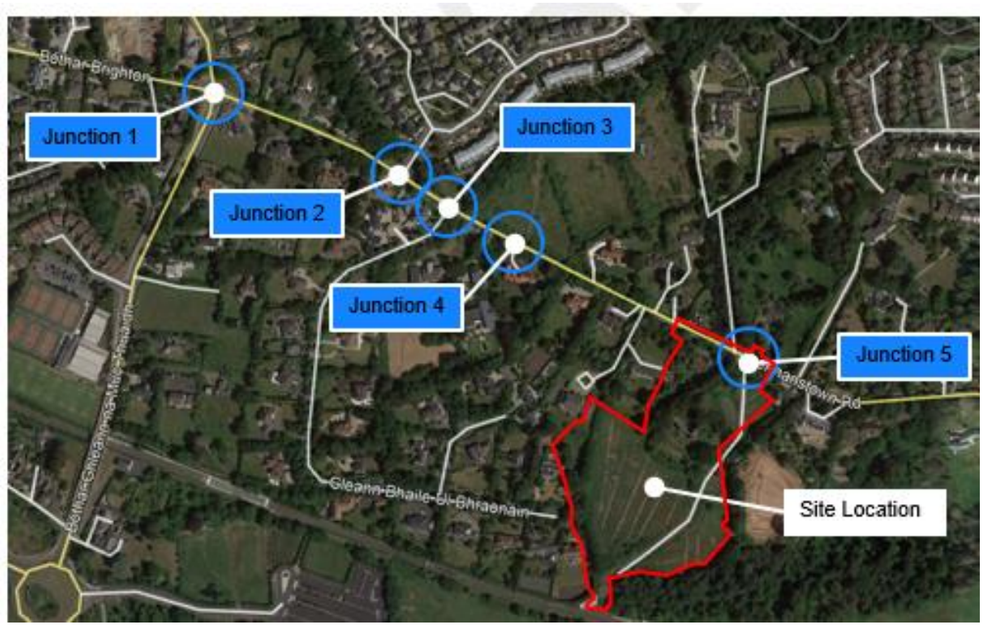


Figure 11.2 Location of Junctions Surveyed

A classified traffic count was carried out on the 5 no. junctions identified on 10 June 2021 by IDASO Ltd, who are an independent firm specialising in traffic counts. The results of the survey indicated that the peak traffic level through the junctions occurred between the hours of 08h00 to 09h00 in the AM and 17h00 to 18h00 in the PM. These traffic levels are illustrated in Figure 11.3 below.

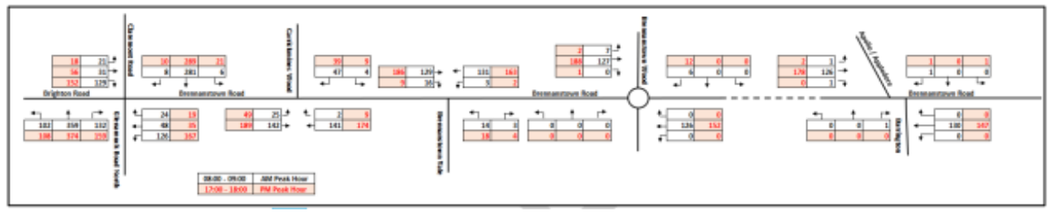


Figure 11.3 Surveyed Flows (2021)

A summary of the baseline two-way flows and the two-way flow expected to be generated by the proposed + committed and potential future developments in the local area are presented below in Table 11.1 for Junction 1, Table 11.2 for Junction 2, Table 11.3 for Junction 3, Table 11.4 for Junction 4 and Table 11.5 for Junction 5.

Description	Junction Two-way Flow (Veh)	Proposed + Committed Two Way Flow (Veh)	Traffic Increase
AM Peak Hour (08:00 - 09:00)	1,267	340	27%
PM Peak Hour (18:00 - 19:00)	1,408	311	22%

Table 11.1 Summary Results for Junction 1

Description	Junction Two-way Flow (Veh)	Proposed + Committed Two Way Flow (Veh)	Traffic Increase
AM Peak Hour (08:00 - 09:00)	361	340	94%
PM Peak Hour (18:00 - 19:00)	469	311	66%

Table 11.2 Summary Results for Junction 2

Description	Junction Two-way Flow (Veh)	Proposed + Committed Two Way Flow (Veh)	Traffic Increase
AM Peak Hour (08:00 - 09:00)	296	340	115%
PM Peak Hour (18:00 - 19:00)	382	311	81%

Table 11.3 Summary Results for Junction 3

Description	Junction Two-way Flow (Veh)	Proposed + Committed Two Way Flow (Veh)	Traffic Increase
AM Peak Hour (08:00 - 09:00)	266	347	130%
PM Peak Hour (18:00 - 19:00)	355	318	90%

Table 11.4 Summary Results for Junction 4

Description	Junction Two-way Flow (Veh)	Proposed + Committed Two Way Flow (Veh)	Traffic Increase
AM Peak Hour (08:00 - 09:00)	260	306	118%
PM Peak Hour (18:00 - 19:00)	329	265	81%

Table 11.5 Summary Results for Junction 5

Trip generation calculation for the proposed, committed, and potential future developments are presented later in this Chapter.

As recommended in the TII Publication, 'Project Appraisal Guidelines Unit 16.1: Expansion Factors for Short Period Traffic Counts (October 2016)', the traffic count data has been converted to Annual Average Daily Traffic (AADT) data in order to provide a dataset representative of the annual traffic flow profile for the road network surrounding the proposed development.

The General Expansion Factor Method, as outlined in the TII Publication, was used to convert the surveyed flows for the 4 No. junctions into the Annual Average Daily Traffic (ADDT). The corresponding Factors for the Greater Dublin Region were used.

The ADDT flows are shown below in Tables 11.6, 11.7, 11.8, 11.9 and 11.10.

Hour Ending	Proportion of Daily Traffic	Existing Two-way Flows through Junction 1 (Vehicles)
07:00	0.037	711
08:00	0.077	1267
09:00	0.081	1161
16:00	0.069	1,414
17:00	0.083	1,423
18:00	0.088	1,408
Total	0.435	7,384

Table 11.6 Junction 1

24 Hour Estimate = 7,384/0.435 = 16,975 vehicles

Weekly Average Daily Traffic (WADT) = 16,975 x 0.99 = 16,805 vehicles

Annual Average Daily Traffic (AADT) = 16,805 x 0.97 = **16,301 vehicles**

Hour Ending	Proportion of Daily Traffic	Existing Two-way Flows through Junction 1 (Vehicles)
07:00	0.037	2263
08:00	0.077	361
09:00	0.081	368
16:00	0.069	427
17:00	0.083	476
18:00	0.088	469
Total	0.435	4,364

Table 11. 7 Junction 2

24 Hour Estimate = 4,364/0.435 = 10,032 vehicles

Weekly Average Daily Traffic (WADT) = 10,032 x 0.99 = 9,932 vehicles

Annual Average Daily Traffic (AADT) = 9,932 x 0.97 = **9,634 vehicles**

Hour Ending	Proportion of Daily Traffic	Existing Two-way Flows through Junction 1 (Vehicles)
07:00	0.037	232
08:00	0.077	296
09:00	0.081	308
16:00	0.069	323
17:00	0.083	390
18:00	0.088	382
Total	0.435	1,931

Table 11.8 Junction 3

24 Hour Estimate = 1,931 /0.435 = 4,439 vehicles

Weekly Average Daily Traffic (WADT) = 4,439 x 0.99 = 4,395 vehicles

Annual Average Daily Traffic (AADT) = 4,395 x 0.97 = **4,263 vehicles**

Hour Ending	Proportion of Daily Traffic	Existing Two-way Flows through Junction 1 (Vehicles)
07:00	0.037	224
08:00	0.077	267
09:00	0.081	270
16:00	0.069	308
17:00	0.083	352
18:00	0.088	355
Total	0.435	1,776

Table 11.9 Junction 4

24 Hour Estimate = 1,779 /0.435 = 4,083 vehicles

Weekly Average Daily Traffic (WADT) = 4,083 x 0.99 = 4,042 vehicles

Annual Average Daily Traffic (AADT) = 4,042 x 0.97 = **3,921 vehicles**

Hour Ending	*Proportion of Daily Traffic*	*Existing Two-way Flows through Junction 1 (Vehicles)*
07:00	*0.037*	*177*
08:00	*0.077*	*260*
09:00	*0.081*	*242*
16:00	*0.069*	*283*
17:00	*0.083*	*317*
18:00	*0.088*	*329*
Total	*0.435*	*1,608*

Table 11.10 Junction 5

24 Hour Estimate = 1,608 /0.435 = 3,697 vehicles

Weekly Average Daily Traffic (WADT) = 3,697 x 0.99 = 3,660 vehicles

Annual Average Daily Traffic (AADT) = 3,660 x 0.97 = **3,550 vehicles**

Pedestrian and Cycling Facilities

In the immediate vicinity of the proposed development site, a narrow standard of footpath is provided along the northern side of Brennanstown Road, as seen in the image below. This footpath leads to Cabinteely Village.It is not continuous as there is a 150m gap, beginning 300m east of the proposed development, therefore it would be necessary for pedestrians to walk along the road edge for a distance of 150m.

To the west of the subject development site on Brennanstown Road, the existing pedestrian facilities are new and appropriate in terms of width, which facilitate pedestrian progression towards Glenamuck Road and associated public transport facilities.

Access from the subject site to the Carrickmines Luas Stop is via Brennanstown Road.

Existing footpath on Brennanstown Road

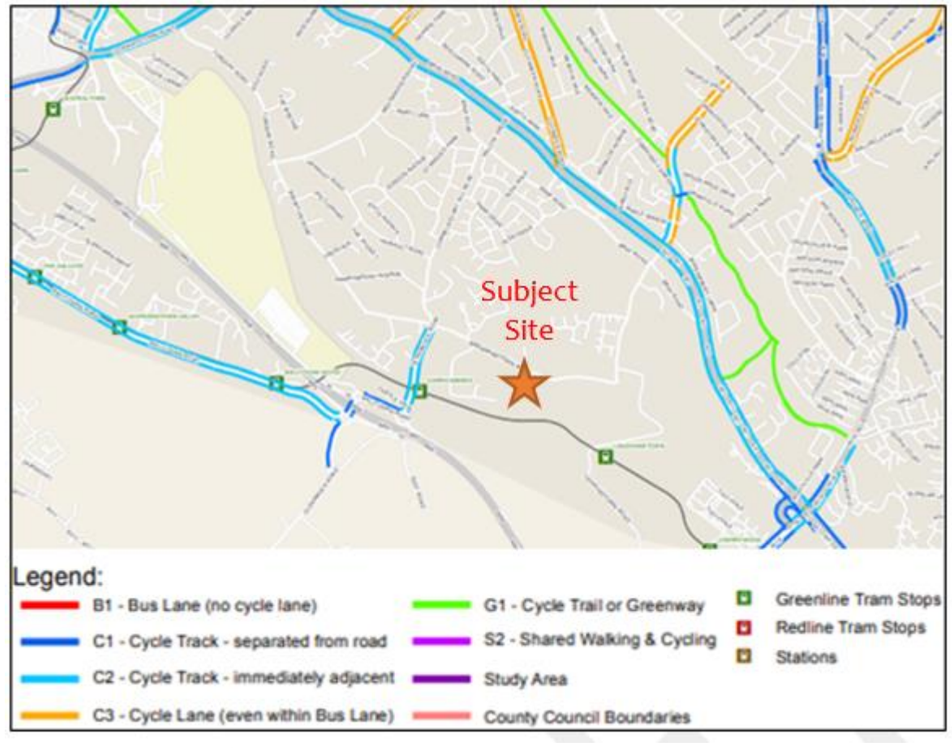


Figure 11.4 Local Cycle Infrastructure

Regarding cycle facilities, *Figure 11.4 Local* Cycle Infrastructure following shows the local cycle track and lane network as taken from the National Transport Authority's (NTA) Greater Dublin Area Cycle Network Plan.

The existing cycle facilities around the proposed development site are shown in Figure 11.4 above. There are currently no cycling facilities along Brennanstown Road. In this regard, Brennanstown Road is a 50kph road and cyclists cycle along the road, which has a tendency to reduce traffic speeds on the Road. To the north of the development there are cycling facilities along either side of the N11. There are also additional cycling facilities to the south of the development along Glenamuck Road North continuing northwest onto Ballyogan Road passing Carrickmines Shopping Centre.
As can be seen in Figure 11.4 above, cyclists can benefit from the provision of cycle tracks immediately adjacent to the bus lanes (south-north bound) on the roads surrounding the site. To the north of the N11, showed cycle lanes which are even within the bus lane.

Existing Public Transport Accessibility
Bus Network
The proposed development site is not directly served by bus routes and will not be relying upon bus services to provide high quality public transport options. The LUAS, which is immediately south of the subject site provides a High Quality Public Transport Link to the City Centre which is set out in more detail under "Rail Network" heading below. It is however noted that bus services may be attractive to a small number of residents who wish to travel to Dun Laoghaire or have a preference for bus travel over the LUAS and as such this section sets out the bus services available. The closest bus stops are located along Brighton Road and Glenamuck Road North approximately 650m (c.9-minute walking) to the west of the proposed site entrance – See Figure 11.5. These bus stops are served by the bus routes 63 and 63A, which connect Kilternan to Dun Laoghaire via two different routes with a service frequency of a bus every 30 minutes.

Figure 11.5 Location of Nearest Bus Stops and walking routes from Subject Site.

In addition to the aforementioned routes, N11 corridor - to the north of development site, is served by a number of bus routes which provide quick access to Dublin City Centre. The routes servicing N11 corridor are routes 84A, 84X, 145 and 155. The walking distance to the closest bus stops on N11 corridor is approximately 1.6km (c. 19-minute walking). This walking route along the Brennanstwon Road to the east does not provide a continuous footpath so is not expected to be considered an attractive option by commuters. Figure 11.5 below shows the location of the nearest bus on N11 corridor while Table 1 provides the bus frequencies of each described route.

Figure 11.6 Location of Bus Stops on N11 Bus Corridor and Walking Routes from the Subject Site.

Bus Route No.	To	From	Weekday Avg. Frequency	Saturday Avg. Frequency	Sunday Avg. Frequency
63A	Kilternan	Dun Laoghaire	30 mins	45 mins	45 mins
	Dun Laoghaire	Kilternan	30 mins	45 mins	45 mins
84A	Blackrock	Newcastle	30 mins to 1 hour	1 hour	1 hour
	Newcastle	Blackrock	30 mins to 1 hour	1 hour	1 hour
84X	Hawkins Street	Newcastle/ Kilcoole	30 mins – 45 mins	-	-
	Newcastle/ Kilcoole	Hawkins Street	30 mins – 45 mins	-	-
145	Heuston Rail Station	Ballywaltrim	ntil 21:00, 1 hour after	15 mins – 20 mins	20 mins – 30 mins
	Ballywaltrim	Heuston Rail Station	10 mins until 21:00, 1 hour after	15 mins – 20 mins	20 mins – 30 mins
155	Ikea	Bray Rail Station	20 mins	20 mins	20 mins
	Bray Rail Station	Ikea	20 mins	20 mins	20mins

Table 11.11 Dublin Bus AM & PM, Weekday & Weekend Frequencies.

Rail Network

The proposed development site is situated just north of the Luas Line. Carrickmines Luas Station, located off Glenamuck Road North is approximately 1km (c. 13-minute walk) southwest of the proposed development site entrance, and is easily accessed via a footpath along this route. The Carrickmines Luas Station is part of the Luas Green line which provides a route from Bride's Glen to Broombridge. This route also provides access to Dundrum Shopping Centre and Dublin City Centre. Brennanstown LUAS stop has been fully constructed as part of the LUAS Green Line but has not yet been opened. It is expected that the Brennanstown LUAS stop will be opened by TII/NTA once there is access to the stop and sufficient development is completed adjacent to the stop. A separate report on the capacity of the Luas Green line at Brennanstown Stop has been carried out and accompanies this planning submission under a separate cover. This report demonstrates that there is spare capacity on the LUAS to cater for the proposed development.

Figure 11.6 and Figure 11.7 below show the location of the station and all stations along the Luas Green Line, respectively. Table 11.12, Table 11.13, and Table 11.14 show the frequency of which the Luas Green Line operates at Carrickmines Station.

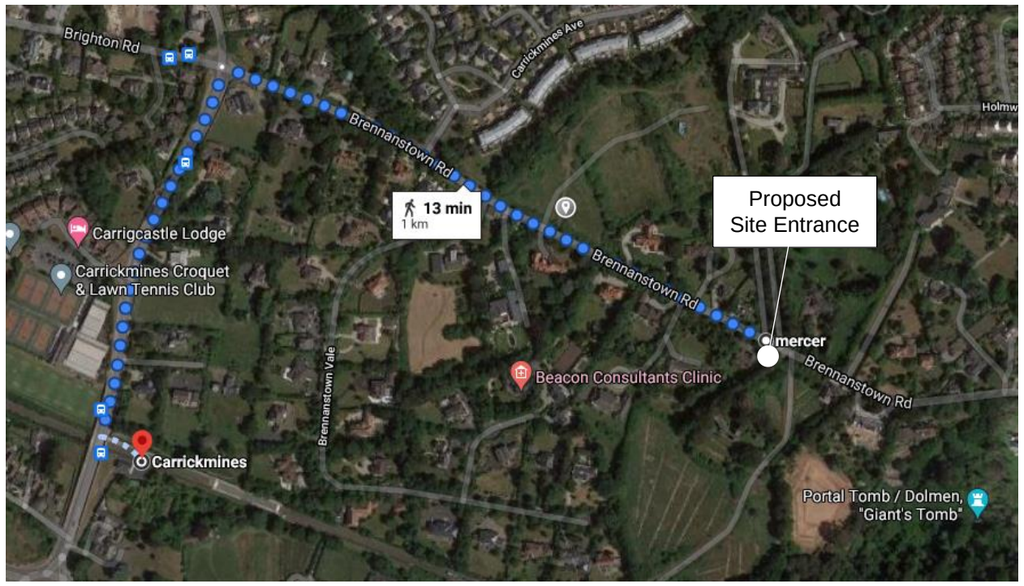


Figure 11.7 Location of Carrickmines Luas Station and Walking Route from the Subject Site.

Figure 11.8 Luas Green Line Stations.

Time	Monday – Friday (Avg. frequency – minutes)	
	Northbound	Southbound
05:39 – 07:00	16	12
07:00 – 10:00	9	9
10:00 – 16:00	13	13
16:00 – 19:00	10	10
19:00 – 00:06	13	13

Table 11.12 Carrickmines Luas Station – Monday to Friday (Avg. Frequency).

Time	Saturday (Avg. frequency – minutes)	
	Northbound	Southbound
06:36 – 10:00	16	15
10:00 – 16:00	14	14
16:00 – 19:00	14	14
19:00 – 00:06	14	14

Table 11.13 Carrickmines Luas Station – Saturday (Avg. Frequency).

Time	Sunday & Bank Holiday (Avg. frequency – minutes)	
	Northbound	Southbound
07:06 – 12:00	14	14
12:00 – 19:00	12	12
19:00 – 23:06	13	13

Table 11.14 Carrickmines Luas Station – Sunday & Bank Holiday (Avg. Frequency).

11.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed 'Build-to-Rent' (BTR) development will consist of the construction of 8 no. blocks in heights up to 10 storeys comprising 534 residential units, a creche, a retail unit, residential support facilities and residential services and amenities. The proposal also includes car and cycle parking, public and communal open spaces, landscaping, waste management areas, plant areas, substations, switch rooms, and all associated site development works and services provision. A full description of the development is provided in the statutory notes and in Chapter 3 of the EIAR.

Internal Layout

All internal roads in the proposed development are designed for a speed limit of 30kph with 5.0 wide carriageways and footpaths along both sides. Traffic calming measures will be implemented where necessary, which, together with the low design speed, will ensure that all road users are kept safe within the site. This includes pedestrian and cyclists.

The internal pedestrian network of the overall proposed development has been designed in accordance with the guidelines outlined in the Design Manual for Urban Roads and Streets (DMURS), which recommends in Section 4.3.1 that a minimum 1.8 footpath should be provided. A DMURS Statement of Compliance has been submitted as part of this application and is included under separate cover.

The pedestrian/cyclist infrastructure proposed consists of two north-south and one east-west spines running across the site - one along the eastern side running from the proposed signalised junction on Brennanstown Road up until the southern point of the site, one greenway along the western side also running from Block J up to the southern point of the site, and one greenway running on the centre of the site connecting both north-south spines. The southern point of the site is directly adjacent to the Luas Green Line where the Brennanstown Stop is located. Brennanstown Stop was completed in 2010, however, at the time of writing, the Luas Green Line services run non-stop through this stop.

The proposed signalised junction on Brennanstown Road will comprise dedicated signalised pedestrian crossings on all arms. New footpaths are also proposed on Brennanstown Road for a section of 250 metres at the site frontage. All proposed pedestrian infrastructures will be connected internally on site and externally with the existing facilities on Brennanstown Road. This connected network will provide a safe and secure environment for pedestrians and will facilitate progression to the local area and surrounding public transport network.

Site Access Points

As part of the subject development works, it is proposed to upgrade a further 250 metres of Brennanstown Road linking up with the eastern end of the Park Developments upgrade and extending eastwards to the entrance to Egypt House. The new access to the subject proposed development will be located on this upgraded section of Brennanstown Road.

Vehicular access to the subject site is proposed via a new four-armed signal-controlled junction to be located on Brennanstown Road which is included as part of this planning submission. Brennanstown Road will form the eastern and western approaches of the junction, the southern approach will provide access to the proposed development site and the northern approach will be reserved for a potential future residential development.

On Brennanstown Road at the location where the new signalised junction is proposed, there are three priority-controlled T-junctions in place, which currently provide access to properties to the north (Appolo / Appledore) and south (Barrington) of the road. These three access points are on lands owned and controlled by the applicant and will be amalgamated into the signal controlled junction therefore replacing three junctions with a single junction which will assist in improving road safety due to the current proliferation of access points to the lands.

The new subject signal-controlled junction is proposed to replace these existing priority junctions by aggregating all three accesses into one signal-controlled access. The layout for the subject proposed junction is illustrated in Figure 10 below. In summary, it will consist of:

- the installation of a new traffic signal infrastructure with a dedicated pedestrian stage;
- the installation of signalised pedestrian crossing with dropped kerbs and tactile paving on all approaches;
- the provision of one entering and one exiting lane on each approach of the junction.

Detailed traffic modelling of the proposed junction has been carried out and is presented later in this report. For further details and exact location of the proposed junction, please refer to Waterman Moylan Drawing No. 20-040-P014 accompanying the documentation package.

Committed Developments

In order to provide a robust assessment of the transportation network in the local area, the below committed developments have also been assessed with regards to trip generation and distribution. The

indicative location of these development sites in relation to the subject development site is illustrated in Figure 11.9.

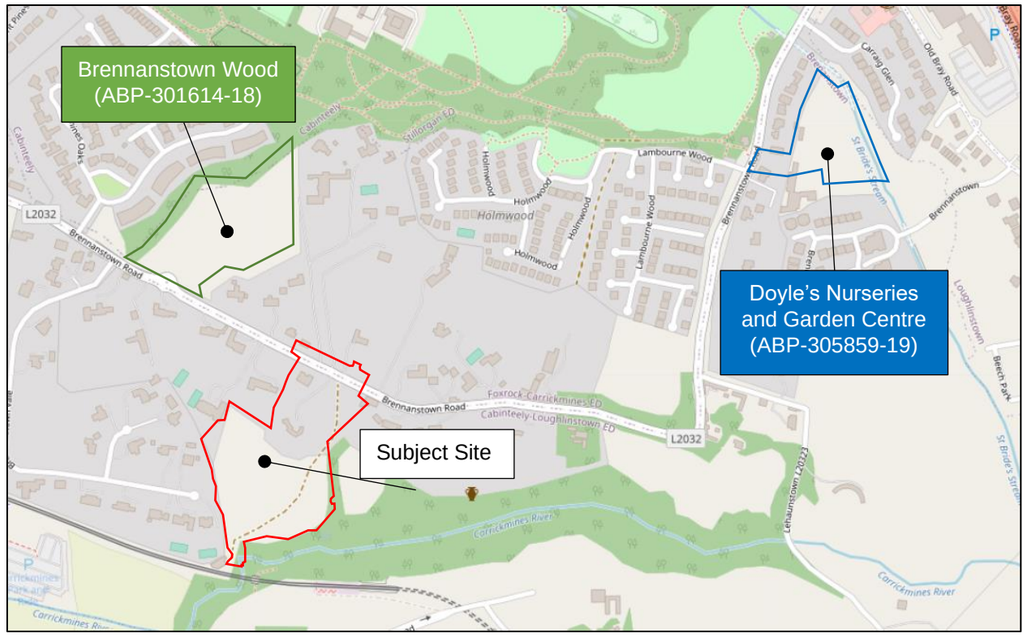


Figure 11.9 Committed Developments

Brennanstown Wood (ABP-301614-18)

In 2018, Viscount Securities submitted a planning application for a residential development of 98 apartments and 38 houses at Brennanstown Wood, Brennanstown Road, Carrickmines (Reg. Ref: ABP-301614-18). The development is currently under construction, and, as part of the subject TTA, it was assumed that it will be fully operational by 2026 (Opening Year of Proposed Development). Included in this development is a new roundabout on Brennanstown Road to provide access to the committed development, which is currently constructed and operational. This development is approximately 300m west from the proposed development site.

Doyle's Nursery and Garden Centre (ABP-305859-19)

In 2019, Atlas GP Limited submitted a planning application for a residential development of 234 apartments at the former Doyle's Nurseries and Garden Centre on Brennanstown (Reg. Ref: ABP-305859-19). Approval for this development was given in 2020. For the purposes of this TTA, it was assumed that this development be fully constructed and occupied by 2026 (Opening Year of Proposed Development). This development is located 900m northeast from the proposed development site.

Trip Generation

In order to assess the likely impact of the traffic generation arising from the subject proposed development, TRICS software has been consulted. TRICS is the national standard of trip generation and analysis in Ireland. It is a database system which allows users to identify representative trip rates and establish potential levels of trip generation for a wide variety of developments.

Full trip rates, which were sourced from TRICS, have been provided in Appendix 11.1 and are summarised in Table 11.15 below.

Use	Units / Sqm	AM Peak Hour		PM Peak Hour	
		IN	OUT	IN	OUT
Apartments	Per Unit	0.076	0.299	0.193	0.089
Retail	Per 100sqm	5.017	4.599	6.856	7.191

Table 11.15 TRIC Rates

The development proposed as part of the subject application will comprise of 534 no. apartment units, a retail unit with 334 sqm of area and a Creche with 334 sqm of area.

Given the size of the proposed residential development, it assumed for the purpose of this assessment that the proposed Creche will only cater for pupils from the proposed scheme and therefore, no additional pupil trips have been assumed for this land use category once all trips will be generated internally within the site.

However, in addition to the internal pupil trips, the proposed Creche will also generate staff trips – people traveling to their place of work at the subject site each morning and departing home each evening.

On the basis of a proposed creche floor space of 334 sqm and an average staff assumption of 1 person per 45 sqm, it was estimated that some 7 persons will work at the proposed Creche.

The AM and PM peak hour car trip generation to/from the proposed development, estimated after the TRICS car trip rates in Table 11.15 and the staff assumption above, is shown in Table 11.16.

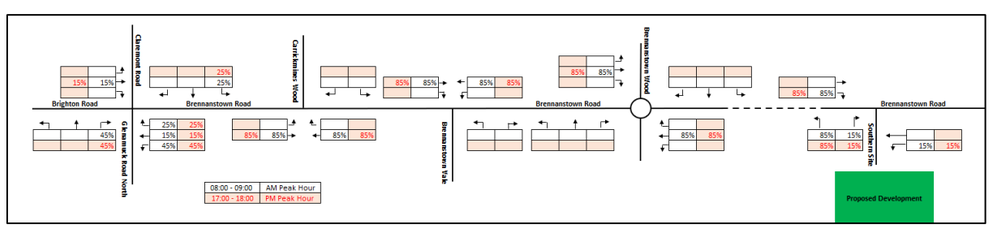
Use	Units / Sqm	AM Peak Hour		PM Peak Hour	
		IN	OUT	IN	OUT
Apartments	534 units	41	160	103	48
Creche (Staff)	334 sqm	7	-	-	7
Retail	334 sqm	17	15	23	24
Total	534 units / 668 sqm	65	175	126	79

Table 11.16 Trip Tares – Proposed Development

As can be seen from the above, it is estimated that the proposed development will generate a total of 240 car trips in the AM peak hour (65 inbound and 175 outbound) and a total of 205 car trips in the PM peak hour (126 inbound and 79 outbound).

Trip Distribution

Based upon our experience and our assessment of the anticipated destinations (determined from existing traffic movements on Brennanstown road) that residents will seek to travel to, a distribution of the traffic that will be generated by the development has been derived. The trip distribution for the AM and PM peak hour generated traffic for the proposed development is detailed in Figure 11.10 as well as the corresponding AM and PM peak hour flows, based on the distribution. For the purpose of this assessment, it was derived from existing traffic movements on Brennanstown Road, that 85% of the car trips generated by the proposed development will travel west on Brennanstown Road towards the signalised junction between Brennanstown Road / Claremont Road / Glenamuck Road North. From this junction 60% is assumed to travel south towards the M50, 25% north onto Claremont Road and 15% straight on to Brighton Road.



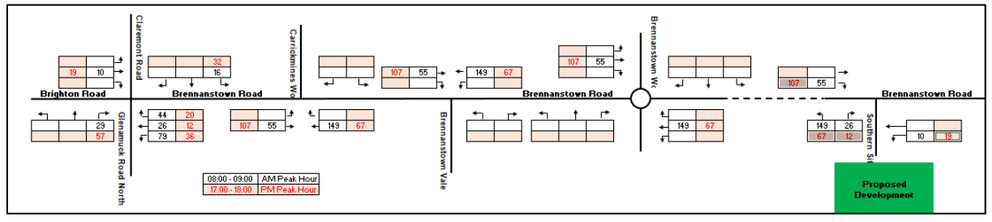


Figure 11.10 Trips Distributed and Assigned

11.5 POTENTIAL IMPACTS

Construction Phase

There is potential for construction traffic travelling to/from and within the subject site to impact from a noise and dust perspective on the surrounding nearby properties and on properties along the construction traffic routes, i.e. Brennanstown Road and Glenamuck Road. Air and Noise impacts arising from the construction traffic on this site are assessed in the Air and Noise Chapter of this EIAR. . There is also potential for traffic congestion, due to increased heavy good vehicles and other construction traffic on the road network which may also perform slow moving turning movements, unloading, etc., in areas that impact on traffic. There is a potential for inappropriate parking/waiting whilst delivering to/seeking to access the site whichmay also impact local road users.

There is potential for construction traffic to have a moderate effect on the surrounding environment. However, the duration of this impact will be short-term (i.e., one to three years).

Operational Phase

The proposed development will generate a number of trips by various modes of travel including vehicular, pedestrian, cycle and public transport. These trips may have an impact on the surrounding road network and could contribute to increased congestion.

Traffic count data was obtained for the purposes of the planning application. The data surveyed is expected to reflect the peak traffic conditions on the local road network. An estimation of the traffic generation and distribution of the proposed development has been set out in the previous sections. This will be compared to the background traffic counts in order to ascertain the impact the proposed development will have on the local road network. A detailed Traffic and Transportation Assessment has been carried out as part of this application and is included under separate cover.

11.6 POTENTIAL CUMULATIVE IMPACTS

The traffic modelling undertaken includes traffic flows extracted from TTA's submitted with the planning applications for the proposed Brennanstown Wood Development and the Doyle's Nursery Development. In addition the background (surveyed) traffic flows have been factored up to include for growth in the background traffic flows which is in accordance with the TII traffic growth recommendations for Moderate Growth. The growth factors increase the background traffic flows annually so as to represent additional developments in the area that may be constructed over the study period, and which are going to generate traffic. This is standard practice in terms of assessing the potential cumulative impacts of traffic from future developments in the surrounding area. It is therefore considered that the potential cumulative impacts have been fully considered as part of this proposal.

11.7 MITIGATION MEASURES

Construction Phase

It is considered that a Construction Management Plan (CMP) will be prepared by the appointed contractor in order to minimise the potential impact of the construction phase of the proposed development on the safety and amenity of other users of the public road. The CMP will consider the following mitigation measures:

- Dust and dirt control measures such as dampening down during dry periods, using dust covers on trucks, road sweeping on public roads and wheel wash facilities at the site exit.
- Noise assessment and control measures such as dampers on rock breaking equipment, regular maintenance of machinery, restrictions on working hours.
- Routes to be used by vehicles which will be primarily using Brennanstown West and Glenamuck Road to the M50.
- Working hours of the site to comply with DLRCC Development Plan requirements, 08:00 to 19:00 Monday to Friday and 08:00 to 14:00 on Saturdays with no working on Sundays
- Programme of construction traffic /deliveries to avoid peak periods.
-
- Facilities for loading and unloading to be provided within the site with the controlled access to the site set back from the public road to ensure space for vehicles to stop without blocking traffic flows on Brennanstown Road
- Facilities for parking cars and other vehicles either on site or at a suitable off site location.

A Preliminary Construction Management Plan has been prepared and is submitted with this application. The purpose of this plan is to provide a guide to the appointed contractor who will be responsible for preparing and agreeing the final plan with the Local Authority. This preliminary Construction

Management Planoutlines proposals in relation to construction traffic and associated construction activities that impact the surrounding roads network.
Care will be taken to ensure existing pedestrian and cycling routes are suitably maintained or appropriately diverted as necessary during the construction period, and temporary car parking is provided within the site for contractor's vehicles. It is likely that construction will have an imperceptible impact on pedestrian and cycle infrastructure.
During works on Brennanstown Road along the site frontage and during the construction of the signalised junction and signal controlled pedestrian crossing single lane traffic will be temporally put into place with stop/go boards or temporary traffic signals. Full details will be agreed with DLRCC as part of the road opening licence which is standard procedure for works on public roads.
Through the implementation of the CMP it is anticipated that the effect of traffic during the construction phase will have a slight effect on the surrounding road network for a period of approximately 24 months.

Operational Phase
The proposed development is situated adjacent to suitable infrastructure and transport services for travel by sustainable modes. A key barrier to modal shift towards sustainable modes of travel is often a lack of information about potential alternatives to the car. As such, it is proposed that residents will be made aware of potential alternatives including information on walking, cycle routes and public transport. Residents will be encouraged to avail of these facilities for travel to and from work. Provision of this information would be made during the sales process and will be included in the new homeowner's pack upon the sale of each unit, as this represents the best opportunity to make residents aware and to secure travel behaviour change. It is anticipated that this measure may help to reduce the level of traffic at the proposed development, thus providing mitigation against any traffic and transport effects of the development.

11.8 PREDICTED IMPACTS

Construction Phase
Provided the mitigation measures and management procedures outlined in the Construction Management Plan are incorporated during the Construction Phase, the residual impact upon the local receiving environment is predicted to be temporary in the nature and slight in terms of effect.

Operational Phase
In order to assess the potential impact arising from the proposed development during the operational phase, a Traffic and Transport Assessment has been prepared and is included in the SHD application under a separate cover. The traffic modelling carried out as part of the Traffic and Transport Assessment includes the analysis of 5 no. Junctions of the surrounding network as set out below.

- **Junction 1 (Signalised):** Brennanstown Road / Claremont Road / Glenamuck Road North.
- **Junction 2 (Priority):** Brennanstown Road / Carrickmines Wood.
- **Junction 3 (Priority):** Brennanstown Road / Brennanstown Vale
- **Junction 4 (Roundabout):** Brennanstown Road / Brennanstown Wood
- **Junction 5 (Signalised):** Brennanstown Road / Barrington Tower / Apollo/Appledore.

Traffic Growth Factors

These junctions were assessed for the estimated opening year of 2026 and future design years of 2031 (Opening Year +5 Years) and 2041 (Opening Year +15 Years). The background traffic growth factors used to factor up the baseline traffic movements are in accordance with the '*Table 6.1: Link-Based Growth Rates: Metropolitan Area Annual Growth Rates'* within the TII Publications – Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections (May 2019). These are:

- 1.084 (Central Growth) growth factor from 2021 to 2026
- 1.162 (Central Growth) growth factor from 2021 to 2031.
- 1.222 (Central Growth) growth factor from 2021 to 2041

Committed and Potential Future Developments

The traffic modelling carried out as part of the Traffic and Transport Assessment also accounts for two committed developments at Brennanstown Wood and Doyle's Nurseries Development. In order to determine the cumulative impact of the subject development in conjunction with other developments in the vicinity of the site is assessed.

<u>Brennanstown Wood (ABP-301614-18)</u>

In 2018, Viscount Securities submitted a planning application for a residential development of 98 apartments and 38 houses at Brennanstown Wood, Brennanstown Road, Carrickmines (Reg. Ref: ABP-301614-18). The development is currently under construction, and, as part of the subject TTA, it was assumed that it will be fully operational by 2026 (Opening Year of Proposed Development). Included in this development is a new roundabout on Brennanstown Road to provide access to the committed development, which is currently constructed and operational. This development is approximately 300m west from the proposed development site.

Trip Generation

Trip generation calculation for the approved (and under construction) residential development of Brennanstown Wood is reproduced in Table 11.17 below. It has been extracted from the approved Traffic and Transport Assessment prepared by DBFL in 2018 as part of the planning application for the approved site. The approved development consists of 136 no. residential units (38 no. houses and 98 no. apartments).

Use	Units	AM Peak Hour		PM Peak Hour	
		IN	OUT	IN	OUT
Houses & Apartments	136	15	69	51	40

Table 11.17 Trips Generated – Brennanstown Wood

As can be seen from the above, as part of the approved TTA for the Brennanstown Wood development, it was estimated that the approved development will generate a total of 84 car trips in the AM peak hour (15 inbound and 69 outbound) and a total of 91 car trips in the PM peak hour (51 arrivals and 40 departures).

Trip Distribution

The trip distribution for the AM and PM peak hour generated traffic for the committed (under construction) development at Brennanstown Wood is detailed in Figure 11.11 as well as the corresponding AM and PM peak hour flows, based on the distribution. Trip distribution for this committed development has been extracted from the Traffic and Transport Assessment prepared by DBFL in 2018 as part of the planning application for the approved site (ABP-301614-18).

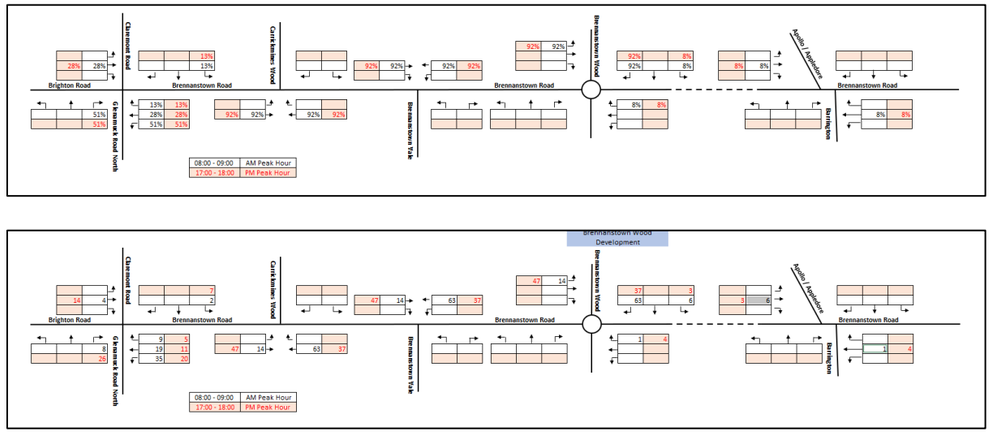


Figure 11.11 Trip Distribution & Assignment – Brennanstown Wood

Doyle's Nursery and Garden Centre (ABP-305859-19)

In 2019, Atlas GP Limited submitted a planning application for a residential development of 234 apartments at the former Doyle's Nurseries and Garden Centre on Brennanstown (Reg. Ref: ABP-305859-19). Approval for this development was given in 2020. For the purposes of this TTA, it was assumed that this development be fully constructed and occupied by 2026 (Opening Year of Proposed Development). This development is located 900m northeast from the proposed development site.

Trip Generation

Trip generation calculation for the approved residential development at the Doyle's Nursery and Garden Centre is reproduced in Table 11.18 below. It has been extracted from the approved Traffic and Transport Assessment prepared by AECOM in 2019 as part of the planning application for the approved site. The approved development consists of 234 no. apartments and a creche with 318sqm of area.

Use	Units / sqm	AM Peak Hour		PM Peak Hour	
		IN	OUT	IN	OUT
Apartments	234 units	16	63	55	19
Creche	318 sqm	11	8	7	9
Total	-	27	72	62	27

Table 11.18 Trips Generated – Doyle's Development

As can be seen from the above, as part of the approved TTA for the Doyle's Nurseries and Garden Centre, it was assumed that the approved development will generate a total of 99 vehicle movements in the AM peak hour (27 arrivals and 72 departures) and a total of 109 vehicle movements in the PM peak hour (70 arrivals and 39 departures).

Trip Distribution

The trip distribution for the AM and PM peak hour generated traffic for the committed development at Doyle's Nurseries is detailed in Figure 11.12 as well as the corresponding AM and PM peak hour flows, based on the distribution. Trip distribution for this committed development has been extracted from the Traffic and Transport Assessment prepared by AECOM in 2019 as part of the planning application for the approved site (ABP-305859-19).

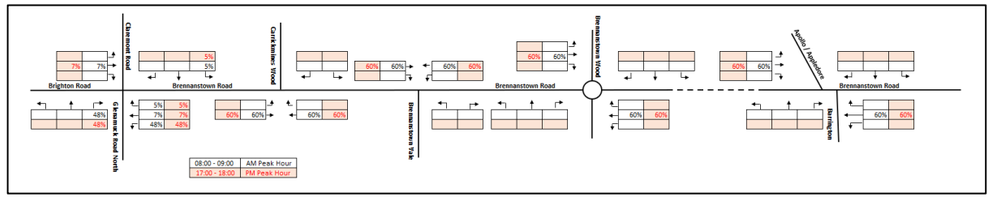


Figure 11.12 Trip Distribution & Assignment – Doyle's Development

Forecast Traffic 2041

The future traffic on the surrounding road network in 2041 is illustrated in Figure 11.13 below. It has been assumed within this TTA that the proposed development will be constructed over a period of approximately 3 years. Therefore, the assumed year of opening is 2026. As per methodology adopted in the 'Transport Assessment Guidelines (May 2014)', which the subject TTA is based on, the future design year (worst-case scenario) for junction assessment is 2041 (Opening year +15 years).

The background traffic growth rates used to factor up the 2021 base year traffic movements are in accordance with the 'Table 6.1: Link-Based Growth Rates: Metropolitan Area Annual Growth Rates' within the TII Publications – Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections (May 2019). These are:

- 1.221 (Central Growth) growth factor from 2021 to 2041.

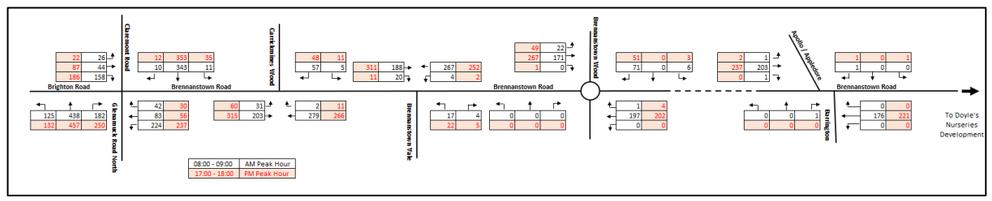


Figure 11.13 Future Traffic 2041

Assessment Scenarios

The performance of the junctions has been analysed for the critical AM Peak Hour and PM Peak Hour (08:00 – 09:00 and 17:00 – 18:00) for the following scenarios:

- **Baseline - 2021 (Base Year)**: Existing Road network with 2021 Base Year flows
- **Baseline - 2026**: Existing Road network with 2021 baseline traffic flows factored up + traffic to/from Brennanstown Wood Development + traffic to/from Doyle's Nurseries Development
- **Baseline - 2031**: Existing Road network with 2021 baseline traffic flows factored up + traffic to/from Brennanstown Wood Development + traffic to/from Doyle's Nurseries Development
- **Baseline - 2041**: Existing Road network with 2021 baseline traffic flows factored up + traffic to/from Brennanstown Wood Development + traffic to/from Doyle's Nurseries Development
- **Baseline + Development - 2026 (Opening Year)**: Proposed junction upgrades with 2021 baseline traffic flows factored up + traffic to/from proposed development + traffic to/from Brennanstown Wood Development + traffic to/from Doyle's Nurseries Development
- **Baseline + Development - 2031 (Opening Year + 5 Years)**: Proposed junction upgrades with 2021 baseline traffic flows factored up + traffic to/from proposed development + traffic to/from Brennanstown Wood Development + traffic to/from Doyle's Nurseries Development
- **Baseline + Development - 2041 (Opening Year + 15 Years)**: Proposed junction upgrades with 2021 baseline traffic flows factored up + traffic to/from proposed development + traffic to/from Brennanstown Wood Development + traffic to/from Doyle's Nurseries Development.

Modelling Results

A summary of the results of the modelling carried out as part of the Traffic and Transport Assessment is provided below.

Junction 1 – (Signalised)

Junction 1 is an existing signalised four-way junction between Brennanstown Road / Claremont Road / Glenamuck Road North. This junction has been modelled based on its current configuration and the TRANSYT analysis results are summarised in Table 11.19 below. The arms of the junction were labelled as follows within the TRANSYT model:

- Arm A: Brennanstown Road
- Arm B: Glenamuck Road North
- Arm C: Brighton Road
- Arm D: Claremont Road

Arm	Mov.	AM Peak (08:00 to 09:00)		PM Peak (17:00 to 18:00)	
		Queue (veh.)	DOS%	Queue (veh.)	DOS%
2021 - Baseline					
A	S/L/R	7.25	63%	9.44	71%
B	L/S	14.59	62%	18.94	69%
	R	3.47	21%	4.98	28%
C	L	1.45	8%	1.45	6%
	S/R	5.92	62%	8.70	65%
D	S/L/R	10.50	67%	13.17	73%
2026 - Baseline					
A	S/L/R	12.22	77%	11.69	80%
B	L/S	18.06	79%	19.33	82%
	R	4.71	30%	6.87	42%
C	L	1.45	8%	1.45	7%
	S/R	6.67	65%	9.71	79%
D	S/L/R	12.07	76%	13.60	80%
2026 – Baseline + Proposed Development					
A	S/L/R	20.08	90%	18.01	95%
B	L/S	21.42	91%	20.60	87%
	R	5.99	41%	9.21	56%
C	L	1.45	8%	1.45	7%
	S/R	7.15	69%	11.19	85%
D	S/L/R	13.71	83%	15.39	85%
2041 – Baseline					
A	S/L/R	14.92	88%	14.40	89%
B	L/S	21.70	86%	25.23	92%
	R	5.24	33%	7.63	46%
C	L	1.45	10%	1.45	7%
	S/R	7.84	73%	12.27	88%
D	S/L/R	14.83	85%	17.35	90%
2041 – Baseline + Proposed Development					
A	S/L/R	28.10	100%	26.07	103%
B	L/S	30.80	99%	30.03	98%
	R	6.56	44%	10.08	60%
C	L	1.45	10%	1.45	7%

	S/R	8.49	77%	13.38	90%
D	S/L/R	18.06	93	23.09	98%

Table 11.19 Junction 1 - TRANSYT Analysis Results.

From the analysis results as summarised above, Junction 1 is currently operating well within capacity during both peak hours. For the future assessment year of 2041 + Proposed Development, the results indicate that this junction will operate above capacity during both peak hours with the highest DOS at 100% and a corresponding queue of 28.10 vehicles recorded in the AM and with the highest DOS at 103% and a corresponding queue of 26.07 recorded in the PM. It is acknowledged that a junction operating with a DOS between 90% and 100% or slightly above is likely to present some level of congestion, however, this is expected to occur for a short period of time in the AM and PM during the normal commuting peak hours. For the remaining of the day, Junction 1 is expected to operate with better operational capacity.

Junction 2 – (Priority)

Junction 2 is an existing priority T-junction between Brennanstown Road and Carrickmines Wood. This junction has been modelled based on its current configuration and the PICADY analysis results are summarise in Table 11.20 below. The arms of the junction were labelled as follows within the PICADY model:

- Arm A: Brennanstown Road (E)
- Arm B: Carrickmines Wood
- Arm C: Brennanstown Road (W)

Stream	AM Peak (08:00 to 09:00)		PM Peak (17:00 to 18:00)	
	Queue (veh.)	RFC	Queue (veh.)	RFC
2021 – Baseline year				
Stream B-C	0.1	0.10	0.1	0.09
Stream C-AB	0.0	0.00	0.0	0.02
2026 – Baseline year				
Stream B-C	0.1	0.11	0.1	0.10
Stream B-A	0.0	0.00	0.0	0.02
2026 – Baseline Year + Proposed Development				
Stream B-C	0.1	0.12	0.1	0.12
Stream C-AB	0.0	0.01	0.0	0.03
2041 – Baseline Year				
Stream B-C	0.1	0.13	0.1	0.12
Stream C-AB	0.0	0.01	0.0	0.03
2041 Baseline Year + Proposed Development				
Stream B-C	0.2	0.14	0.2	0.14
Stream C-AB	0.0	0.01	0.0	0.03

Table 11.20 Junction 2 - TRANSYT Analysis Results.

From the analysis results as summarised above, Junction 2 is currently operating well within capacity during the AM and PM peak hours and will continue to do so for the future assessment year of 2041 + Proposed Development with the highest RFC at 0.14 and a corresponding queue of 0.4 vehicle in the AM and with the highest RFC at 0.13 and a corresponding queue of 0.2 vehicle recorded for the PM.

Junction 3 – (Priority)

Junction 3 is a priority T-junction between Brennanstown Road and Carrickmines Wood. This junction has been modelled based on its current configuration and the PICADY analysis results are summarise in Table 11.21 below. The arms of the junction were labelled as follows within the PICADY model:

- Arm A: Brennanstown Road (W)
- Arm B: Brennanstown Vale
- Arm C: Brennanstown Road (E)

Stream	AM Peak (08:00 to 09:00)		PM Peak (17:00 to 18:00)	
	Queue (veh.)	RFC	Queue (veh.)	RFC
2021 – Baseline year				
Stream B-C	0.0	0.02	0.0	0.03
Stream C-AB	0.0	0.03	0.0	0.02
2026 – Baseline year				
Stream B-C	0.0	0.03	0.0	0.03
Stream B-A	0.0	0.03	0.0	0.02
2026 – Baseline year + Proposed Development				
Stream B-C	0.0	0.03	0.0	0.03
Stream C-AB	0.1	0.04	0.0	0.02
2041 – Baseline Year				
Stream B-C	0.0	0.03	0.0	0.04

Stream C-AB	0.1	0.04	0.0	0.02
2041 - Baseline year + Proposed Development				
Stream B-C	0.0	0.03	0.0	0.04
Stream C-AB	0.1	0.04	0.0	0.03

Table 11.21 Junction 3 - TRANSYT Analysis Results.

From the analysis results as summarised above, Junction 3 is currently operating well within capacity during the AM and PM peak hours and will continue to do so for the future assessment year of 2041 + Proposed Development with the highest RFC at 0.04 and a corresponding queue of 0.1 vehicle in the AM and with the highest RFC at 0.04 with not vehicle queue recorded for the PM.

Junction 4

Junction 4 is a new four-armed priority-controlled roundabout located east of the proposed development site. This roundabout was constructed as part of the Brennanstown Wood development. This roundabout has been modelled based on its current configuration and the ARCADY analysis results are summarise in Table 11.22 below. The arms of the roundabout were labelled as follows within the ARCADY model:

- Arm 1: Brennanstown (W);
- Arm 2: Private Road;
- Arm 3: Brennanstown (E);
- Arm 4: Brennanstown Wood.

Arm	AM Peak (08:00 to 09:00)		PM Peak (17:00 to 18:00)	
	Queue (veh.)	RFC	Queue (veh.)	RFC
2021 – Baseline Year				
Arm 1	0.2	0.13	0.2	0.16
Arm 2	0.0	0.00	0.0	0.00
Arm 3	0.2	0.14	0.3	0.19
Arm 4	0.0	0.01	0.0	0.01
2026 -Baseline Year				
Arm 1	0.2	0.15	0.2	0.18
Arm 2	0.0	0.00	0.0	0.00
Arm 3	0.2	0.16	0.4	0.26
Arm 4	0.1	0.08	0.1	0.06
2026 - Baseline Year + Proposed Development				
Arm 1	0.5	0.30	0.3	0.25
Arm 2	0.0	0.00	0.0	0.00
Arm 3	0.3	0.22	0.6	0.37
Arm 4	0.1	0.09	0.1	0.07
2041 – Baseline Year				
Arm 1	0.2	0.16	0.2	0.20
Arm 2	0.0	0.00	0.0	0.00
Arm 3	0.2	0.18	0.4	0.28
Arm 4	0.1	0.09	0.1	0.06
2041 - Baseline Year + Proposed Development				
Arm 1	0.5	0.35	0.4	0.28
Arm 2	0.0	0.00	0.0	0.00
Arm 3	0.3	0.24	0.7	0.41
Arm 4	0.1	0.09	0.1	0.07

Table 11.22 Junction 4 - TRANSYT Analysis Results.

From the analysis results as summarised above, Junction 4 is currently operating well within capacity during the AM and PM peak hours and will continue to do so for the future assessment year of 2041 + Proposed Development with the highest RFC at 0.35 and a corresponding queue of 0.5 vehicle in the AM and with the highest RFC at 041 and a corresponding queue of 0.7 vehicle recorded for the PM.

Junction 5 – (Signalised)

Junction 5 is a signalised junction proposed on Brennanstown Road to provide access to the subject development site. This junction is designed as a signalised four-armed junction with the eastern and western arms being the Brennanstown Road, the southern arm forming the access to the site and the northern arm forming the road access to the northern lands. The lands to the north of the Brennanstown Road are owned by the Applicant. It is envisaged that the proposed junction, although designed as a four-armed signalised junction, will initially operate as a signalised T-junction, with the northern approach being closed to traffic and not operational. Therefore, the initial model carried out for this proposed junction was based on a signalised T-junction layout.

The model was carried out using TRANSYT software and the analysis results are shown in Table 11.23 below. The arms of the junction were labelled as follows within the TRANSYT model:

- Arm A: Brennanstown (W);

- Arm B: Site Access;
- Arm C: Brennanstown (E);

Arm	Mov.	AM Peak (08:00 to 09:00)		PM Peak (17:00 to 18:00)	
		Queue (veh.)	DOS%	Queue (veh.)	DOS%
2026 – Baseline Year + Proposed Development					
A	S/L	4.17	42%	5.26	45%
B	L/R	4.25	41%	2.23	44%
C	S/R	5.00	37%	5.98	39%
2031 – Baseline Year + Proposed Development					
A	S/L	4.36	43%	5.54	48%
B	L/R	4.31	43%	2.23	44%
C	S/R	5.28	39%	6.34	41%
2041 – Baseline Year + Proposed Development					
A	S/L	4.37	40%	4.33	30%
B	L/R	4.45	47%	2.43	55%
C	S/R	5.54	41%	8.77	64%

Table 11.23 Junction 5 - TRANSYT Analysis Results.

From the analysis results as summarised above, the proposed Junction 5 is expected to operate well within capacity during the AM and PM peak hours in the 2026 + Proposed Development (Opening Year) scenario and would continue to do so for the future assessment year of 2041 + Proposed Development with the highest DOS at 47% and a corresponding queue of 4.45 vehicles in the AM and with the highest DOS at 64% and a corresponding queue of 8.77 vehicles recorded for the PM.

11.9 `DO NOTHING` SCENARIO

Should the proposed development not take place, the access roads and infrastructure will remain in their current state and there will be no change. Background traffic would be expected to grow over time. Given the location and zoning of the subject site, it is reasonable to assume that a similar development, with a potentially more intensive requirement for vehicular trips would be established on this site at some stage in the future.

11.10 WORST CASE SCENARIO

The application of traffic growth rates assumes a worst case for the future year scenarios. The worst case scenario for this development is assumed to be 2041 + Proposed Development + Committed Developments.

11.11 MONITORING & REINSTATEMENT

Traffic management and deliveries will be carefully monitored during the construction stage as part of the Construction Management Plan. A mobility management plan has been prepared and is submitted under separate cover with the application which includes "Construction Stage Mobility Management". The appointed contractor will implement and monitor the mobility management plan at Construction Stage to ensure that it is operating effectively. Local residents will be kept fully informed of construction activities through mail shots, email and site notices.

During the operational stage the Mobility Management Plan will be monitored by the Co-ordinator. The travel survey will establish the initial modal split of travel by residents.
The Co-ordinator, in consultation with the Developer, the Occupiers, and the Local Authority or its agents, will agree annual targets, following completion and analysis of the travel survey, to improve the attractiveness of public transport, walking and cycling in order to reduce the need for car based travel.
The Co-ordinator will:

- Meet with officers of the Local Authority or its agents within a period of 6 months following occupation of the building(s) and thereafter every 12 months to assess and review progress of the Plan and agree objectives for the next 12 months,

and to

- Prepare and submit to senior management of the Developer, the Occupier(s) and the Local Authority or its agents, an annual Monitoring Report.

Reinstatement is not applicable to this chapter.

11.12 DIFFCULTIES IN COMPILING INFORMATION

There were no difficulties encountered.

11.13 REFERENCES

In preparing this report, Waterman Moylan Consulting Engineers have referred to:
The Traffic Management Guidelines,
Guidance on Transport Assessment,
Design Manual for Urban Roads and Streets,
Dún Laoghaire-Rathdown County Development Plan 2016-2022,
Project Appraisal Guidelines for National Roads – Unit 5.3 Travel Demand Projections Link-Based Growth Rate; Annual Growth Factors,
Chartered Institute of Highways and Transportation "Traffic and Transportation Assessment Guidelines",
Greater Dublin Area Cycle Network Plan – National Transport Authority (NTA),
Sustainable Urban Housing: Design Standards for New Apartments – Guidelines for New Apartments – Department of Housing, Planning and Local Government – March 2018, and
"Standard for Cycle Parking and associated Cycling Facilities for New Developments" – Dún Laoghaire-Rathdown County Council.

12 MATERIAL ASSETS - UTILITIES

12.1 INTRODUCTION

This chapter has been prepared by Waterman Moylan Consulting Engineers for Cairn Homes Properties Ltd as part of a planning submission to An Bord Pleanála for a Strategic Housing Development (SHD) at Barrington Tower, Cabinteely, Co. Dublin.
This section examines the material assets serving the subject lands relating to surface water drainage, water supply, foul sewerage, electricity, gas and telecommunications.

12.2 METHODOLOGY

The methodology followed for this section is in accordance with the EPA "Environmental Impact Assessment Reports, Draft Guidelines 2017". Information on built assets in the vicinity of the development lands was assembled from the following sources:

- A desktop review of Irish Water Utility Plans, ESB Networks Utility Plans, Gas Networks Ireland Service Plans, EIR E-Maps and Virgin Media Maps;
- Consultation with Irish Water and Dún Laoghaire-Rathdown County Council;
- Submission of a Pre-Connection Enquiry Application to Irish Water;
- Review of ESB Network Utility Plans & Site meetings with ESB Network
- Review of Gas Networks Ireland exiting network maps;
- Review of EIR Telecommunications exiting network maps;
- Site Inspections / Walkover;

As part of assessing the likely impact of the proposed development, surface water runoff, foul drainage discharge and water usage calculations were carried out in accordance with the following guidelines:

- Greater Dublin Strategic Drainage Study (GDSDS);
- IS EN752, "Drain and Sewer Systems Outside Buildings";
- Irish Water's Code of Practice (water demand and foul water loading);

12.3 RECEIVING ENVIROMENT

Surface Water Drainage
There are no underground public surface water pipes within the subject site. The EPA Watercourse Maps shows the closest watercourse to the subject site is the Carrickmines Stream which connects into the Loughlinstown River and eventually discharges into the Irish Sea.
The southern edge and southeast corner of the proposed development is located directly north of the Carrickmines Stream. The existing site slopes from North to South. The existing site drains surface water, unrestricted, overland to the Carrickmines Stream.
Figure 12.2 below shows the subject site location in relation to the surrounding water courses, the figure includes arrows indicating the direction of the surface water flow to the Irish Sea.
Refer to Chapter 8.0 –Water of this EIAR submission for further information on the environmental surface water discharge into the watercourse.

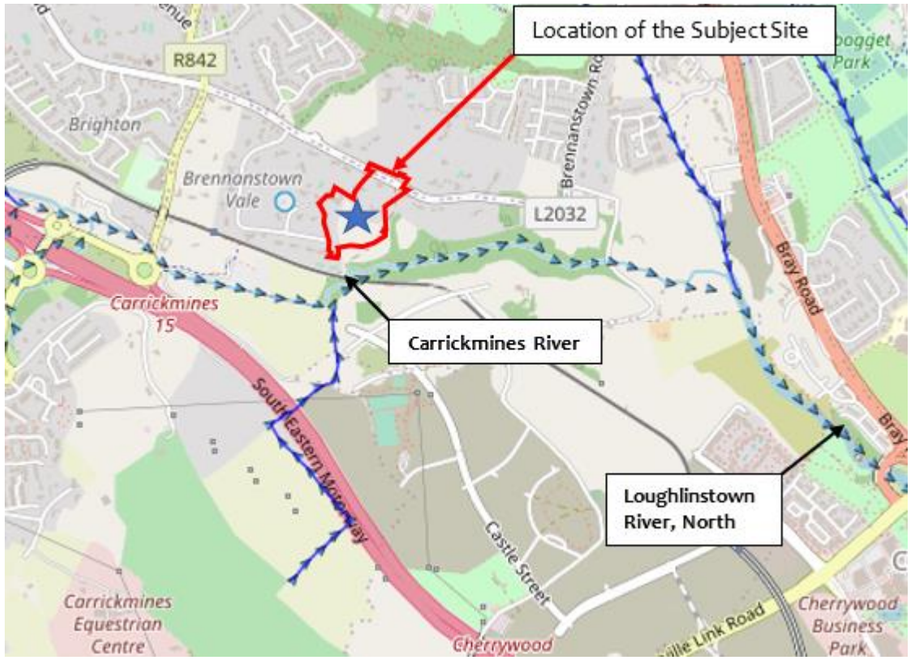


Figure 12.1 EPA Watercourse Map

Foul Sewers
Irish Water have been contacted and existing foul sewer network maps for the area surrounding the proposed development have been obtained. The existing surrounding developments' foul water sewers are drained via gravity at Brennanstown Vale, which is located southwest of the proposed development, with an additional existing foul water sewer located directly south of the development, parallel to the Luas line.
A Pre-Connection Enquiry form was submitted to Irish Water in January 2022 which outlined the proposals for the drainage of wastewater from the development. Irish Water responded with the Confirmation of Feasibility (COF) on 4th February 2022 stating that an upgrade of the existing 225mmØ and 300mmØ gravity sewer (from the development connection point up to the 900mm trunk sewer) may be required. Any upgrade works will be confirmed by Irish Water at connection stage following future surveys to be undertaken by Irish Water to establish the integrity and capacity of the existing foul sewer line.
Refer to Figure 12.3 which shows the existing Irish Water infrastructure in the vicinity of the proposed site. Both sewers connect into a combined foul sewer mainline (wastewater collection network).
The wastewater collection network forms part of the wastewater catchment within the south of Dun Laoghaire-Rathdown County Council. This network is pumped to the Shanganagh Wastewater Treatment Works (WwTW), where the wastewater undergoes secondary treatment. The capacity of the Shanganagh WwTW is a population equivalent (p.e.) of 186,000, which translates to 43,700 m3/day, with the potential to increase capacity to 248,000 p.e. by 2022.
The latest available information on the WwTW (DLR Final SEA 2016) states the current plant loading is 105,000 p.e. with a spare capacity of 81,000 p.e.

Figure 12.2 Irish Water Records

Water Supply

Irish Water have been contacted and existing water supply network maps for the area surrounding the proposed development have been obtained. Refer to *Figure 12.2 Irish* Water Records above for details. There is an existing 6-inch uPVC watermain on Brennanstown Road to the north of the subject. A Pre-Connection Enquiry form was submitted to Irish Water in January 2022 which outlined the proposals for the provision of water supply to the development. Irish Water responded with the Confirmation of Feasibility (COF) on 4th February 2022 stating that the water connection is feasible without upgrade of the existing infrastructure. The COF is included in Appendix 12.1 of this EIAR.

Gas

Gas Networks Ireland have been contacted and an existing gas network map for the area surrounding the site has been obtained, refer to **Error! Reference source not found.** below. There are existing gas pipes on Brennanstown Road, to the north of the site, and in the vicinity of existing dwellings located to the northwest of the site.

A 180 PE 4 Bar gas line exists in Brennanstown Road, directly north of the site, and 2 №63 PE 4 Bar gas lines exist at the existing dwellings. The proposed site boundary contains 1 №of the 63 PE 4 Bar lines.

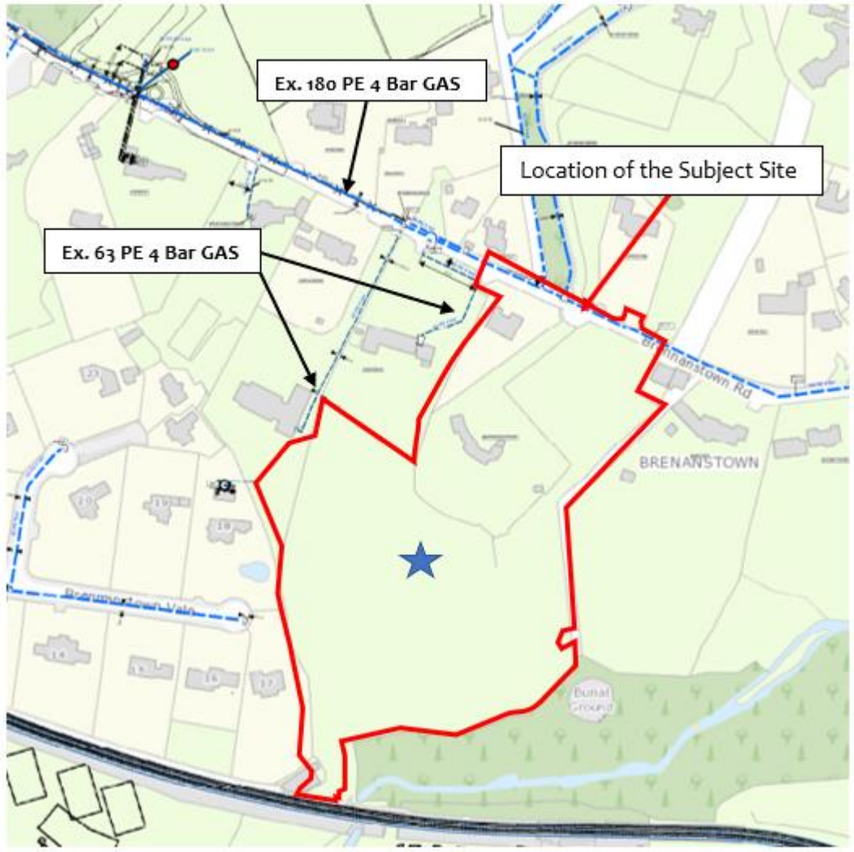


Figure 12.3 Gas Networks Ireland Map

ESB Supply

Electricity Supply Board (ESB) Networks have been contacted and an existing ESB network map for the area surrounding the proposed development has been obtained. The site is currently connected to the ESB network on Brennanstown Road.

Low voltage (LV) overhead lines exist within Brennanstown Road and medium voltage (MV) / LV underground cables exist in the adjacent Brenannstown Vale, west of the site.

Refer to *Figure 12.4 ESB* Network Map below for the ESB map showing the existing electrical supply in the vicinity of the site.

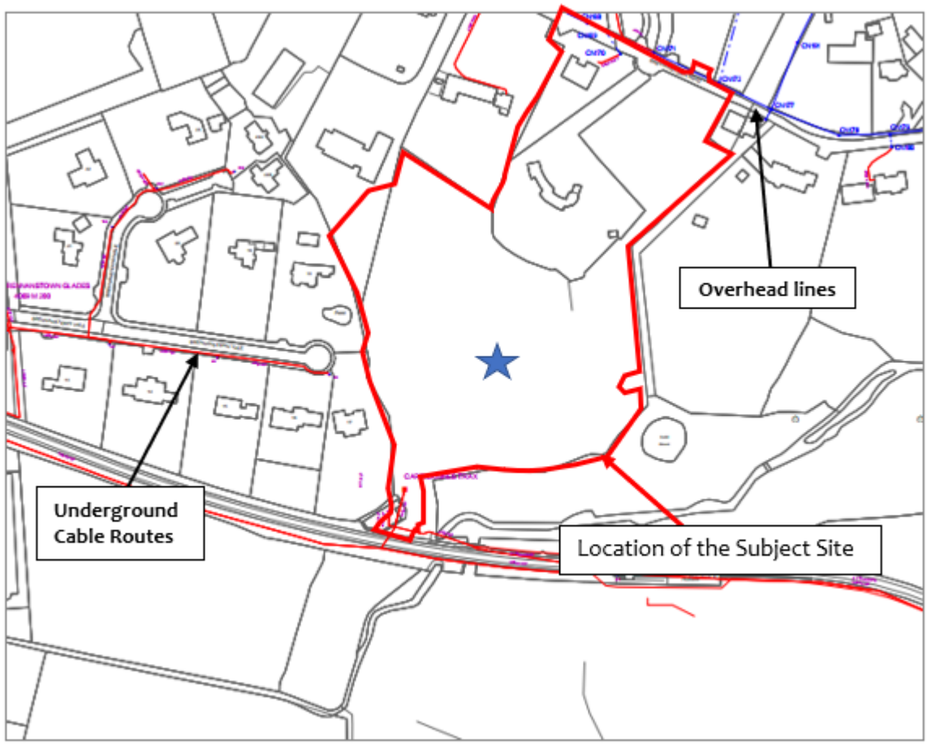


Figure 12.4 ESB Network Map

Telecommunications – EIR

EIR have been contacted and an existing EIR network map for the area surrounding the proposed development has been obtained. **Error! Reference source not found.** below. There are existing EIR services on Brennanstown Road, north of the site and on the west of the site within Brenannstown Vale.

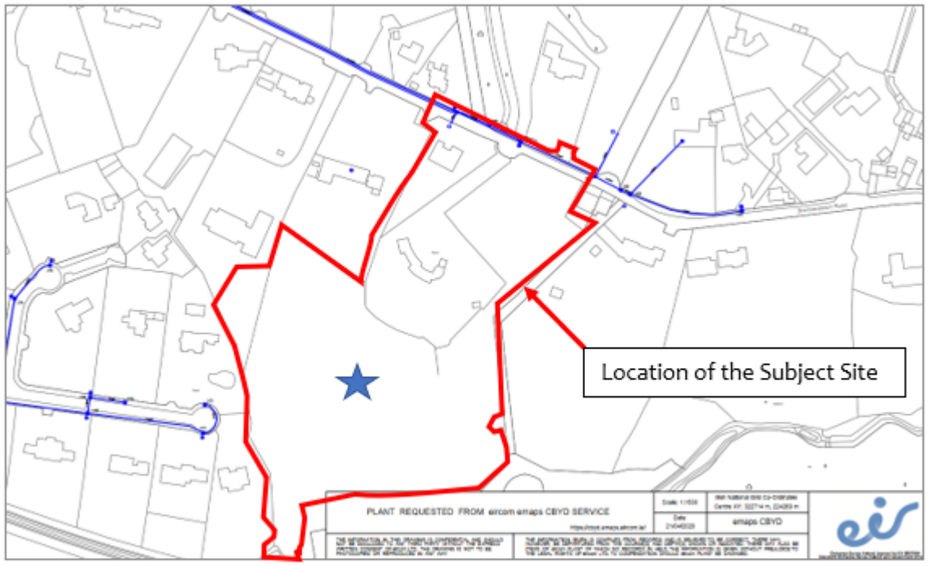


Figure 12.5 EIR Network Map

12.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed 'Build-to-Rent' (BTR) development will consist of the construction of 8 no. blocks in heights up to 10 storeys comprising 534 residential units, a creche, a retail unit, residential support facilities and residential services and amenities. The proposal also includes car and cycle parking, public and communal open spaces, landscaping, waste management areas, plant areas, substations, switch rooms, and all associated site development works and services provision. A full description of the development is provided in the statutory notes and in Chapter 3 of the EIAR submitted with this application.

Surface Water Drainage

The existing site drains surface water, unrestricted, to Carrickmines Stream to the south of the site.
It is proposed that the development will attenuate the surface water on-site before discharging at the existing greenfield rate into the Carrickmines Stream.
The following parameters have been used in greenfield run-off rate calculations:

	Catchment
Site Area (Catchment) *[1] – Ha	3.9
SAAR - mm*[2]	892
SOIL Index*[3]	0.37
Climate Change	20%

Table 12.1 Surface Water Catchment Details

*1 – The total site area within the application red line boundary.

*2 – The soil type of Ireland indicated Soil Type 1 however the 2 No. Site investigations carried out on site in November 2020 and May 2021 would suggest this is not correct for this particular site with soil conditions being an overburden, generally made of made ground or cobbles and boulders and granite bedrock at a depth between 0.2m and 10.10 m below ground level. The site investigation is included as part of this planning application under a separate cover. These soil conditions are expected for Soil Type 3 and therefore 0.37 is used as the Soil Index for this site. In addition, there is a natural average slope of c. 1:22 across the site which will increase the rate of run-off from site, even in its greenfield state.

The Local Authority requirements, as outlined in the Local Development Plan are that post-development run-off rates are limited to greenfield run-off rates for the hardstanding areas of the site which totals to 2.325ha. The greenfield run-off rates for the site have been calculated in accordance with the Institute of Hydrology report No 124 "Flood Estimation for Small Catchments", using the UK SUDS Website. The Greenfield run-off for the site is 8.8 l/s (Qbar).
It is proposed to limit the discharge from the site to 8.8 l/s by providing a Sustainable Drainage System (SUDS). A series of Hydrobrakes will be installed at the outfall of the network.

Foul Sewers
There is an existing 225 mm Ø foul sewer to the south of the site running along the north of the Luas line. This foul water pipe discharges to the 900mm Ø combined trunk sewer approximately 120m to the east of site.
It is proposed to drain the site to the existing 900mm Ø combined trunk sewer at the southern corner of the subject site.
Based on Irish Waters Code of Practice, the peak foul flow from the proposed development will be as follows:

Description	№of Units	Flow l/h/day	Population per Unit	Infiltration Factor	Total Discharge (l/d)
Residential Units	534	150	2.7	1.1	237,897
Crèche	1	50	119	1.1	6,545
Retail	1	45	10	1.1	495
Total l/d					***244,937 l/d***

Table 12.2 Calculation of Proposed Foul Water Flow

Calculation of Proposed Peak Foul Flow		Units
Dry Weather Flow Residential (DWF)	2.753	l/s
Dry Weather Flow Commercial (DWF)	0.081	l/s
Peak Foul Flow Residential (=6 x DWF)	16.518	l/s
Peak Foul Flow Commercial (=4.5 x DWF)	0.365	l/s
Total Peak Foul Flow	16.88	l/s

Table 12.3 Foul Water Calculations

Water Supply
It is proposed to supply the proposed development using 1 No. 200mmØ connections which will connect into the existing 6-inch uPVC watermain north of the site.
The water demand for the proposed development is calculated according to the Irish Water Code of Practice and can be seen in Table 12.4 below.
The total water requirement from the public supply, for the development, is estimated at 237 m3/day.
Waterman Moylan Drawing 20-040-P011 shows the proposed indicative water supply layout for the subject site.

Description	№of Units	Flow l/h/day	Population per Unit	Total Discharge (l/d)
Residential Units	534	150	2.7	216,270
Crèche	1	50	119	5,950
Retail	1	45	10	450
Total				222,670 l/d

Table 12.4 Water Demand Calculations

The total water requirement from the public supply, for the development, is estimated at 223 m3/day.

ESB Network

It is proposed development to connect to the existing ESB Network at Brennanstown road.
Two double sub stations will be provided to cater for the electricity demand for the site.
These sub-stations will be located above ground with no impact on visibility on the main access road near the underground carpark entrance. Applications to are yet to be made for extending the ESB Networks MV connection to the site. Similarly, the location of the sub-stations are subject to approval from DLRCC.

Gas
There are existing gas pipes on Brennanstown Road, to the north of the site, and in the vicinity of existing dwellings located to the northwest of the site.

The proposal for the development is to utilise the main 180mm Diameter gas main to serve the apartments. The main gas skid is to be located within the basement level car park and is to be mechanically ventilated to atmosphere.

Telecommunications – EIR
A connection will be made via chambers along the main telecommunications ducts existing around the site. There will be a connection via a chamber at Brennanstown Road, to the north of the site. Comms will be drawn through ducts for connection of telecommunication providers, these will go to the comms room proposed to be located in the ground floor of each Block of the development. All the works are subjected to be agreed with EIR during the installation time.

12.5 POTENTIAL IMPACTS

Construction Phase

Surface Water

- Significant amounts of site stripping and excavation will be required to construct the development. Approximately 5440m^3 of topsoil and 59,700m3 of sub-soil/made ground/rock will be excavated on site and approximately 1410m^3 of this material will be reused on site. When the site has been stripped layers of sub-soil will be exposed to weathering and there will be potential for erosion due to rainfall and subsequent runoff. The erosion of soil can lead to sediments being washed into the receiving watercourses /sewers at higher rates of runoff.
- There is also potential during the development's construction stage that contaminants from cement/concrete be washed into the receiving watercourses/sewers. The Carrickmines Stream ultimately discharges into Killiney Bay. Further information on the receiving water bodies can be found in the water chapter of this EIAR.
- There is a risk of pollution of groundwater / watercourses / soils by accidental spillage of oils / diesel from temporary storage areas or where maintaining construction equipment.
- Foul water could be connected to the surface water drainage network resulting in the contamination of the receiving watercourses. Furthermore, if there is damage to any foul pipes, there is potential for contaminants to seep into the groundwater.
- Contamination from faecal coliforms can arise if there is inadequate containment and treatment of onsite toilets and washing facilities.
- There is a possibility of a temporary Increase in traffic due to deliveries of materials and other construction related traffic.

Foul Water

- There is a risk of the ingress of ground/surface water to the foul water network.
- There is a risk of damage to existing buried utilities during excavations works resulting in temporary loss of supply to existing properties.
- There is a possibility of a temporary Increase in traffic due to deliveries of materials and other construction related traffic.
- There will be some disruption to traffic during construction works on the public road.
- Cross connection between foul and surface water pipes.

Water Supply

- There is a risk of contamination of the existing water supply during construction of the development when connection of the trunk watermain to the public water supply is being made.
- There is a risk of damage to watermain fittings due to high pressure in the existing watermain.
- There will be a minor water demand for site offices.
- There is a possibility of a temporary increase in traffic due to deliveries of materials and other construction related traffic.
- There is a risk of damage to existing buried utilities during excavations works resulting in temporary loss of supply to existing properties.

- The proposed development will not give rise to any significant long term adverse impact. Negative impacts during the construction phase will be short term only.

Electricity

- There are power requirements during the construction phase for temporary lighting and construction actives. The power demand is considered to be slight, negative and short-term impact.
- Some local diversions may be required to supply temporary power to the site for the construction works. This is envisaged to be a slight, negative and short-term impact.

Gas

- There will be minimal impact on the site for the connection of the required gas pipework to service the site.
- The trenching works will be done in accordance with the GNI design drawings which will outline the routes for all new incoming mains.
- All trenches within the site boundary will need to be coordinated with the main contractor's programme to allow for timely completion to avoid repeating works.
- There is a potential to impact the surrounding traffic in the area of the connection to the main line. All traffic management associated with works outside of the site boundary is to be organized by GNI.

Telecommunications

- Some local diversions may be required in the upgrade works of the controlled pedestrian crossing and new proposed ducting works. This is envisaged to be a slight, negative and short-term impact.
- OCSC have reviewed the proposed development and consider that the height and scale being sought for this new development will not have an impact on any current microwave telecommunication channels. If however, a microwave link is found to be effected by this new development, during the construction stage of this project, mitigation will be employed by engaging with the telecommunication company and organising the re-alignment of their microwave links to a new hop site.

Operational Phase

Surface Water

- The proposed development will result in increased impermeable areas and there is potential for an increase in the risk of higher rates of surface water runoff leading to increased downstream flooding.
- There is a potential impact for the discharge of contaminants from the proposed development and road surfaces to the surrounding drainage networks/watercourse. These would include particulates, oil, soluble extracts from the bitumen binder etc. The quality of runoff from the site would be dependent on the time of year, weather, particulate deposition from the atmosphere and any gritting or salting carried out by the Local Authority. The time of year has a major bearing on the quality of storm water run-off - in particular the first rains after a prolonged dry period where accumulated deposits of rubber, particulates, oils, etc. are, washed away.
- Stagnation of the water and siltation within the attenuation areas may occur.

Foul Water

- Blockages may occur within the pipe network and the wastewater could become septic.
- Foul water could be connected to the surface water drainage network on-site.
- Increased flows to the wastewater network and the Shanganagh Treatment Plant.

Water Supply

- There will be an increased demand for water once the development is occupied.

Electricity

- Additional power will be required for the grid for the proposed developments. The increase in demand is considered to be slight, negative and long-term impact.

Gas

- The increased demand on the GNI network is to be assessed by GNI in order to ensure there is ample capacity for the development. Any issues with demands are to be corresponded to the design team and the client prior to installation of network.
- All requirements to increase the networks capacity will be undertaken by GNI.
- Ventilation to the Gas skid to be maintained all year round. No additional landscaping is to be put in place that may mitigate the free area serving the ductwork.

Telecommunications

- The increased demand on existing telecommunications infrastructure is considered to be imperceptible.

12.6 POTENTIAL CUMULATIVE IMPACTS

In the event of future development adjacent to the proposed development, there are no predicted cumulative impacts arising from the construction or operation phase related to the material assets – built services, provided the other permitted developments implement appropriate mitigation measures.

12.7 MITIGATION MEASURES

Construction Phase

Surface Water

- The contractor will appoint a suitably qualified person to oversee the implementation of measures for the prevention of pollution to the receiving surface water environment.
- To minimise the adverse effects, the prevailing weather conditions and time of year is to be taken into account when the site development manager is planning the stripping back of the site.
- Regular testing of surface water discharges will be undertaken at the outfall from the subject site. The location for testing and trigger levels for halting works will be agreed upon between the project ecologist and the site foreman at the commencement of works.

- Where silt control measures are noted to be failing or not working adequately, through regular monitoring by the site team, works will cease in the relevant area. The system is cleaned and works can then recommence.
- All fuels and chemicals will be bunded, and where applicable, stored within double skinned tanks / containers with the capacity to hold 110% of the volume of chemicals and fuels contents. Bunds will be located on flat ground a minimum distance of 50 m from any watercourse or other water conducting features, including the cut off trenches.
- Site stripping will be minimised as far as practicable.
- All existing services will be located using service records, GPR surveys and slit trenches to ensure that their position accurately identified before excavation works commence.
- Foul and surface water pipes will be carefully laid to minimise the potential for cross-connections which results in contamination of receiving watercourses.
- Site personnel inductions are to be conducted such that all site personnel are made aware of the procedures the best practice in relation to the management of surface water runoff.
- Where possible, precast concrete units are to be used to avoid on-site "wet" mix concrete usage. In situ concrete pours are to be managed in accordance with best practice to avoid overspills
- Concrete truck and wheel wash down facilities are to be provided in designated areas. Discharge from these areas is to be directed into the settlement ponds/silt traps.
- Topsoil for landscaping will be located in such a manner as to reduce the risk of washing away into local drainage or watercourses.

Foul Water

- All existing services will be located using service records, GPR surveys and slit trenches to ensure that their position accurately identified before excavation works commence.
- Foul water pipes to be laid with sufficient falls to ensure self-cleansing velocity
- Foul pipes will be carefully laid to minimise the potential for cross connections.

Water Supply

- All existing services will be located using service records, GPR surveys and slit trenches to ensure that their position accurately identified before excavation works commence.
- All water mains will be cleaned, sterilised, and tested to the satisfaction of the Irish Water/Local Authority prior to connection to the public water main.
- All connections to the public water main will be carried out under the supervision of the Irish Water/Local Authority.

ESB Network

- All existing services will be identified using ESB service record maps. CAT survey to be carried prior to excavation to accurately identify cable routes indicated on ESB maps.
- All connections to the ESB mains will be carried out and tested by ESB personnel

Gas

- All existing services will be located using service records, GPR surveys and slit trenches to ensure that their position is accurately identified before excavation works commence.
- All connections to the public Gas main will be carried out under the supervision of GNI and will be tested and certified in accordance with their requirements.

Telecommunications – EIR

- All existing services will be identified using Open EIR service record maps.
- All connections to the Open EIR network will be carried out and tested by EIR personnel.

Operational Phase

Surface Water

- Flow restrictors with attenuation storage will be used to slowdown and store surface water runoff from discharging above green field rates to the Carrickmines Stream.
- Attenuation systems will be constructed on-line to intercept the first flush during rainfall events after periods of dry weather.
- The surface water drainage network has been designed in accordance with the CIRIA SUDS Manual and the Greater Dublin Strategic Drainage Scheme. The appropriate interception mechanisms and treatment train process has been incorporated into the design.
- Sustainable urban drainage measures such as permeable paving and swales will be provided.
- A petrol interceptor will be installed to prevent hydrocarbons entering the local drainage system.
- The attenuation storage systems will be constructed at a fall to maintain movement of water and thus prevent stagnation. Silt would be collected at a sump and removed periodically.
- Regular maintenance of the drainage network, including petrol interceptor.
- The drainage network will be inspected annually and maintained by the building management company.

Foul Water

- The foul network will be inspected annually and maintained. Private foul water drainage will be maintained by the building management company and public drainage will be maintained by Irish Water.

Water Supply

- It is not envisaged that any other mitigation measures will be necessary upon the completion of the development.

ESB Network

- It is not envisaged that any other mitigation measures will be necessary upon the completion of the development.

Gas

- It is not envisaged that any other mitigation measures will be necessary upon the completion of the development.

Telecommunications - EIR

- It is not envisaged that any other mitigation measures will be necessary upon the completion of the development.

12.8 PREDICTED IMPACTS

Construction Phase

Surface Water

Due to the proposed mitigation measures outlined above no significant impact will arise during the construction phase of the proposed development on a surface water quality.

Foul Water

Due to the proposed mitigation measures outlined above, the impact of the foul network construction will be not significant.

There may be short term disruption to local traffic on connection of the foul sewers from the proposed development to the existing foul sewers.

Water Supply

Due to the proposed mitigation measures outlined above, the impact on the water supply infrastructure during the construction phase of the proposed development is slight.

There will be disruption to local traffic during the connection of the watermains from the proposed development to the existing watermains on Brennanstown Road.

ESB Network

Due to the proposed mitigation measures outlined above, the impact on the ESB network infrastructure during the construction phase of the proposed development is slight.

There may be disruption to local traffic during the connection of the ESB mains for the proposed development from the existing ESB mains on Brennanstown Road.

Gas

Due to the proposed mitigation measures outlined above, the impact on the water supply infrastructure during the construction phase of the proposed development is slight.

There will be disruption to local traffic during the connection of the Gas main from the proposed development to the existing watermains on Brennanstown Road.

Telecommunications – EIR

Due to the proposed mitigation measures outlined above, the impact on the EIR network infrastructure during the construction phase of the proposed development is slight.

There may be disruption to local traffic during the connection of the ESB mains for the proposed development from the existing EIR network on Brennanstown Road.

Operational Phase

Surface Water

Due to the proposed mitigation measures outlined above many of the potential impacts will not arise during the operation phase of the proposed development on surface water quality.

Surface water discharge from the site will be restricted by means of attenuation to greenfield runoff rates, therefore, no adverse impact in respect of flooding downstream will arise from the proposed development.

The installation of a Sustainable Urban Drainage System will ensure surface water runoff will be of high quality before discharge to the receiving stream to the north of the site and will not have an impact on the receiving watercourse.

The impact following the operational phase mitigation measures outlined above is imperceptible

Foul Water

There will be increased flows in the existing foul water drainage network, resulting in a moderate impact in terms of demand on the receiving foul water network. This impact will be managed through consultation with Irish Water to ensure any necessary upgrades are provided and that connections are carried out in accordance with the Code of Practice.

Water Supply

There will be an increased demand for water supply due to the development resulting in a moderate impact in terms of demand on the water supply infrastructure. This impact will be managed through consultation with Irish Water to ensure necessary upgrades are provided and that connections are carried out in accordance with the Code of Practice.

ESB Network

There may be an increased demand for electricity supply due to the development resulting in a moderate impact in terms of demand on the electricity supply infrastructure. This impact will be managed through consultation with ESB to ensure necessary upgrades are provided and that connections are carried out in accordance with the Code of Practice.

Gas

There will be an increased demand for water supply due to the development resulting in a moderate impact in terms of demand on the gas supply infrastructure. This impact will be managed through consultation with GNI to ensure necessary upgrades are provided and that connections are carried out in accordance with the Code of Practice.

Telecommunications - EIR

There may be an increased demand for due to the development resulting in a moderate impact in terms of demand on the telecommunication infrastructure. This impact will be managed through consultation with EIR personnel to ensure necessary upgrades are provided and that connections are carried out in accordance with the Code of Practice.

12.9 `DO NOTHING` SCENARIO

No change of use of the brownfield lands and therefore no further impact to the material assets – built services would exist.

12.10 WORST CASE SCENARIO

Surface Water

The worst-case scenario, although highly unlikely given the mitigation measures proposed, would be that flooding occurs at the subject site and in the surroundings due to the construction of the development. Surface Water from the site will be attenuated prior to discharge to the stream. A storm event in excess of 1 in 100 year storm plus 20% climate change would be the worst case scenario. House floor levels are elevated more than 500mm above the predicted high water levels in accordance with the GDSDS and overland flow path routes are along roads and grassland areas directed towards the green areas of the site. In addition, the overland flood route direct the water to the Carrickmines Stream. Responsible and competent implementation of the mitigation measures will result in making this worst-case scenarios an unlikely event.

Foul Water

A worst-case scenario regarding the foul network would be the contamination of groundwater and stream Carrickmines by foul effluent from the development. However, the mitigation measures proposed should ensure that this will not occur.

Water Supply

In regards of the water supply, the worst-case scenario would be the contamination of the water supply by an accidental spillage or contamination during the connection process. However, the mitigation measures outlined above should ensure that this will not occur. Prior to connection to the public watermain, all watermain in the development will be tested and cleaned to the requirements of Irish Water.

ESB Network

Regarding the electricity supply, the worst-case scenario would be the shutdown of the network due to damage caused during the excavation of the existing mains or during any natural events like storm. Prior to connection to the ESB mains, all connections within the site boundary are to be tested to the requirements of ESB.

Gas

In regards to the gas supply, the worst case scenario would be the shut down of the network due to damage caused during the excavation of the existing main. Any debris entering the network during the construction phase could have serious impact on the network and cause damage. Prior to connection to the public main, all gas pipework within the site boundary is to be tested to the requirements of Gas Networks.

Telecommunications - EIR

Regarding the telecommunication, the worst-case scenario would be the shutdown of the network due to damage caused during the construction of the existing network or during any natural events like storm. Prior to connection to the EIR network, all connections within the site boundary are to be tested to the requirements of EIR Networks.

12.11 MONITORING & REINSTATEMENT

The proposed monitoring of the various built services during the operation stage will include:

- Surface water drainage and SUDS features will be monitored and maintained by the Developer/Management Company.
- The water usage within the proposed development will be monitored via the bulk water meters. Records will be maintained by Irish Water to ensure any excess usage is identified and investigated as necessary.
- Irish Water will monitor the operation of the foul drainage network including the receiving environment.
- The construction and waste management plans will be adhered to by the contractor during the construction process.
- The provision of utility services including electricity, gas and broadband will be monitored by the relevant utility provider.

12.12 DIFFCULTIES IN COMPILING INFORMATION

There were no particular difficulties encountered compiling the Material Assets –Utilities chapter of the EIAR.

12.13 REFERENCES

Code of Practice for Water Infrastructure – Connections and Developer Services, (2017), Irish Water
Code of Practice for Wastewater Infrastructure – Connections and Developer Services, (2017), Irish Water
EIRcom Emaps
Environmental Impact Assessment Reports – Draft Guidelines, (2017), Environmental Protection Agency
ESB Networks
Gas Networks Ireland – Cork Design Department
Greater Dublin Strategic Drainage Study (GDSDS), (2015), Dublin Drainage
Irish Building Regulations – Part H 2010 – Drainage and Waste Water Disposal

13 WASTE MANAGEMENT

13.1 INTRODUCTION

This chapter of the EIAR comprises an assessment of the likely impact of the proposed development on the waste generated from the development as well as identifying proposed mitigation measures to minimise any associated impacts.

A site-specific Resource Waste Management Plan (RWMP) has been prepared by AWN Consulting Ltd to deal with waste generation during the demolition, excavation and construction phases of the proposed Development and has been included as Appendix 13.1. The RWMP was prepared in accordance with the Environmental Protection Agency's (EPA) document 'Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects' (2021) and '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 (DoEHLG) (2006).

A separate Operational Waste Management Plan (OWMP) has also been prepared for the operational phase of the proposed development and is included in Appendix 13.2 of this chapter.

The Chapter has been prepared in accordance with European Commission's Guidelines, 'Guidance on the preparation of the Environmental Impact Assessment Report (2017)' and the EPA 'Guidelines on the Information to be contained in EIAR (2017, Draft)'.

These documents will ensure the sustainable management of wastes arising at the development site in accordance with legislative requirements and best practice standards.

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)'. European and national waste management policy is based on the concept of 'waste hierarchy', which sets out an order of preference for managing waste (prevention > preparing for re-use > recycling > recovery > disposal) (Figure 13.1).

Figure 13.1 Waste Hierarchy (Source: European Commission)

EU and Irish National waste policy also aims to contribute to the circular economy by extracting high-quality resources from waste as much as possible. Circular Economy (CE) is a sustainable alternative to the traditional linear (take-make-dispose) economic model, reducing waste to a minimum by reusing, repairing, refurbishing and recycling existing materials and products. (Figure 12.2).

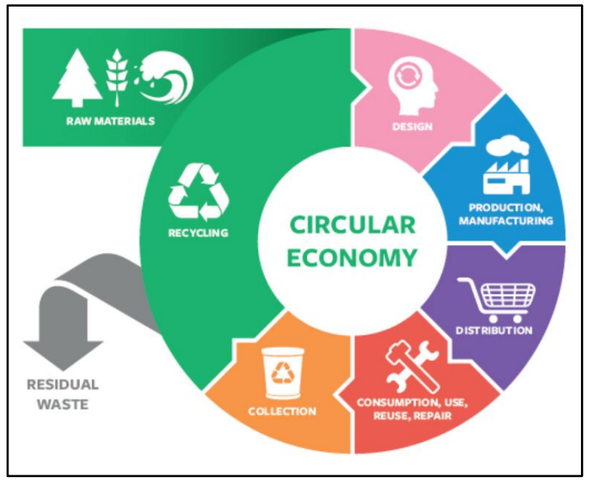


Figure 13.2 Circular Economy (Source: Repak)

The Irish Government issues policy documents which outline measures 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, 'Waste Action Plan for a Circular Economy – Waste Management Policy in Ireland' (WAPCE), was published in 2020 and shifts focus away from waste disposal and moves it back up the production chain. The move away from targeting national targets is due to Irish and international waste context changing in the years since the launch of the previous waste management plan, 'A Resource Opportunity', in 2012.

One of the first actions to be taken from the WAPCE was the development of the Whole of Government Circular Economy Strategy 2022-2023 'Living More, using Less' (2021) to set a course for Ireland to transition across all sectors and at all levels of Government toward circularity and was issued in December 2021.

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 Resource & Waste Management Plans for Construction and Demolition Projects' document, produced by the EPA in November 2021. The guidance document 'Construction and Demolition Waste Management: A Handbook for Contractors and Site Managers (FÁS & Construction Industry Federation 2002) was also consulted in the preparation of this assessment.

There is currently no Irish guidelines on the assessment of operational waste generation and guidance is taken from industry guidelines, plans, and reports including the 'EMR Waste Management Plan 2015-2021', 'BS 5906:2005 Waste Management in Building – Code of Practice', the Dún Laoghaire Rathdown County Council Segregation, Storage and Presentation of Household and Commercial Waste) Bye-laws (2019), the EPA National Waste Database Reports 1998-2019 and the EPA National Waste Statistics Web Resource.

Terminology
Note that the terminology used herein is generally consistent with the definitions set out in Article 3 of the Waste Framework Directive. Key terms are defined as follows:

Waste - Any substance or object which the holder discards or intends or is required to discard.

Prevention - Measures taken before a substance, material or product has become waste, that reduce:
a) the quantity of waste, including through the re-use of products or the extension of the life span of products;
b) the adverse impacts of the generated waste on the environment and human health; or
c) the content of harmful substances in materials and products.

Reuse - Any operation by which products or components that are not waste are used again for the same purpose for which they were conceived.

Preparing for Reuse - Checking, cleaning or repairing recovery operations, by which products or components of products that have become waste are prepared so that they can be re-used without any other pre-processing.

Treatment - Recovery or disposal operations, including preparation prior to recovery or disposal.

Recovery - Any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy. Annex II of the Waste Framework Directive sets out a non-exhaustive list of recovery operations.

Recycling - Any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations.

Disposal - Any operation which is not recovery even where the operation has as a secondary consequence the reclamation of substances or energy. Annex I sets out a non-exhaustive list of disposal operations.

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 as covered in Appendix 13.1 and 13.2.

This chapter is based on the proposed project, as described in Chapter 3 (Description of the Development) and considers the following aspects:

- Legislative context;
- Construction Phase (including excavation and site preparation); and
- Operational Phase

A desktop 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 the National Waste Reports and National Waste Statistics, data recorded from similar previous developments, Irish and US EPA waste generation research as well as other available research sources.

Mitigation measures are proposed to minimise the effect of the proposed development on the environment during the construction and operational phases, to promote efficient waste segregation, and to reduce the quantity of waste requiring disposal. This information is presented in Section 13.7.

A detailed review of the existing ground conditions on a regional, local and site-specific scale are presented in Chapter 6 (Land, Soils and Geology). Chapter 6 also discusses the environmental quality of any soils which will have to be excavated to facilitate construction of the proposed development.

13.3 RECEIVING ENVIRONMENT

In terms of waste management, the receiving environment is largely defined by Dún Laoghaire Rathdown County Council (DLRCC) 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 and the Waste Action Plan for a Circular Economy – Waste Management Policy in Ireland. Currently the EMR and other regional waste management plans are under review and the Regional Waste Management Planning Offices expect to publish the final plan in early 2022.

The EMR Waste Management Plan sets out 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 55% of managed municipal waste by 2025; 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 EMR Waste Management 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. Ireland achieved 84 per cent material recovery of such waste in 2019, and therefore surpassed the 2020 target and is currently surpassing the 2025 target. The National Waste Statistics update published by the EPA in November 2021 identifies that Ireland's current against "Preparing for reuse and recycling of 50% by weight of household derived paper, metal, plastic & glass (includes metal and plastic estimates from household WEEE)" was met for 2020 at 51% however they are currently not in line with the 2025 target (55%).

The 'Dún Laoghaire-Rathdown County Development Plan 2016 – 2022' and the 'Dún Laoghaire-Rathdown County Development Plan 2022 – 2028 (2021)' also set out policies and objectives for the DLRCC area which reflect those set out in the regional waste management plan.

In terms of physical waste infrastructure, DLRCC no longer operates any municipal waste landfill in the area. There are a number of waste permitted and licensed facilities located in the EMR region, in the surrounding counties and over Ireland and Northern Ireland for management of waste from the construction industry as well as municipal sources. These include soil recovery facilities, inert C&D waste facilities, hazardous waste treatment facilities, municipal waste landfills, material recovery facilities, waste transfer stations and two waste-to-energy facilities. However, these sites may not be available for use when required or may be limited by the waste contractor selected to service the development in the appropriate phase. In addition, there is potential for more suitably placed waste facilities or recovery facilities to become operational in the future which may be more beneficial from an environmental perspective.

The ultimate selection of waste contractors and waste facilities would be subject to appropriate selection criteria proximity, competency, capacity and serviceability.

13.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed 'Build-to-Rent' (BTR) development will consist of the construction of 8 no. blocks in heights up to 10 storeys comprising 534 residential units, a creche, a retail unit, residential support facilities and residential services and amenities.

Demolition Phase

There will be a quantity of waste materials generated from the demolition of Winterbrook, an existing dwelling and partial demolition of the modern extension dwelling to Barrington Tower, as well as from the excavation of the building foundations.

Further detail on the waste materials likely to be generated during the demolition works are presented in the project-specific RWMP in Appendix 13.1. The RWMP provides an estimate of the main waste types likely to be generated during the C&D phase of the proposed development. The reuse, recycling/recovery and disposal rates have been estimated using the EPA National Waste Reports and these are summarised in Table 13.1.

Waste Type	Tonnes	Reuse		Recycle / Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Glass	35.7	0	0.0	85	30.4	15	5.4
Concrete, Bricks, Tiles, Ceramics	202.5	30	60.8	65	131.7	5	10.1
Plasterboard	15.9	30	4.8	60	9.5	10	1.6
Asphalts	4.0	0	0.0	25	1.0	75	3.0
Metals	59.6	5	3.0	80	47.7	15	8.9
Slate	31.8	0	0.0	85	27.0	15	4.8
Timber	47.7	10	4.8	60	28.6	30	14.3
Asbestos	0.0	0	0.0	0	0.0	100	0.0
Total	**397.2**		**73.4**		**275.9**		**48,1**

Table 13.1 Estimated off-site reuse, recycle and disposal rates for demolition waste

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 arising from packaging (cardboard, plastic, timber) and oversupply of materials may also be generated. The appointed 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, topsoil, sub soil and made ground will require excavation to facilitate the proposed basement, site levelling, construction of foundations, along with the installation of underground services. The project engineers, Waterman Moylan, have estimated that 65,100m^3 of material will require excavation. It is envisaged that the majority of this material will be removed off-site, with the exception of 1,410 m^3 which will be retained and reused onsite for fill. These estimates will be refined prior to

commencement of construction. If the 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 for the receiving facility. Alternatively, the material may be classed as by-product under 'Article 27 classification (European Communities (Waste Directive) Regulations 2011, S.I. No. 126 of 2011)'.

In order to establish the appropriate reuse, recovery and/or disposal route for the soils and stones to be removed off-sit, 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 and Determining If Waste is Hazardous or Non-Hazardous'. Environmental soil analysis will be carried out prior to removal of the material on a number of the soil samples in accordance with the requirements for the acceptance of waste at landfills (Council Decision 2003/33/EC Waste Acceptance Criteria). This legislation sets limit values on landfills for acceptance of waste material based on properties of the waste including potential pollutant concentrations and leachability. It is anticipated that the surplus of material will be suitable for acceptance at either inert or non-hazardous soil recovery facilities/landfills in Ireland or, in the unlikely event of hazardous material being encountered, be transported for treatment/recovery or exported abroad for disposal in suitable facilities.

Waste will also be generated from construction phase workers e.g. organic/food waste, dry mixed recyclables (wastepaper, newspaper, plastic bottles, packaging, aluminium cans, tins, Tetra Pak cartons), mixed non-recyclables, and potentially sewage sludge from temporary welfare facilities provided on-site during the construction phases. Waste printer/toner cartridges, waste electrical and electronic equipment (WEEE) and waste batteries may also be generated infrequently from site offices.

Further details on the waste materials likely to be generated during the excavation and construction works are presented in the project-specific RWMP. The RWMP provides an estimate of the main waste types likely to be generated during the construction phase of the proposed project and these are summarized in Table 13.2.

Waste Type	Tonnes	Reuse		Recycle/Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	1405.8	10	140.6	80	1124.7	10	140.6
Timber	1192.8	40	477.1	55	656.1	5	59.6
Plasterboard	426.0	30	127.8	60	255.6	10	42.6
Metals	340.8	5	17.0	90	306.7	5	17.0
Concrete	255.6	30	76.7	65	166.1	5	12.8
Other	639.0	20	127.8	60	383.4	20	127.8
Total	4260.0		967.0		2892.6		400.4

Table 13.2 Estimated off-site reuse, recycle and disposal rates for construction waste

Operational Phase

As noted in Section 13.1, and OWMP has been prepared for the proposed project and is included in Appendix 13.2. The OWMP provides a strategy for segregation (at source), storage and collection of all wastes generated within the development during the operation phase, including dry mixed recyclables, organic waste and mixed non-recyclable waste as well as providing a strategy for the management of waste glass, batteries, WEEE, printer/toner cartridges, chemicals, textiles, waste cooking oil and furniture.

The total estimated waste generation for the proposed project for the main waste types based on the AWN Waste Generation Model (WGM) is presented in Tables 13.3 and 13.4, below, and is based on the uses and areas as advised by the project architects (Reddy Architecture and Urbanism).

Waste Type	m^3 per week				
	Block AB (Combined)	Block CD (Combined)	Block E (Combined)	Block F (Combined)	Block G (Combined)
Organic Waste	0.67	0.54	1.13	1.57	1.31
DMR	4.75	3.67	8.00	11.14	9.30
Glass	0.13	0.10	0.22	0.30	0.25
MNR	2.50	2.13	4.21	5.86	4.89
Total	**8.05**	**6.44**	**13.56**	**18.87**	**15.75**

Table 13.3 Estimated waste generation for the development for the main waste types

Waste Type	m^3 per week				
	Block H (Combined)	Block I (Combined)	Block J (Combined)	Retail Unit (Block CD)	Crèche Unit (Block CD)
Organic Waste	1.36	0.72	0.95	0.11	0.03
DMR	9.63	5.13	6.76	2.10	1.23
Glass	0.26	0.14	0.18	0.06	<0.01
MNR	5.07	2.70	3.56	0.88	0.67
Total	**16.32**	**8.69**	**11.45**	**3.15**	**1.94**

Table 13.4 Estimated waste generation for the development for the main waste types

The residents, commercial tenants will be required to provide and maintain appropriate waste receptacles within their units to facilitate segregation at source of these waste types. The location of bins within the units will be at the discretion of the residents, tenants and hotel operator. As required, the residents, tenants and hotel operator will need to bring these segregated wastes from their units to their allocated Waste Storage Areas (WSAs).

The OWMP seeks to ensure the proposed project contributes to the targets outlined in the 'EMR Waste Management Plan 2015-2021' and the DLRCC Waste Bye-Laws (2019)'.

Mitigation measures proposed to manage impacts arising from wastes generated during the operational phase of the development are summarised below.

13.5 POTENTIAL IMPACTS

Construction Phase
The proposed development will generate a range of non-hazardous and hazardous waste materials during site excavation and construction. General housekeeping and packaging will also generate waste materials, as well as typical municipal wastes generated by construction employees, including food waste. Waste materials will be required to be temporarily stored on-site pending collection by a waste contractor. If waste material is not managed and stored correctly, it is likely to lead to litter or pollution issues at the development site and in adjacent areas. The indirect effect of litter issues is the presence of vermin in areas affected. In the absence of mitigation, the effect on the local and regional environment is likely to be ***short-term, significant*** and ***negative.***

The use of non-permitted waste contractors or unauthorized waste facilities could give rise to inappropriate management of waste, resulting in indirect negative environmental impacts, including 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. In the absence of mitigation, the effect on the local and regional environment is likely to be ***long-term, significant*** and ***negative***.

Wastes arising will need to be taken to suitably registered/permitted/licensed waste facilities for processing and segregation, reuse, recycling, recovery, and/or disposal, as appropriate. There are numerous licensed waste facilities in the EMR which can accept hazardous and non-hazardous waste materials, and acceptance of waste from the development site would be in line with the daily activities at these facilities. At present, there is sufficient capacity for the acceptance of the likely C&D waste arisings at facilities in the region. The majority of construction materials are either recyclable or recoverable. However, in the absence of mitigation, the effect on the local and regional environment is likely to be **short-term, significant** and **negative**.

There is a quantity of excavated material which will need to be excavated to facilitate the proposed Project. A detailed review of the existing ground conditions on a regional, local site-specific scale are presented in Chapter 6. The project engineers have estimated that most of the c. 65,100m^3 of excavated material, with the exception of c. 1,410 m^3 which will be retained and reused onsite for fill, 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. However, in the absence of mitigation, the effect on the local and regional environment is likely to be ***short-term, significant*** and ***negative***.

Operational Phase
The potential impacts on the environment of improper, or a lack of, waste management during the operational phase would be a diversion from the priorities of the waste hierarchy which would lead to small volumes of waste being sent unnecessarily to landfill. In the absence of mitigation, the effect on the local and regional environment is likely to be ***long-term, significant*** and ***negative***.

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

If waste material is not managed and stored correctly, it is likely to lead to litter or pollution issues at the development site and in adjacent areas. The knock-on effect of litter issues is the presence of vermin in affected areas. However, in the absence of mitigation, the effect on the local and regional environment is likely to be ***long-term, significant*** and ***negative.***
Waste contractors will be required to service the proposed 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.. However, in the absence of mitigation, the effect on the local and regional environment is likely to be ***long-term, significant*** and ***negative.***

13.6 POTENTIAL CUMULATIVE IMPACTS

As has been identified in the receiving environment section all cumulative developments that are already built and in operation contribute to our characterisation of the baseline environment. As such any further environmental impacts that the proposed development may have in addition to these already constructed and operational cumulative developments has been assessed in the preceding sections of this chapter.

Construction Phase
There are existing residential and commercial developments close by, along with the multiple permissions remaining in place in the area. In a worst-case scenario, multiple developments in the area could be developed concurrently or overlap in the construction phase.
Developments that potentially could overlap during the construction phase of note:

- *Brennanstown Wood Residential Development*
  ABP reference: *ABP-301614*
  Decision: *Granted 31st August 2018*
  Viscount Securities were granted planning permission for a strategic housing development at Brennanstown Road, Dublin 18 for 136 number residential units, comprising of 98 number apartments and 38 number houses. A 195 square metre creche facility and play area is proposed on the lower ground
  floor of Block 1. The development includes 227 number car parking spaces at basement / lower ground floor and surface level.

- *Doyle's Nursery*
  ABP reference: *ABP-305859-20*
  Decision: *Granted 25th June 2020*
  Atlas GP limited were granted planning permission for the Demolition of 'Benoni' and extant single storage buildings, construction of 234 no. apartments, creche and associated site works.

Due to the high number of waste contractors in the Dublin region there would be sufficient contractors available to handle waste generated from a large number of these sites simultaneously, if required. Similar waste materials would be generated by all the developments.

Other developments in the area will be required to manage waste in compliance with national, regional and local legislation, policies and guidance which will mitigate against any potential cumulative effects associated with waste generation and waste management. As such the effect will be **short-term, not significant and neutral**.

Operational Phase

There are existing residential and commercial developments close by, along with the multiple permissions remaining in place. All of the current and potential developments will generate similar waste types during their operational phases. Authorised waste contractors will be required to collect waste materials segregated, at a minimum, into recyclables, organic waste and non-recyclables. An increased density of development in the area is likely improve the efficiencies of waste collections in the area.

Other developments in the area will be required to manage waste in compliance with national and local legislation, policies and plans which will minimise/mitigate any potential cumulative impacts associated with waste generation and waste management. As such the effect will be a **long-term, imperceptible** and **neutral**.

13.7 MITIGATION MEASURES

This section outlines the measures that will be employed in order to reduce the amount of waste produced, manage the waste generated responsibly and handle the waste in such a manner as to minimise the effects on the environment.

Construction Phase

The following mitigation measures will be implemented during the construction phase of the proposed development:

As previously stated, a project specific RWMP has been prepared in line with the requirements of the 'Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects' (EPA 2021) and is included as Appendix 13.1. The mitigation measures in the RWMP will be implemented in full and form part of mitigation strategy for the site. Adherence to the high-level strategy and the mitigation measures presented in this RWMP will ensure effective waste management and minimisation, reuse, recycling, recovery and disposal of waste material generated during the excavation and construction phases of the proposed development.

- Prior to commencement, the appointed contractor(s) will be required to refine/update the RWMP (Appendix 13.1) in agreement with DLRCC, detailing specific measures to minimise waste generation and resource consumption, and provide details of the proposed waste contractors and destinations of each waste stream.
- The contractor will be required to fully implement the RWMP throughout the duration of the proposed construction phase.

A quantity of topsoil, sub soil, clay and made ground will need to be excavated to facilitate the proposed development. The project engineers have estimated that most of the c. 65,100m^3 of excavated material, with the exception of c. 1,410 m^3 which will be retained and reused onsite for fill, will need to be removed off-site. Correct classification and segregation of the excavated 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.

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. 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 Resource Manager (RM) 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 suitably 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.
- Nearby sites requiring clean fill material will be contacted to investigate reuse opportunities for clean and inert material, if required. If any of the material is to be reused on another site as by-product (and not as a waste), this will be done in accordance with Article 27 of the EC (Waste Directive) Regulations (2011). EPA approval should be obtained prior to moving material as a by-product. However, it is not currently anticipated that Article 27 will be used.

These mitigation measures will ensure that the waste arising from the construction phase of the proposed development is dealt with in compliance with the provisions of the Waste Management Act 1996 as amended, associated regulations and the Litter Pollution Act 1997 and the 'EMR Waste Management Plan 2015-2021'. It will ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved and will promote more sustainable consumption of resources.

Operational Phase

As previously stated, a project specific OWMP has been prepared and is included in Appendix 13.2. The mitigation measures outlined in the OWMP will be implemented in full and form part of mitigation strategy for the site.

- The Operator/Facilities Management of the site during the operational phases will be responsible for ensuring – allocating personnel and resources as needed – the ongoing implementation of

this OWMP, ensuring a high level of recycling, reuse and recovery at the site of the proposed development.

In addition, the following mitigation measures will be implemented:

- The Operator/Facilities Management will ensure on-Site segregation of all waste materials into appropriate categories, including (but not limited to):
  - Organic waste;
  - Dry Mixed Recyclables;
  - Mixed Non-Recyclable Waste;
  - Glass;
  - Waste electrical and electronic equipment (WEEE);
  - Batteries (non-hazardous and hazardous);
  - Cooking oil;
  - Light bulbs;
  - Cleaning chemicals (pesticides, paints, adhesives, resins, detergents, etc.);
  - Furniture (and from time-to-time other bulky waste); and
  - Abandoned bicycles
- The Operator/Facilities Management will ensure that 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;
- The Operator/Facilities Management will ensure that all waste collected from the site of the proposed development will be reused, recycled, or recovered, where possible, with the exception of those waste streams where appropriate facilities are currently not available; and
- The Operator/Facilities Management will ensure that all waste leaving the site will be transported by suitable permitted contractors and taken to suitably registered, permitted, or licensed facilities.

These mitigation measures will ensure the waste arising from the proposed Development during the operational phase is dealt with in compliance with the provisions of the Waste Management Act 1996 as amended, associated regulations, the Litter Pollution Act 1997, the EMR Waste Management Plan 2015 – 2021 and the DLRCC waste bye-laws. 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 the high rate of reuse, recovery and recycling is achieved at the development during the excavation and construction phases as well as during the operational phase. It will also ensure that European, National and Regional legislative waste requirements with regard to waste are met and that associated targets for the management of waste are achieved.

Construction Phase
A carefully planned approach to waste management as set out in Section 13.7 and adherence to the RWMP (which include mitigation) during the construction phase will ensure that the effect on the environment will be ***short-term, imperceptible*** and ***neutral***.

Operational Phase
During the operational phase, a structured approach to waste management as set out in Section 13.7 and adherence to the OWMP (which include mitigation) 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 effect of the operational phase on the environment will be long-term, imperceptible and neutral.

13.9 'DO NOTHING' SCENARIO

If the proposed development was not to go ahead (i.e. in the Do-Nothing scenario) there would be no excavation or construction or operational waste generated at this site. There would, therefore, be a neutral effect on the environment in terms of waste.

13.10 WORST CASE SCENARIO

If the RWMP, OWMP and mitigation measures provided in this chapter are not implemented and the waste materials are not dealt with in accordance with regional and national legislation. Then in the absence of this mitigation, the effect on the local and regional environment is likely to be **long-term, significant** and **negative.**

13.11 MONITORING & REINSTATEMENT

The management of waste during the construction phase should be monitored to ensure compliance with relevant local authority requirements, and effective implementation of the RWMP including maintenance of waste documentation. The management of waste during the operational phase should be monitored to ensure effective implementation of the OWMP by the facilities management company and the nominated waste contractor(s).

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 excavation and construction phases where there is a potential for waste management to become secondary to progress and meeting construction schedule targets. The mitigation measures in the RWMP specifies the need for a waste manager to be appointed who will have responsibility to monitor the actual waste volumes being generated and to ensure that contractors and sub-contractors are segregating waste as required. Where targets are not being met, the waste manager should identify the reasons for targets not being achieved and work to resolve any issues. Recording of waste generation during the project will enable better management of waste contractor requirements and identify trends. The data should be maintained to advise on future projects.

Operational Phase
During the operational phase, waste generation volumes should be monitored against the predicted waste volumes outlined in the OWMP. There may be opportunities to reduce the number of bins and equipment required in the WSAs where estimates have been too conservative. Reductions in bin and equipment requirements will improve efficiency and reduce waste contractor costs.

13.12 DIFFICULTIES IN COMPILING INFORMATION

Until final materials and detailed construction methodologies have been confirmed, it is difficult to predict with a high level of accuracy the construction waste that will be generated from the proposed works as the exact materials and quantities may be subject to some degree of change and variation during the construction process.

There is a number of licensed, permitted and registered waste facilities in the Dublin region and in surrounding counties. However, these sites may not be available for use when required or may be limited by the waste contractor selected to service the development in the appropriate phase.

In addition, there is potential for more suitably placed waste facilities or recovery facilities to become operational in the future which may be more beneficial from an environmental perspective. The ultimate selection of waste contractors and waste facilities would be subject to appropriate selection criteria proximity, competency, capacity and serviceability.

13.13 CONCLUSION

This chapter has reviewed and analysed the potential and the predicted the impact of the Proposed Development with regards to waste management. These impacts have been considered for both the construction and operational phases of the Proposed Development. The cumulative impact of the Proposed Development and surrounding developments have also been considered.

Provided all mitigation measures as set out in this chapter and the attached RWMP and OWMP are implemented, the overall predicted impact of the proposed development is **long-term, imperceptible and neutral.**

13.14 REFERENCES

- Waste Management Act 1996 - 2021 as amended.
- Environmental Protection Agency Act 1992 (Act No. 7 of 1992) as amended.
- Litter Pollution Act 1997 (S.I. No. 12 of 1997) as amended.
- Eastern-Midlands Region Waste Management Plan 2015 – 2021 (2015).
- Department of Environment and Local Government (DoELG) Waste Management – Changing Our Ways, A Policy Statement (1998).
- Forum for the Construction Industry – Recycling of Construction and Demolition Waste.
- Department of Environment, Communities and Local Government (DoECLG), A Resource Opportunity - Waste Management Policy in Ireland (2012).
- Environmental Protection Agency (EPA) of Ireland, Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects (November 2021).
- Department of Environment, Heritage and Local Government (DEHLG) (2020). Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities.
- Environmental Protection Agency (EPA) 'Best Practice Guidelines for the Preparation of Resource Management Plans for Construction & Demolition Projects' (2021)
- FÁS and the Construction Industry Federation (CIF), Construction and Demolition Waste Management – a handbook for Contractors and Site Managers (2002).
- DLRCC, Dún Laoghaire Rathdown County Council Development Plan 2016 – 2022.
- DLRCC, Dún Laoghaire Rathdown County Council Development Plan 2022 – 2028.
- Planning and Development Act 2000 (S.I. No. 30 of 2000) as amended.
- EPA, Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous (2015).
- Council Decision 2003/33/EC, establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC.
- Environmental Protection Agency (EPA), National Waste Database Reports 1998 – 2012.
- EPA and Galway-Mayo Institute of Technology (GMIT), EPA Research Report 146 – A Review of Design and Construction Waste Management Practices in Selected Case Studies –Lessons Learned (2015).
- BS 5906:2005 Waste Management in Buildings – Code of Practice.
- DoEHLG, Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities (2018).
- Dún Laoghaire Rathdown County Council (DLRCC), Dún Laoghaire Rathdown County Council Segregation, Storage and Presentation of Household and Commercial Waste) Bye-laws (2019).
- Department of Housing, Planning & Local Government, Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (2018).
- European Commission, Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (2017).
- EPA, Guidelines on the Information to be Contained in Environmental Impact Assessment Reports – Draft (2017).
- Department of Communications, Climate Action and Environment (DCCAE), Waste Action Plan for the Circular Economy - Ireland's National Waste Policy 2020-2025 (Sept 2020).

14 CULTURAL HERITAGE – ARCHAEOLOGY

14.1 INTRODUCTION

IAC Archaeology has prepared this chapter in order to assess the impact, if any, on the archaeological and cultural heritage resource of a proposed development located at Barrington's Tower, Brennanstown Road, Carrickmines, Dublin 18 (I.T.M. 722591,724229, Figure 14.1). The assessment has been undertaken by Faith Bailey and Jacqui Anderson of IAC Archaeology.

Faith is an Associate Director and Senior Archaeologist and Cultural Heritage Consultant with IAC Archaeology. She holds an MA in Cultural Landscape Management (archaeology and built heritage) and a BA in single honours archaeology from the University of Wales, Lampeter. She is a licence eligible archaeologist, a member of the Chartered Institute of for Archaeologists, a member of the Institute of Archaeologists of Ireland and has over 18 years' experience working in the commercial archaeological and cultural heritage sector. Jacqui works as an Archaeological Consultant with IAC Archaeology. She holds an MA in Archaeology from University College Dublin and a BA in Archaeology and Classical Studies also from University College Dublin. She is a member of the Institute of Archaeologists of Ireland and has seven years' experience in the commercial archaeological sector in Ireland. Jacqui specialises in the production of archaeological assessments and EIAR across all sectors of development.

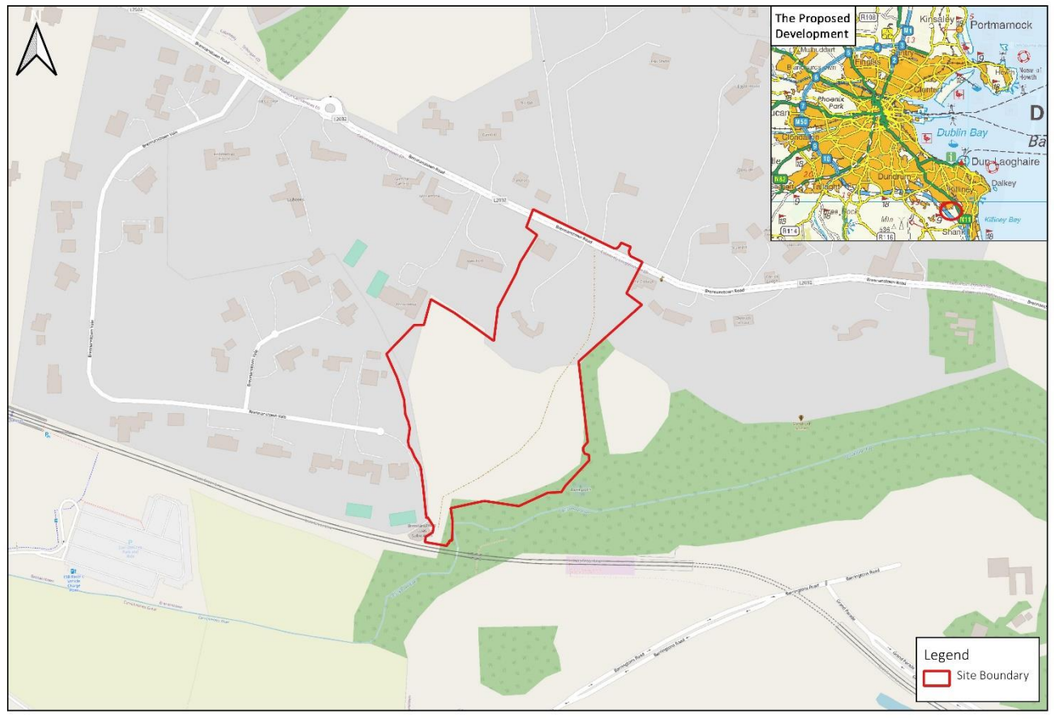


Figure 14.1 Location of the proposed development area

14.2 CONSULTATION

The following legislation, standards and guidelines were consulted as part of the assessment.

- National Monuments Acts, 1930–2014;
- Planning and Development Act (as amended);
- Heritage Act, 1995;
- Environmental Protection Agency (EPA) 2015 Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) (Draft Sept. 2015). Dublin, Government Publications Office;
- Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EIAR) (EPA 2017). Dublin: Government Publications Office;
- Guidelines on the Information to be Contained in Environmental Impact Statements, (EPA, 2002);
- Advice notes on Current Practice in the Preparation of Environmental Impact Statements, (EPA, 2003);
  Environmental Impact Assessment of Projects- Guidance on the Preparation of the Environmental Impact Assessment Report (European Commission, 2017)
- Frameworks and Principles for the Protection of the Archaeological Heritage, 1999, (formerly) Department of Arts, Heritage, Gaeltacht and Islands; and
- Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act,2000 and the Local Government (Planning and Development) Act 2000

14.3 METHODOLOGY

Research for this report was undertaken in three 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. A third phase comprised geophysical survey and subsequent targeted archaeological test trenching.

Desktop Resources

The following resources were consulted as part of the desk-based assessment of the proposed development area;

- 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;
- Dun Laoghaire-Rathdown County Development Plan 2022–2028;
- Aerial photographs;
- Excavations Bulletin (1970–2021).

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 Housing, Local Government and Heritage (DoHLGH) – www.archaeology.ie.

National Monuments in State Care Database is a list of all the National Monuments in State guardianship or ownership. Each is assigned a National Monument number whether in guardianship or ownership and has a brief description of the remains of each Monument. The Minister for the DoHLGH may acquire national monuments by agreement or by compulsory order. The state or local authority may assume guardianship of any national monument (other than dwellings). The owners of national monuments (other than dwellings) may also appoint the Minister or the local authority as guardian of that monument if the state or local authority agrees. Once the site is in ownership or guardianship of the state, it may not be interfered with without the written consent of the Minister.

Preservation Orders List contains information on Preservation Orders and/or Temporary Preservation Orders, which have been assigned to a site or sites. Sites deemed to be in danger of injury or destruction can be allocated Preservation Orders under the 1930 Act. Preservation Orders make any interference with the site illegal. Temporary Preservation Orders can be attached under the 1954 Act. These perform the same function as a Preservation Order but have a time limit of six months, after which the situation must be reviewed. Work may only be undertaken on or in the vicinity of sites under Preservation Orders with the written consent, and at the discretion, of the Minister.

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

Cartographic sources are important in tracing land use development within the development area as well as providing important topographical information on areas of archaeological potential and the development of buildings. Cartographic analysis of all relevant maps has been made to identify any topographical anomalies or structures that no longer remain within the landscape. The following historic maps were consulted as part of this assessment;

- Sir William Petty, Down Survey Map, 1654–56, Barony of Rathdown
- John Rocque's Exact survey of Dublin County, 1760
- John Taylor's Map of the Environs of Dublin, 1816
- Ordnance Survey maps of County Dublin (1837-1940)

Documentary sources were consulted to gain background information on the archaeological, architectural and cultural heritage landscape of the proposed development area. A full list of references used is included in Section 14.4.

Development Plans contain a catalogue of all the Protected Structures and archaeological sites within the county. The Dun Laoghaire-Rathdown County Development Plan (2022-2028) 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 (1995–2013), Google Earth (2005–2021).

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 1970–2021.

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.

Geophysical Survey

Geophysical survey is used to create 'maps' of subsurface archaeological features. Features are the non-portable part of the archaeological record, whether standing structures or traces of human activities left in the soil. Geophysical instruments can detect buried features when their electrical or magnetic properties contrast measurably with their surroundings. In some cases, individual artefacts, especially metal, may be detected as well. Readings, which are taken in a systematic pattern, become a dataset that can be rendered as image maps. Survey results can be used to guide excavation and to give archaeologists insight into the pattern of non-excavated parts of the site. Unlike other archaeological methods, the geophysical survey is not invasive or destructive.

A geophysical survey was undertaken to inform this assessment in May 2017 within the proposed development in Brenanstown townland (Leigh 2017, Licence 17R0025). A summary of the geophysical report is presented in Section 14.4.8 and the full text included in Appendix 14.1.

Archaeological Testing

Archaeological Test Trenching can be defined as 'a limited programme... of intrusive fieldwork which determines the presence or absence of archaeological features, structures, deposits, artefacts or ecofacts within a specified area or site on land or underwater. If such archaeological remains are present test trenching defines their character and extent and relative quality' (CIfA 2014a, 4). A program of archaeological testing based on the results of the geophysical survey was carried out within the proposed development area in 2018. This was undertaken by David McIlreavy of IAC under licence 17E0181. Detailed results of the archaeological testing are included in Section 14.4.9 and Appendix 14.2 of this report.

Significance of Effects

Imperceptible	An effect capable of measurement but without noticeable consequences.
Not significant	An effect which causes noticeable changes in the character of the environment but without noticeable consequences.
Slight Effects	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate Effects	An effect that alters the character of the environment in a manner that is consistent with existing and emerging trends.
Significant Effects	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters the majority of a sensitive aspect of the environment.
Profound Effects	An effect which obliterates sensitive characteristics.

Impacts as defined by the Draft EPA 2017 Guidelines (pg. 42).

14.4 RECEIVING ENVIRONMENT

Archaeological and Historical Background

The proposed development area is located in Brenanstown townland, in the Parish of Tully and Barony of Rathdown. The site is bordered by Brenanstown Road to the north, by the Carrickmines Stream and the Luas line to the south and by residential properties to the east and west. The land slopes to the south with far-reaching views toward the peak of Ballycorous. To the south of the site, the ground slopes steeply into the valley of the Carrickmines River.

There are a total of six recorded monuments located within 500m of the proposed development area (Figure 14.2). The closest of these are Brenanstown Portal Tomb (DU026-007) and the mill/enclosure site (DU026-080001-2). The Brenanstown Portal Tomb is also designated as a National Monument in State Guardianship (Nat. Mon. 291).

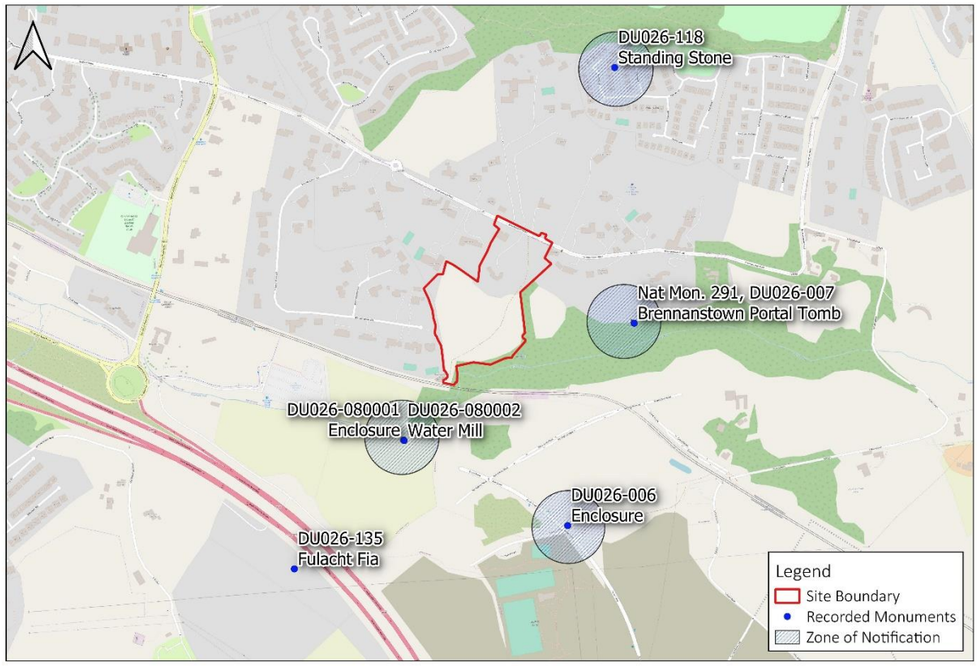


Figure 14.2 Recorded archaeological sites within 500m of the proposed development area

Prehistoric Period (c. 5000– AD 400)

Located in the lowlands of the eastern seaboard, at the foot of the Wicklow Mountains, this area would have been highly attractive for settlement during the prehistoric period. Although Mesolithic stone tools have been recorded from the surrounding lands the first conclusive evidence for continued settlement dates from the Neolithic period (c. 4000–2500 BC) onwards. This is corroborated in the archaeological record by the presence of significant upstanding prehistoric monuments. The most common type of megalithic tomb within the Rathdown area is the portal tomb (Corlett 1999, 17); such as the Brenanstown Portal Tomb (DU026-007 Nat. Mon. 291), 190m east of the proposed development area. other megalithic tombs are also known from the wider area, for example the Laughanstown Wedge Tomb (DU026-024, Nat. Mon. 215), 1.4km south. Further evidence for intensive settlement of this area during the Neolithic and Bronze Age periods has been provided during excavations in advance of the South Eastern Motorway and the Luas line.

Emergency excavation was carried out of four pit burials within a penannular enclosure containing urns, a cremation deposit, and a pit containing a token burnt bone deposit, c. 425m southwest of the proposed development area, indicating further prehistoric funerary activity in the area (Licence 18E0650, Bennett 2018:368). A standing stone (DU026-118) is recorded c. 350m northeast of the proposed development

area. Although standing stones are a monument type can be enigmatic, this particular standing stone was subject to archaeological excavation and confirmed to be prehistoric in date. Two fragments of cremated bone were recovered from the site, indicating that the stone may have marked the site of a token burial. The stone itself is granite and was set within a pit, supported by packing stones (Licence 93E0164, Bennett 1993:044).

Settlement evidence dating to the prehistoric period is also known from the immediate vicinity of the proposed development area. Evidence for a probable late Neolithic/ early Bronze Age settlement, was excavated in advance of the Luas line in the townlands of Carrickmines Little, Brenanstown, Laughanstown (Bennett 2006:570, 2007:544, Licence 06E0214, 07E0095). Archaeological excavation of a late Neolithic or early Bronze Age cluster of pits and lithic artefacts in Brennanstown, possibly represents a settlement site, c. 335m southeast. In addition, works at the Luas Park and Ride facility revealed a posthole and two prehistoric finds (licence 05E0010, Cryerhall 2005).

Burnt mounds or fulachatí fia are among the most commonly discovered evidence for Bronze Age settlement, although they have in some cases been proven to date to earlier or later periods. A fulacht fia (DU026-135) was excavated c. 455m southwest of the proposed development area as part of works during the construction a gas pipeline (Licence 98E0455). A large deposit of burnt material was noted, above a pit feature. A fragment of struck flint was also recovered (Bennett 1998:125).

Further evidence of burnt mounds in the landscape of the proposed development area was discovered during the construction of the South Eastern motorway, now the M50. A large Bronze Age flint-knapping site was also noted during works prior to the M50 (Licence 02E0700). Over 1400 pieces of struck or worked flint were recovered from the site (Bennett 2002:0484).

Early Medieval Period (AD400–1100)

During this period powerful ecclesiastic and secular settlements expanded and a mosaic of kingdoms formed across the country. The Mac Turcaill dynasty controlled large tracts of land at this time, including lands in Uí Briúin Cualann stretching south from Tully to the Dargle River in Bray (Murphy and Potterton 2010, 88). It was at this time that important ecclesiastical centres were being founded across the country, including that at Laughanstown known as Tulach na nEpscop (Tully) or 'Hillock of the Bishops' (ibid. 67). Tully Church, graveyard, crosses and ecclesiastical enclosure (DU026-023001–19, Nat. Mon. 225), located 1km southeast of the development area, are situated on a natural prominence overlooking the coastal plains. The church at Tully was dedicated to St. Brigid. It has been suggested by Corlett (2013) that the church may have been founded in the 8th century when the Uí Briúin Chualann came under the influence of the Uí Dúnlainge. The church gained much power and appears to have been the pre-eminent Bishopric of the Uí Briúin Cualann territory. Given its significance, Murphy and Potterton (2010, 67) suggest that following the establishment of the Viking longphort settlement in Dublin by AD 841 episcopal functions may have transferred to Tully. The distribution of Rathdown slabs, including those at Tully Church, within this wider region appear to indicate additional evidence for the spread of Scandinavian settlement activity.

Two early medieval cemeteries and settlements, pre-dating Tully Church with origins in the late 5th or 6th centuries, were identified and excavated c. 1.8km southeast of the proposed development area at Cherrywood (O'Neill 2006 and O'Neill and Coughlan 2010, Licence 99E0523) and c. 1km east at Loughlinstown/ Cabinteely (DU026-119). It would appear that the Hiberno-Norse settlement and burial ground at Cherrywood was abandoned around the 8th century, probably due to the shift in the Church law at this time to regularise burial within church lands. Archaeological evidence seems to indicate that the hinterlands of Dublin would have contained ethnically mixed settlement (Murphy and Potterton 2010, 71).

Towards the end of this period secular power changes in Dublin led to the founding of Christ Church around AD 1030. Tully Church (DU026-023) and the Manor of Clonkeen were among the lands granted to the newly founded church by Sitric Mac Thorcaill, the ruling Viking leader (Corlett 2013).

An enclosure (DU026-006) is depicted c. 335m south of the proposed development area on the first edition OS map of 1837. Many sites recorded as enclosures may represent ringforts or similar early medieval settlement features. They may also represent prehistoric features or simple enclosures such as animal pens. It is difficult to establish the date of such features and no evidence of this enclosure has been discovered during the previous archaeological works associated with the Phase 1 Infrastructure (Licence 15E0471) or Beckett Park works (Licence 15E0472). Furthermore, no evidence of the feature was identified during the 2015 geophysical survey (Nicholls 2015, Licence 15R0070), or during testing in 2020.

Medieval Period (AD1100–1600)

The arrival of the Anglo-Normans and associated social upheaval led to the significant changes in land ownership and settlement. In 1179 Tully Church was granted to the Augustinian Priory of the Holy Trinity by Archbishop Lorcán Ua Tuathail/ Sir Laurance O'Toole (ibid.). It is likely that a medieval manor was established close to the church at an early stage, which may have been replaced by Laughanstown Castle (DU026-093); later constructed by a tenant to defend The Pale. The boundary line of the Pale was located within the immediate vicinity of the development lands and would have been lined by defensive tower houses and fortified houses. The largest of these include that at Carrickmines held by the Walsh family. This family appear to have controlled the nearby thriving port of Dalkey at this time (Murphy and Potterton 2010, 164) indicating the power and affluence of the secular land holders in the area. The Walshes are credited with constructing Pale boundary defences between their castles at Carrickmines and Kilgobbin close to the Wicklow Mountains. Tully graveyard became the ancestral burial ground of the Walshes from at least the 18th century onwards (Corlett 2013).

A number of semi-militant tenants had been settled in these lands to protect the southern barriers of the Pale (Swan 1998, 165). Castles was constructed at nearby Carrickmines (DU026-005005), Laughanstown (DU026-093) and Loughlinstown (DU026-029001).

The northern half of the site contains the Protected Structure Barrington's Tower (RPS 1729), which is adjoined to an abandoned 1950s house. The folly was constructed in the second decade of the 19th century and at the time of construction of the tower (1810), it was noted by D'Alton that the site of a former castle was nearby. He describes 'a lofty pleasure turret erected near its (the castle's) former site by Mr Barrington, deceives the traveller'. Any unrecorded castle site in the vicinity of the proposed development area is likely to have been associated with the marcher family of the Walshes. There is currently no archaeological evidence of a medieval castle at this location. It is possible that it may be located within the immediate vicinity of the existing tower or within the surrounding environs.

Post-Medieval Period (AD1600-1900)

A significant 18th century military camp (DU026-127) was established in Laughanstown and Cherrywood townlands as a result of the Napoleonic threat, c. 1.3km southeast of the proposed development area. John Ferrars (1796) depicted two uniform lines of tents/huts east of Tully church and west of the Shanganagh River and village of Loughlinstown. Following the closure of the camp the land was returned to agricultural use and all trace of the former buildings removed. The zone of archaeological potential (ZAP) for the camp covers a large area however, it is believed that features associated with the military camp may extend outside of this area. Numerous programmes of investigation have indicated that the camp was heavily truncated and disturbed following closure, by centuries of agricultural activity and the construction of the railway. Military buttons, musket shot, clay pipe, glass bottles, tokens and a range of 18th century artefacts have been retrieved from the topsoil and plough zone as far distant as the footprint of the M50 suggesting that the surrounding fields were used for the practice of tactical manoeuvres.

The Civil Survey (1654-6) records a corn mill and tuck mill 150m south of the proposed development area along the Carrickmines Stream (Simington 1945). The site is a recorded monument: water mill (DU026-080002). The OS letters of 1837 depict enclosures in close proximity to the site of the mill (DU026-080001). These are of unclear date and are not visible at ground level today. Furthermore, no evidence of the mill or enclosure were discovered during geophysical survey and subsequent archaeological testing (Licence 18R0197, Nicholls 2018, Licence 18E0650, Kavanagh and Tobin 2019.)

The 18th century was characterised by a rise in development of parklands and demesne landscapes. Significant demesnes located in the wider area include Loughlinstown to the east and Brennanstown and Cabinteely further to the north, however many smaller parklands are shown on the first edition 6-inch OS mapping, such as that at Glendruid, to the immediate east of the proposed development area. The former Glendruid House Demesne, as depicted in the first edition OS map of 1837 is located to the immediate east of the proposed development area. Today, the riverbanks of the Cabinteely Stream are largely obscured by heavy vegetation, although during the use of the demesne the watercourse would have formed a key part of the parkland landscape, with the second edition OS map of 1871 showing footbridges and pathways within the demesne. The principal building, Glendruid House survives as does a gate lodge and the original entrance. Furthermore, a mausoleum was erected within the demesne by the Barrington family in 1847, and is located north of the river, immediately east of the proposed development area. John Barrington also erected a folly in 1810 known as 'Barrington's Tower' (RPS 1729, NIAH 60260220), which is located within the proposed development area and a cultural heritage site.

Summary of Previous Archaeological Fieldwork

A review of the Excavations Bulletin (1970-2021) and the available excavation reports indicated that a large number of previous archaeological investigations have taken place to date within the 500m study area of the proposed development area. These are summarised below in Table 14.1.

LICENCE NO.	REFERENCE	DETAILS	DISTANCE FROM DEVELOPMENT
20E0511	Ní Cheallacháin 2020	Archaeological testing has been carried out to the immediate north of the site but nothing of archaeological significance was identified.	Immediately north
15E0471	2018:073	Six archaeological areas were identified during an excavation for Phase 1 of the Cherrywood Strategic Development Zone. A Bronze Age burnt mound, a possible prehistoric structure and associated features, a possible token cremation burial pit, and an area of probable industrial activity with a kiln were identified.	c. 270m south
15E0472	2017:336	Monitoring for a development did not identify anything of archaeological significance.	c. 330m southeast
06E0214, 07E0095	2006:570 2007:544	Testing, monitoring, and excavation along the footprint of the Luas B1 and compound area. Excavation of a late Neolithic or early Bronze Age cluster of pits and lithic artefacts in Brenanstown.	c. 335m southeast
93E0164	1993:044	Excavation around standing stone DU026-118. Two small fragments of cremated human bone were noted. The stone was confirmed to be set within a pit and supported by packings stones.	c. 350m northeast
05E0010	Cryerhall 2005	Testing at the site of the Park and Ride for the Luas B1 at the Carrickmines stop revealed a posthole and two prehistoric finds.	c. 405m southwest
15E0471	2018:381	Monitoring during Phase 1 of the Cherrywood Strategic Development Zone did not identify any archaeological remains within the study area.	c. 420m southeast
18E0650	2018:368	Testing revealed seven previously unrecorded areas of archaeological significance, which have been designated as Archaeological Areas 1–7. These comprise a probable Bronze Age penannular ditch enclosing at least four cremation pit burials and two pits (AA1), two single pits (AA2 and AA3) and four areas containing disturbed spreads of burnt mound material (AA4–7). Emergency excavation was carried out of four pit burials within a penannular enclosure (AA1) containing urns, a cremation deposit, and a pit containing a token burnt bone deposit.	c. 425m southwest
00E0098	2000:0217	Site 19, identified during monitoring of the route of the M50, comprised a post-medieval ridge and furrow field system.	c. 435m southwest
07E1003	2007:438	Monitoring of the widening of the Glenamuck Road did not identify any archaeological features.	c. 450m west
01E1229	Conboy 2005	Monitoring of topsoil stripping in advance of the M50 identified a fulacht fia at Site 56, two possible pits at Site 58M, pit and post holes at Site 59M-62M, a hearth and two pits at Site 63M, and a possible pit feature at Site 64M.	c. 450-490m southwest
98E0445	1998:125	The construction of the Carrickmines-Bray Bord Gáis Éireann pipeline identified a number of sites, one of which were located within the study area, fulacht fia (DU026-135).	c. 455m southwest
02E0700	2002:0484	Site 63, identified during monitoring of the route of the M50, identified a Bronze Age flint-knapping site. Over 1400 pieces of struck or worked flint were recovered.	c. 465m southwest
02E0117	2002:0485	Site 64, identified during monitoring of the route of the M50, proved to be a non-archaeological tree hollow.	c. 485m southwest
02E0428	2002:0480	Site 56, identified during monitoring of the route of the M50, comprised a burnt mound, pits, and a metalled roadway.	c. 500m south
E003284 E004059 E004244	2008:375 2009:293 2010:289	A mid-18th-century gilded copper alloy rococo shoe buckle was found during monitoring and metal detecting for a diversion of a canalised watercourse for the site of the park-and-ride for the Luas B1. Testing identified two postholes and a ditch. Monitoring of SI works did not identify any archaeological features.	c. 500m southwest

Table 14.1 Previous archaeological investigations within the study area of the proposed development area

Cartographic Analysis

Sir William Petty, Down Survey Map, 1654–56, Barony of Half Rathdown (Figure 14.3)

A dotted line running north–south to the east of the development area is annotated as 'The High Way to Dublin from Wicklow'. To the west of this Carrickmines Stream flows from the high ground via 'Carrickmaine' and 'Brennanstonne'. Large houses are shown at both of these locations and a water mill is illustrated to the south of the proposed development area, possibly representing that recorded as DU026-080002.

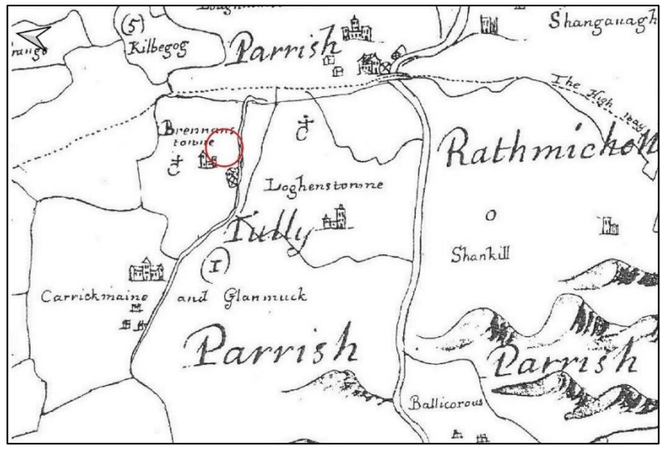


Figure 14.3 Extract from the Down Survey Map (1654-6) showing the approximate location of the proposed development area

John Rocque's Exact survey of the Dublin County, 1760 (Figure 14.4)

This map shows individual field plots and infrastructure in detail for the first time. The Brennanstown Road is largely set out in its current layout, running south from Cabinteely village. The road turns west sharply at the corner of 'Bryanstown' House and continues towards 'Carrick Mines'. A small house is shown at the location of Glendruid House but it is not named. Several small unnamed houses are dispersed along the southern side of the road.

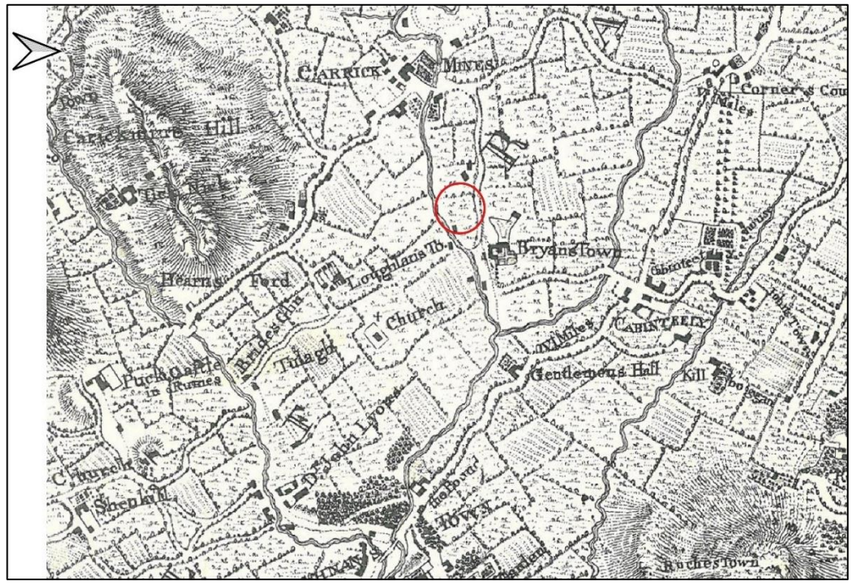


Figure 14.4 Extract from Rocque's map (1760) showing the approximate location of the proposed development area

John Taylor's Map of the Environs of Dublin, 1816 (Figure 14.5)

This map contains more accurate topographical details of the area such as the evolving road network, wooded areas and the areas of high ground. The proposed development site is shown as being located within a wooded area, likely forming part of the Glendruid demesne. Glendruid House is annotated for the first time to the south of the road and Brenanstown House to the north. The megalithic tomb (DU026-007) is illustrated to the south of the road on the banks of the river and labelled as a 'Cromloch'. The military camp DU026-127 is also noted on this map to the south of the river in Loughlinstown, annotated as 'Camp Ground'.

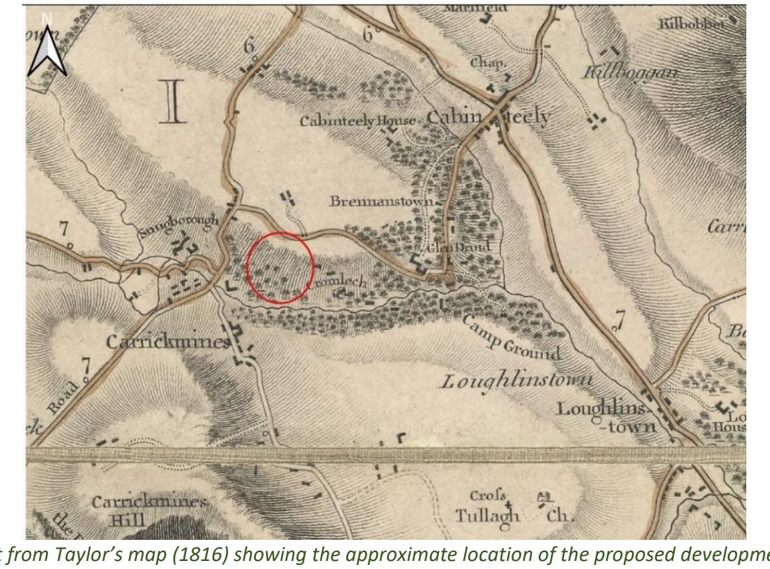


Figure 14.5 Extract from Taylor's map (1816) showing the approximate location of the proposed development area

First Edition Ordnance Survey Map, 1837, scale 1:10560 (Figure 14.6)

This is the first accurate historic mapping coverage of the area containing the proposed development area. The existing roadway is depicted as following its current route – a narrow access road running from Cabinteely Village largely surrounded by undeveloped fields and parkland. The road provides access to Brenanstown and Glendruid House and the associated demesnes.

Approximately six buildings of various sizes are located at the rear of Brenanstown House, to the immediate north of the roadway, and a gate lodge and main entrance are shown to the northeast, nearer the village. The demesne landscape associated with Brenanstown House is clearly shaded.

A gate lodge and entrance are shown at Glendruid House and numerous outbuildings and a walled garden are located within the associated yard. Glendruid Cottage is marked to the southwest of Glendruid House. They both share the same entrance and are marked within a shaded demesne landscape. A feature is marked as 'Barrington's Tower' is shown within the western most portion of the demesne, and within the proposed development area. The megalithic tomb is also marked within the demesne and continues to be annotated as 'Cromlech', to the east of the proposed development area.

A section of the large demesne landscape associated with Cabinteely House, which is located north of the proposed development, is shown bordered by the Brennanstown Road.

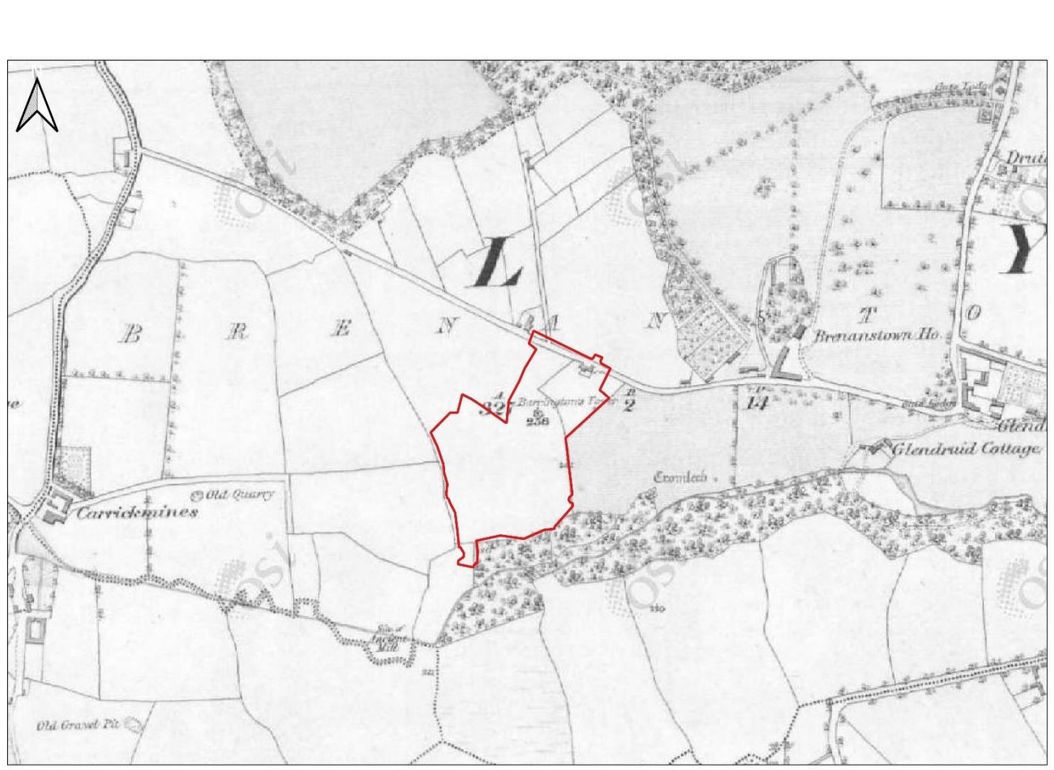


Figure 14.6 Extract from the First Edition OS map of 1837 showing the proposed development area

Second Edition Ordnance Survey Map, 1870, scale 1:10560

This map shows more detail within the Glendruid Demesne with numerous foot bridges and Summer Houses shown. By this time, the circular feature which represents the Barrington Family Burial Ground is shown but not labelled. Barrington's Tower is once more shown within the proposed development area, and the Brennanstown Portal Tomb is once more labelled as a 'Cromlech'. The most significant change to the landscape by the time of this map, is the Dublin Wicklow and Wexford Railway which runs to the immediate south of the proposed development area, roughly along the route of the modern Luas line.

Ordnance Survey Map, 1906-9, scale 1:2,50 0 (Figure 14.7)

A circular area of rough vegetation is shown around Barrington's Tower within the proposed development area. A well is also shown at the eastern extent of the proposed development area. The Barrington family burial plot is shown and labelled as a burial ground for the first time, immediately east of the proposed development area. in the wider area, the demesne associated with Brenanstown House appears to have been extended to the north, where it abuts Cabinteely Village. A number of residences have been built along the Brenanstown Road, to the west of the proposed development area.

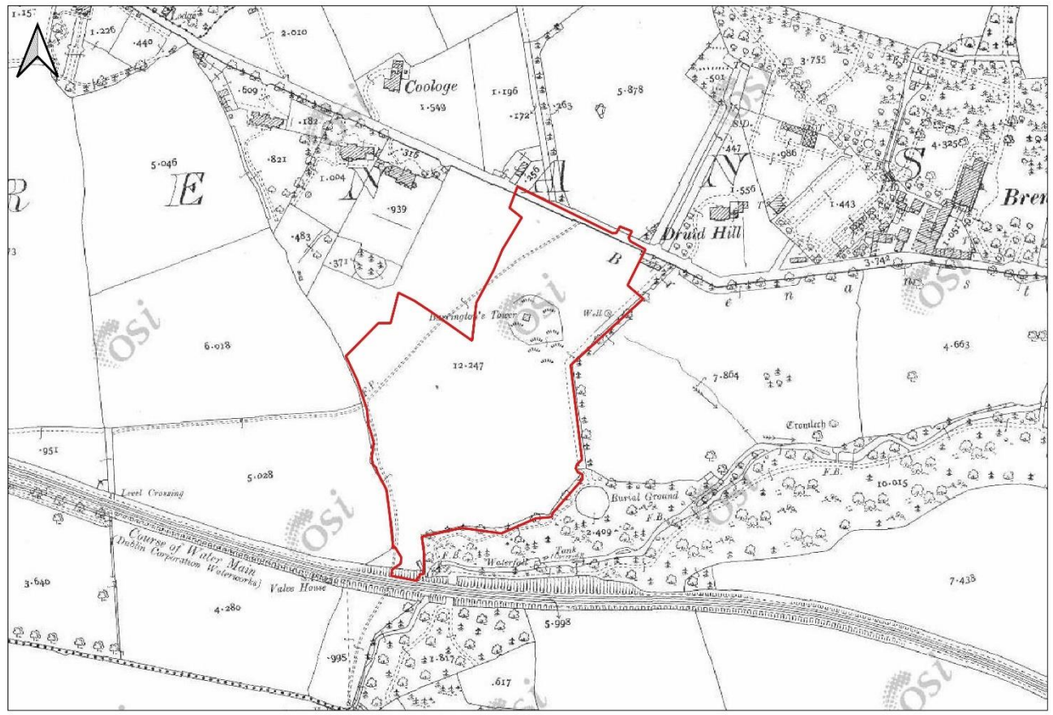


Figure 14.7 Extract from the historic OS map of 1906-9 showing the proposed development area

Third Edition Ordnance Survey Map, 1940, scale 1:10560

There is little significant change to the proposed development area and its immediate surroundings by the time of this mapping in 1940.

County Development Plan

The Dun Laoghaire-Rathdown Development Plan (2022-2028) details all of the Recorded Monuments within the vicinity of the proposed development area and sets out policies and objectives relating to archaeological heritage (Appendix 14.5).

A total of six Recorded Monuments are recorded within 500m of the proposed development area (Table 14.2). In addition, the Brennanstown Portal Tomb is also designated as a National Monument in State Guardianship (Nat. Mon. 291). Further information on these recorded monuments can be found in Appendix 14.3.

RMP NO./NAT. MON. NO.	CLASSIFICATION	LOCATION	DISTANCE TO SITE
DU026-080001	Enclosure	Brenanstown	150m south
DU026-080002	Water Mill	Brenanstown	150m south
DU026-007, Nat. Mon. 291	Portal Tomb	Brenanstown	190m east
DU026-006	Enclosure	Brenanstown/ Laughanstown	335m south
DU026-118	Standing Stone	Brenanstown	350m northeast
DU026-135	Fulacht fia	Carrickmines Great	455m southwest

Table 14.2 Recorded Monuments in the study area of the proposed development area

Aerial Photographic Analysis

Inspection of the aerial photographic coverage of the proposed development area held by the Ordnance Survey (1995–2013), Google Earth (2005–2021) and Bing Maps (2022) was undertaken. This did not identify any previously unknown archaeological features. It did reveal that the site was disturbed by a possible haul road from the Luas to Brennanstown Road through the site between 2008 and 2009, likely to facilitate the construction of the Luas line (Google Earth 2009, Figure 14.8).

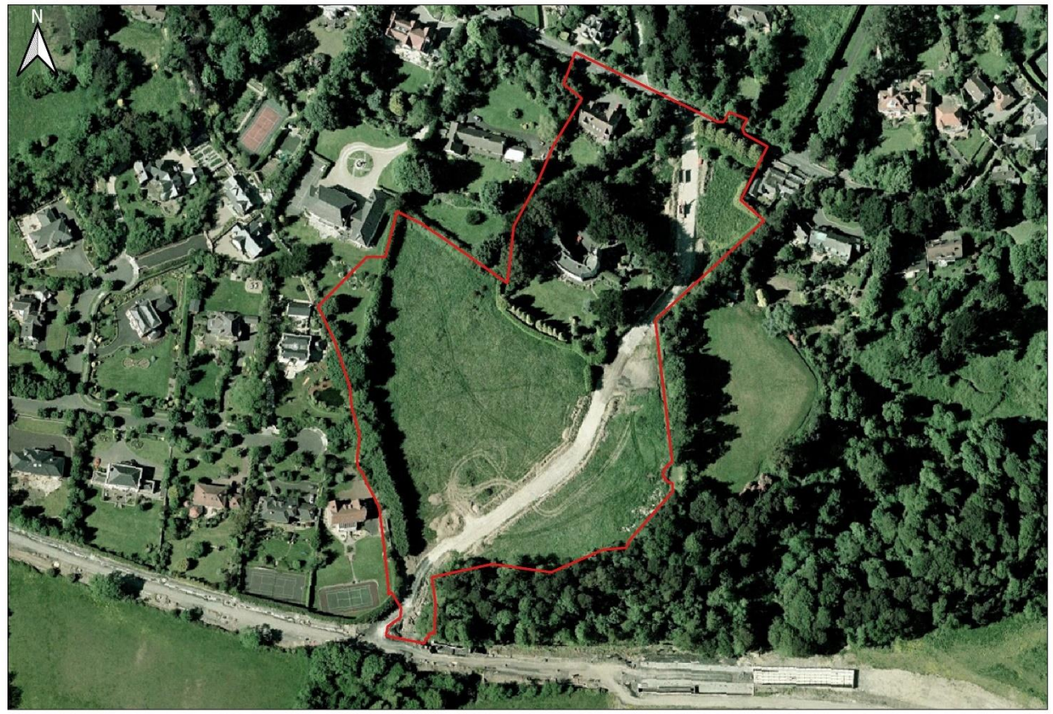


Figure 14.8 Satellite imagery of the proposed development area (Google Earth 2009)

Topographical Files of the National Museum of Ireland

Information on artefact finds from the study area in County Dublin has been recorded by the National Museum of Ireland since the late 18th century. Location information relating to these finds is important in establishing prehistoric and historic activity in the study area.

No stray finds are recorded for the study area of the proposed development area.

Field Inspection Results

The field inspection sought to assess the proposed development area, its previous and current land use, the topography and any additional information relevant to the report. During the course of the field investigation the proposed scheme and its immediate surrounding environs were inspected.

The northern half of the site contains the Recorded Protected Structure - Barringtons Tower (RPS 1729), which is adjoined to an abandoned 1950s residential structure (Plate 14.1). The grounds to the north and northeast of the structures have been laid with hardcore and the surrounding garden is overgrown and partially enclosed by hoarding. The northwest corner of the proposed development area contains a modern house, which fronts on to Brennanstown Road, set within its own garden defined by wooden fencing. The southern half of the site comprises overgrown grass in the south, bisected by a modern trackway which leads towards the Luas line adjacent to the southwest corner of site. The site is bordered to the east by a well-maintained grassed lane bound by high stone walls, which leads to the 19th century

family burial plot of the Barringtons. The burial plot itself is located outside of the proposed development area.

The site is located on a south-facing slope adjacent to the Carrickmines Stream with far-reaching views across to the Ballycorus hills. Approximately 190m east the Brenanstown Portal Dolmen (DU026-007, Nat. Mon. 291) is located on the northern banks of the stream. There are no views towards the monument from the proposed development area.

Plate 14.1 Barrington's Tower and adjacent Neo-classical house, facing north

Results of Geophysical Survey

A geophysical survey was undertaken in May 2017 within the proposed development in Brenanstown townland (Leigh 2017, Licence 17R0025; Figure 14.9). A summary of the geophysical report is presented below and the full text included in Appendix 14.1.

The results of the survey indicated no clear archaeological patterns within the proposed development area. Some isolated responses in the largest field are likely to represent deeply buried ferrous debris and the archaeological potential is considered to be limited in this respect. Modern magnetic disturbance affected the results of the survey to the immediate south of Barrington's Tower and no responses of archaeological interest were recorded.

Figure 14.9 Results of geophysical survey (Licence 17R0025, Leigh 2017)

Results of Archaeological Testing

A programme of archaeological testing based on the results of the geophysical survey was carried out within the proposed development area in April 2018. This was undertaken by David McIlreavy of IAC under licence 17E0181 (Figure 14.10). A summary of the results is included here and the full report included in Appendix 14.2.

A total of 21 trenches were excavated across all available green space in the site, targeting geophysical anomalies. No features of archaeological potential were identified and no evidence for the possible location of a former castle site was noted at this time. (This castle reference originates from an early 19th century reference, which suggests a castle was present in the vicinity of Barrington Tower). The site was deemed to be of low archaeological potential (McIlreavy 2018).

Figure 14.10 Locations of archaeological test trenches overlaid on Google Earth 2021 imagery (Licence 17E0181, McIlreavy 2018)

Cultural Heritage

Toponomy of Townlands

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

PLACE NAME	DERIVATION	POSSIBLE MEANING
Laughanstown	-	May derive from the same origin as Loughlinstown as they may have been indistinguishable in the past. Possibly relates to the family name Loughlin.
Brenanstown	-	Relates to the family name Brennan.
Carrickmines	Carraig Mhaighin/ Carraig Mheadhon	Rock of the little plain/ Middle Rock
Tully	An Tulaigh	The Hillock
Rathdown	Ráth an Dúin	Ringfort

Table 14.3 Placename Analysis

Townland boundaries

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

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

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

In the 19th century, some demesnes, deer parks or large farms were given townland status during the Ordnance Survey and some imprecise townland boundaries in areas such as bogs or lakes, were given more precise definition (ibid.). Larger tracks of land were divided into a number of townlands, and named Upper, Middle or Lower, as well as Beg and More (small and large) and north, east, south and west

(Culleton 1999, 179). By the time the first Ordnance Survey had been completed a total of 62,000 townlands were recorded in Ireland.

Although not usually recorded as archaeological monuments in their own right, townland boundaries are important as cultural heritage features as they have indicated the extents of the smallest land division unit in the country—the townland—which have been mapped since the 19th century. It remains unclear how old these land units actually are, though it has been convincingly argued that they date to at least the medieval period and may be significantly older than this (McErlean 1983; MacCotter 2008).

There are no townland boundaries traversing or bordering the proposed development area. The site is located within the townland of Brenanstown.

Cultural Heritage Sites

The term 'cultural heritage' can be used as an over-arching term that can be applied to both archaeology and architecture. However, it also refers to more ephemeral aspects of the environment, which are often recorded in folk law or tradition or possibly date to a more recent period.

The northern half of the site contains the Barrington's Tower (which is a protected structure), adjoined to an abandoned 1950s house. The folly was constructed in the early 19th century and comprised a three-storey tower that is square in plan with crenelations.

Plate 14.2 Barrington's Tower, facing southwest

The proposed development area is also bordered to the east by a well-maintained grassed lane bound by a high stone wall to the east, which leads to the 19th century burial plot of the Barrington family (Plates 14.3 and 14.4). The site is not subject to statutory protection but possesses cultural heritage significance.

Plate 14.3 Access lane leading to burial ground, facing south

Plate 14.4 Entrance to burial ground, facing south

Conclusions

The proposed development area is located in Brenanstown townland, in the Parish of Tully and Barony of Rathdown. There is a total of six recorded monuments located within 500m of the proposed development area. The closest of these are Brenanstown Portal Tomb (DU026-007) and the mill/enclosure site (DU026-080001-2). The Brenanstown Portal Tomb is also designated as a National Monument in State Guardianship (Nat. Mon. 291). There are no lines of sight between the proposed development area and the portal tomb, which is located within an area of mature woodlands.

A large number of previous excavations have taken place in the study area to date, many of which have identified prehistoric (particularly late Neolithic and Bronze Age) features. Archaeological geophysical

survey (Leigh 2017, Licence 17R0025) and subsequent test trenching (Licence 17E0181, McIlreavy 2018) within the proposed development area have failed to identify any features of archaeological potential.

The northern half of the proposed development area is occupied by Barrington's Tower, a folly built in the 19th century, which is listed as a Protected Structure, but also represents a cultural heritage site. There are references that this structure was built on or near the former site of a castle, however; there is currently no archaeological evidence to support this. The proposed development area is also adjacent to the burial plot of the Barrington Family, within the former Glendruid Demesne and is a site of cultural heritage significance.

The cartographic sources show the proposed development area as largely undeveloped, with the exception of Barrington's Tower from 1837. The aerial photography and satellite imagery confirm this, however; a haul road or track way is present within the proposed development area from 2009, likely as a result of the adjacent Luas works to the south.

14.5 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed 'Build-to-Rent' (BTR) development will consist of the construction of 8 no. blocks in heights up to 10 storeys comprising 534 residential units, a creche, a retail unit, residential support facilities and residential services and amenities. The proposal also includes car and cycle parking, public and communal open spaces, landscaping, bin stores, plant areas, substations, switch rooms, and all associated site development works and services provision. A full description of the development is provided in the statutory notes and in Chapter 3 of the EIAR submitted with this application.

14.6 POTENTIAL IMPACTS

Construction Phase
Archaeology
Although geophysical survey and archaeological testing failed to identify any features of archaeological significance, it remains possible that small-scale archaeological features survive within the proposed development area outside of the footprint of the excavated trenches. There is potential for groundworks associated with the proposed development area to have a direct and negative impact on any such features, which may survive below current ground level without surface expression. Impacts may range from moderate to significant in significance, dependant on the nature, scale and significance of the remains identified.

Cultural Heritage
The cultural heritage site within the proposed development area, Barrington's Tower (also a protected structure), will be retained and conservated as part of the proposed development. The architectural heritage of this structure is addressed in Chapter 15. Conservation of the cultural heritage site will represent a significant positive impact as currently the 19th century folly is in poor repair. It is possible that direction negative impacts may occur due to the movement of plant during construction. This may result in direct significant negative impacts to the fabric of the structure.

Operational Phase
Archaeology
There are no potential impacts to the archaeological resource as a result of the operation of the proposed development.

Cultural Heritage
Although the conservation of Barrington's Tower is a positive construction impact, the operation of the proposed development will indirectly impact on the setting of the structure. This represents an indirect slight negative impact.

No operational impacts are predicted with regards to the adjacent post medieval burial ground associated with the Barrington Family.

14.7 POTENTIAL CUMULATIVE IMPACTS

A review of surrounding proposed and permitted developments, as detailed in Chapter 3, has revealed that there will be no potential cumulative impacts to the archaeological or cultural heritage resource when considered in combination with the proposed development.

14.8 MITIGATION MEASURES

Construction Phase
Archaeology
All topsoil stripping associated with the development will be monitored by a suitably qualified archaeologist. This will include monitoring of any slab removal or foundation excavation following demolition of the modern buildings on site. If any features of archaeological potential are discovered during the course of the works further archaeological mitigation will be required, such as preservation in-situ or by record. Any further mitigation will require approval from the National Monuments Service of the Department of Housing, Local Government and Heritage.

Cultural Heritage Barrington's Tower will be located within a buffer zone, within which no construction activity will take place. Similarly, no construction traffic will be routed within the buffer zone. The protected structure will be protected by hoarding. Chapter 15 details the conservation of the structure during the construction phase, which will result in a positive impact on the Protected Structure.

Operational Phase
Archaeology
As there are no potential impacts on the archaeological resource during the operation phase of the proposed development, no mitigation is deemed necessary.

Cultural Heritage
The visual impacts and impacts on the setting of Barrington's Tower have been mitigated through design. Significant sight lines to and from Barrington's Tower were identified by the Conservation Architect and heeded by the design team (Chapter 15).

14.9 PREDICTED IMPACTS

Following the completion of all mitigation measures, there will be no significant residual impacts upon the archaeological or cultural heritage resource.

14.10 'DO NOTHING' SCENARIO

If the proposed development were not to proceed, there would be no negative impact on the archaeological resource; however, there would be a negative impact on the cultural heritage site of Barrington's Tower. Without intervention, the condition of Barrington's Tower will continue to deteriorate, potentially leading to eventual ruin or collapse.

14.11 WORST CASE SCENARIO

Under a worst-case scenario, the proposed development would disturb previously unidentified and unrecorded deposits and artefacts without appropriate excavation and recording being undertaken. The proposed mitigation measures will ensure this does not occur.

14.12 MONITORING & REINSTATEMENT

The mitigation measures recommended above will also function as a monitoring system during construction to allow the further assessment of the scale of the predicted impacts and the effectiveness of the recommended mitigation measures.

14.13 DIFFICULTIES IN COMPILING INFORMATION

No difficulties were encountered in the compilation of this chapter.

14.14 REFERENCES

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John Rocque's Exact survey of Dublin County, 1760

John Taylor's Map of the Environs of Dublin, 1816

Ordnance Survey maps of County Dublin (1837-1940)

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

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.bing.com– Satellite imagery of the proposed development area

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

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15 CULTURAL HERITAGE – ARCHITECTURAL HERITAGE

15.1 INTRODUCTION

This chapter of the EIAR focuses on the Architectural Heritage of the site and surrounding areas, including designated and other significant architectural heritage in the vicinity. It has been prepared by James Howley and Lucy O'Connor, of Howley Hayes Cooney Architecture, based in Blackrock, Co. Dublin. James Howley, FRIAI, SCA, Director of Howley Hayes Architects, has over thirty years of experience in architectural practice and is a RIAI Conservation Architect Grade I Architect. Lucy O'Connor, MRIAI, AABC, is an accredited Conservation Architect in the UK, with a Masters in Architectural Conservation and over fourteen years of experience in architectural practice.

The proposed development is located off Brennanstown Road in Cabinteely and is a proposed 'Build-to-Rent' (BTR) development which will consist of the construction of eight no. blocks in heights up to ten storeys comprising 534 residential units, a creche, a retail unit, residential support facilities and residential services and amenities. The proposal also includes car and cycle parking, public and communal open spaces, landscaping, waste management areas, plant areas, substations, switch rooms, and all associated site development works and services provision. A full description of the development is provided in the statutory notes and in Chapter 3 of the EIAR submitted with this application.

15.2 METHODOLOGY

A desktop study of the site was carried out using the sources listed below, along with a visual survey across several site visits. Survey drawings of the existing Mount Errol house and adjacent stable block buildings was commissioned and completed by an independent surveyor. Howley Hayes Architects carried out an inspection of the buildings to determine the condition and historic significance of the structures, ahead of completion of the report.

Desktop study referencing the following sources:

- Record of Protected Structures (RPS) and Architectural Conservation Areas (ACAs), Dun Laoghaire Rathdown County Development Plan (2016-2022).
- The Record of Monuments and Places (RMP) and Sites and Monuments Record (SMR).
- The Trinity Map Library – topographical files of the site.
- The Irish Architectural Archive.
- Aerial imagery including OSi imagery from 1995 onwards.

The study referenced the following documents:

- The Architectural Heritage Protection Guidelines for Planning Authorities
- Advice Notes For Preparing Environmental Impact Statements Draft (September 2015)
- Guidelines on the Information to be contained In Environmental Impact Assessment Reports Draft (August 2017).
- Guidelines for Planning Authorities and ABP for carrying out EIA (2018).

Definitions

UNESCO define the term cultural heritage as encompassing several aspects of heritage:

Tangible cultural heritage:	movable cultural heritage (artefacts) immovable cultural heritage (monuments, archaeological sites, and so on) underwater cultural heritage (shipwrecks, underwater ruins and cities) Intangible cultural heritage: oral traditions, folklore etc.

The 'Guidelines on the information to be contained in environmental impact assessment reports' (DRAFT August 2017) refer to Cultural Heritage as:

Archaeology	Known archaeological monuments Areas of archaeological potential (including unknown archaeology) Underwater archaeology
Architectural heritage	Designated architectural heritage Other significant architectural heritage
Folklore and history	Designations or sensitivities

15.3 RECEIVING ENVIRONMENT

Relevant Statutory Context

The site is just off Brennanstown Road, and it is zoned A 'To provide residential development and / or protect and improve residential amenity' under the Dún Laoghaire-Rathdown County Council County Development Plan, 2022-2028. Further west of the site and along Brighton Road there is a zoning objective 'to protect and enhance the open nature of lands between urban areas.'

It is Council policy to:

i. *Include those structures that are considered in the opinion of the Planning Authority to be of special architectural, historical, archaeological, artistic, cultural, scientific, technical or social interest in the Record of Protected Structures (RPS).*

ii. Protect structures included on the RPS from any works that would negatively impact their special character and appearance

iii. Ensure that any development proposals to Protected Structures, their curtilage and setting shall have regard to the 'Architectural Heritage Protection Guidelines for Planning Authorities' published by the Department of the Arts, Heritage and the Gaeltacht

iv. Ensure that all works are carried out under supervision of a qualified professional with specialised conservation expertise.

v. Ensure that any development, modification, alteration, or extension affecting a Protected Structure and/or its setting is sensitively sited and designed, and is appropriate in terms of the proposed scale, mass, height, density, layout, and materials.

vi. Ensure that the form and structural integrity of the Protected Structure is retained in any redevelopment and that the relationship between the Protected Structure and any complex

of adjoining buildings, designed landscape features, or views and vistas from within the grounds of the structure are respected.

vii. Ensure that new and adapted uses are compatible with the character and special interest of the Protected Structure.

There is one protected structure, Barrington Tower, located within the site boundary, RPS 1729, which is also included on the National Inventory of Architectural Heritage (NIAH) and is considered to be of 'regional' interest for 'architectural / technical' merit.

The NIAH describes it as follows:
Attached single-bay three-stage folly, built 1810, on a square plan originally detached. Extended, 1956, producing present composition to accommodate alternative use. Now disused. Set in overgrown grounds with rusticated rendered piers to perimeter having stringcourses below capping supporting wrought iron double gates.

Appraisal
A 'faux' Irish tower house folly erected by John Barrington (1764-1824) of nearby Glendruid representing an integral component of the early nineteenth-century built heritage of south County Dublin with the architectural value of the composition…confirmed by such attributes as the compact square plan form; the battered silhouette; and the crow stepped parapets embellishing the roofline. NOTE: An adjoining "fan-shaped" neo-Georgian house not only repurposed the folly, but also timber work reclaimed from Platin Hall (1700; demolished 1954-5), County Meath.

There are a number of other protected structures in the area and along Brennanstown Road including Glendruid House (RPS 1730) and Brennanstown House (RPS 1729).

Brennanstown House is located approximately half a kilometre from Barrington Tower, further east of the site and outside of the site boundary. It is a country house, erected in 1801-87, with adjacent outbuildings, and a nearby gate lodge, all that remains of the much diminished estate lands.

Glendruid House is further east again, approximately three quarters of a kilometre from Barrington Tower. It was built in 1908 for John Barrington, and the Glendruid estate originally included Barrington Tower. The house is not visible from the tower. The old boundary walls of the estate still exist in places along Brennanstown Road but have been much altered in recent years, with new entrances and portions rebuilt or removed.

Other items of note on the NIAH but not on the RPS include the mausoleum, which sits outside of the site boundary, to the south east of the site. The mausoleum according to the NIAH built in 1845-50.
Private burial ground, opened 1847, including: Part subterranean single-bay single-storey barrel-roofed single-cell vault on a rectangular plan. Sod-covered segmental barrel roof. Roughcast wall between roughcast splayed abutment walls with cut-granite coping. Pair of trefoil-headed panels centred on square-headed door opening with cast-iron door. Set in unkempt grounds with piers to perimeter supporting flat iron gate.

Also noted on the NIAH is a water-pump, at the entrance to the lane-way which leads down to the grave-yard and mausoleum. It is described as a 'Freestanding cast-iron "lion mask" water hydrant, extant 1937. Now disused. Road fronted,' and sits outside the site boundary.

The only archaeological site in the vicinity is a megalithic tomb (RMP DU026–007), which is located a further east of site and well outside the site boundary.

Brief History of the Site
Barrington Tower stands in Brennanstown, part of Carrickmines, in south county Dublin. One of the earliest known references to the place is in a record of 1654, from Christ Church cathedral which owned the tithes to the settlement that consisted of a thatched castle, a tuck mill and a corn mill. The Walsh family, who owned the nearby Carrickmines Castle was at this time, also owned Brennanstown.

Though subject to an inevitable degree of artistic licence, Rocque's 1760 map of the *County of Dublin* is nonetheless insightful. It depicts a Bryanstown, probably a transliteration of Brennanstown, west of Carrckmines, before the Brennanstown Road was cut through. It shows that there was at this point a notable building complex, possibly a precursor of Brennanstown House, close to where Brennanstown Road today turns sharply northwards at its eastern end.

In the late-eighteenth and early-nineteenth century, a number of large villas were erected for the wealthier merchant and middle classes, who prized the area's picturesque setting and splendid views, together with its proximity to Dublin. These included Cabinteely House (1769), Glendruid House (1808) and Brennanstown House (1847), all of which were set in fine natural-style landscaped demesnes, enclosed by stone boundary walls.

Samuel Lewis in his '*Topographical Dictionary of Ireland*' of 1837, describes the area as:

Brennanstown, the admired seat of G. Pim Esq; and Glen-Druid of Mrs Barrington. Near Loughlinstown, on the right of the road leading to Bray, is the site of an extensive encampment, held there in 1797 and for years after the disturbances in 1798. At Glen-Druid there is a perfect cromlech, consisting of six upright stones supporting one of 14 ft by 12…

This cromlech is also visible on the Taylor Map of 1816, the Duncan map of 1821 and the first edition Ordnance Survey.

Glendruid House was built in 1810 for John Barrington, a Dublin-based soap and candle manufacturer. His father, also John Barrington, established his soap works in 1775, which in time became one of the most important manufacturing industries in Dublin. The estate comprised one hundred and twenty-six acres and included the dramatic Druid's Glen, which was landscaped by Barrington, and included outbuildings to cater for the needs of his family. These included extensive stables and ancillary buildings and a market garden, clearly seen on the 1837-42 Ordnance Survey map. Barrington planted trees, set out paths and constructed two cottages in the Glen.

The most striking structure he erected in 1818 was a Gothick style belvedere, built further along the valley to the west of the house, but then with a symbiotic connection to it, *'to observe the beauty'* afforded by the striking views across the valley. This structure Barrington named *Tillientudelem* after the castle in Sir Walter Scott's novel *Old Mortality,* published two years earlier. Scott's fictitious castle was located on *a very preciptitous bank, formed by the junction of a considerable brook with the Clyde,* which was similar to the setting of Glendruid.

It was described in John D'Alton's *History of the County of Dublin* (1838) as – *'a lofty pleasure turret erected near [the site of] a castle.'* The square plan-form of the tower first appears as *Barrington's Tower* on the Ordnance Survey map of 1837-42. Brennanstown Road was, at this point, more meandering in character, with no discernible entrance off it leading to the tower.

By the time of the 1888-1913 Ordnance Survey map, the walls along Brennanstown Road appear to be straighter and more geometric, with a number of new entrances formed, including one for Druid Hill, a house sited to the north-west of the road. This suggests that Brennanstown Road was straightened and the walls rebuilt, possibly reusing the original stone, sometime between 1842 and 1888.

There also appears to have been a discreet path leading from the eastern side of a new house adjacent to the road to the south-east of Barrington's Tower, before turning sharply towards the burial ground to the south. Both the Glendruid and Brennanstown House complex had grown considerably between the first Ordnance Survey map and the 1888 map.

In 1857 Edward Barrington constructed a small private cemetery, which includes a family vault in which his father John and three of his children were interred. The graveyard is accessible from Brennanstown Road, up a grassy laneway, where it sits just outside the site boundary to the south east.

Brennanstown House is a short distance to the west of Glendruid House, along Brennanstown Road, Brennanstown House was erected in 1842 for Joseph Pim, to a design by the architect George Papworth (1781-1855). Though not an architect of the first order, Papworth notably designed Whitefriar Street Church (1825-37); the Baptist Chapel on Abbey Street Lower (1838-9); Ballymount Castle, a castellated House in Clontarf, together with a number of early railway stations throughout Ireland. Samuel Lewis describes it as *[a] handsome and substantial mansion…situated in a fine demesne (Lewis 1837 II, 656).* It is visible on the first edition Ordnance Survey map as consisting principally of an L-shaped range bordering the road with a range extending out to the rear (north).

In the mid-twentieth century the Maguire family, then proprietors of Brown Thomas, purchased an 8.3 acre site which included Barrington's tower. They subsequently built a curved two-storey neo-Georgian house, attached to the tower, which provided expansive views to the south, over Carrickmines Valley, to the Dublin mountains.

The ground floor of the tower was adapted to become the entrance vestibule to the house, leading to a large entrance hall with a curved oak stair, marble floor and ornate plaster pilasters that were salvaged from Platten Hall (1700), near Drogheda, Co Louth, which was designed by the noted surveyor-architect, Sir William Robinson (1645-1712), and is described as being: *'built of red brick and with a tripartite nine-bay facade, it was originally three-storied, but the uppermost floor was removed in the nineteenth century'* (*The Irish Aesthete*). It was built for Alderman John Graham of Drogheda and was demolished 1954-5.

There is otherwise a dearth of documentary evidence relating to Platten Hall just as relatively little is known about Robinson before his arrival in Ireland in 1670. It is, however, known that he was born in England in 1645 and was appointed to the position of Surveyor General of Ireland by the Viceroy. Robinson is credited with designing a number of highly significant buildings in Dublin including: St. Michan's Church (1686); St. Mary's Church (c.1700) and Marsh's Library (1701-3), though it is his work on the Royal Hospital (1684) that is unquestionably his finest achievement.

In October 1967, the house was advertised as being up for auction and was described as '*perhaps the most superb modern residence of character in a unique setting within easy commuting distance of Dublin city.'* Accompanied by external photographs, it went on in rather overblown terms to describe the accommodation:

'*which is spacious, the reception room reminiscent of the Georgian period comprises briefly: Entrance Hall, Reception Gallery (incorporating original eighteenth century pillars and cornices further reception rooms five family bedrooms; four bathrooms. A truly dream kitchen…nursery wing. Grounds easy of upkeep.*

Still on the market, and presumably trying to attract an oversees buyer, Barrington Tower was also advertised in *Country Life,* in May 1970, and included an internal view of the saloon and dining room, which was fifty-four feet long and the '*grounds are mainly paddock, with lawns and formal garden. Garage. Out-offices.'*

To-date, it has not proven possible to find out who owned / occupied the house between 1970 and when were put on the market in 2005. At that time there was no mention of fire damage to either building, nor is a fire mentioned in the 2007 conservation report prepared by Cathal Crimmins, following the sale of the tower and its land for an estimated €36m for a planning application at that time. It is therefore assumed that a fire occurred at some point after 2007, as today the house is completely derelict, and the floors in both the house and tower, including the roof of the house, have partially or fully collapsed due to fire damage, which is visible.

The now disused Glendruid House stands about a quarter of a mile to the east of Barrington Tower. It comprises five-bays and two-storeys over a basement with a projecting entrance porch, and a bow on its eastern side, on an elevated site within its own mature grounds overlooking the Carrickmines River Valley. The house is accessed via the original gated entrance, which includes a single-storey gate lodge.

There is an interesting range of outbuildings to the rear of the house, accessed through a tall granite arched gateway. The site is bounded by a combination of high stone walls, mature trees and hedges, giving it a strong sense of enclosure. Today Glendruid is set within a distinctive landscape encompassing a river valley and mature woodland to the south, with borrowed views above the tree canopy towards the mountains. The original house is largely screened from the public road with glimpses of it visible from the river valley on Lehaunstown Lane to the southeast.

15.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development site is located between Brennanstown Road to the north and the Luas green line and M50 to the south, at the site known as 'Barrington's Tower', Brennanstown Road, Dublin 18, named for the protected structure Barrington's Tower (RPS No. 1729), which situated within the land. The tower will be retained and conserved under the proposals.

The proposed development will comprise of 8 no build to rent apartment blocks, ranging in height up to 10 storeys (including lower ground floor) providing 534 no. apartments. The development will also include resident support facilities, a creche, car and cycle parking and associated site development works.

Construction of a Build to Rent (BTR), Strategic Housing Development (SHD) comprising the following:

- Demolition of existing non-designated habitable dwelling ('Winterbrook'), and derelict, former dwelling attached to Barrington Tower (Protected Structure RPS 1729). Removal of existing gates, piers and boundaries along Brennanstown Road. Barrington's Tower is to be conserved and retained.
- Construction of 534 no. apartments (30 no. studios, 135 no. 1 -beds, 318 no. 2-bed, and 51 no. 3-bed) within 8 no. blocks ranging in height up to 10 storeys (including lower ground floor).
- Provision of creche, retail unit, and Resident Support Facilities/Resident Services and Amenities.
- Provision of car and cycle parking, at basement (2 levels) and ground level.
- Provision of vehicular and pedestrian/cyclist accesses from Brennanstown Road with public access through the development to Brennanstown Luas Stop to the south.
- Provision of public and communal open spaces including an enhanced landscaped setting in the vicinity of Barrington Tower.
- Provision of all landscaping, play areas and boundary treatment works, ESB substations, plant areas, bin storage, and all other site development works, and site services required to facilitate the proposed development.

Two five-storey residential apartment blocks fronting onto Brennanstown Road are proposed within the development. These will form a landscaped corridor to frame axial views of the tower from Brennanstown Road. Currently there are no views of the tower from Brennanstown Road due to the presence of boundary walls and dense vegetation. The outdoor area serving the creche will be positioned east of the tower, with views to and from the tower and an open playground is positioned further west of the tower. Public pedestrian access will be facilitated along the eastern boundary, close to the original access lane from the main road south to the graveyard.

15.5 POTENTIAL IMPACTS

Construction Phase

There is no recorded archaeology within the site area, and due to the history of development on the site, it is very unlikely any significant archaeology will be found during the below ground works phase. However, monitoring should be put in place for the duration of these below ground works on site. See Chapter 17 for further information.

There is one protected structure, Barrington's Tower (RPS No. 1729) located within the site, which will be significantly impacted by the development. This early nineteenth century prospect tower was located within the former Glendruid demesne. A neo-classical Georgian style house was added to the tower in the nineteen fifties, and the tower was converted for residential use. In subsequent years the building has become derelict and suffered fire damage. The proposals include for the removal of the nineteen fifties house, which is in an advanced state of dereliction, and for the conservation and repair of the tower. This impact is considered primarily positive as it will allow for the repair and conservation of this historic prospect tower, with the removal of inappropriate and unsightly development directly adjacent to it, the house. These works will be carried out under the supervision of an experienced Conservation Architect. All construction works to protected structures carry inherent risks, which must be mitigated by the construction approach and design proposals. The following methodology should be implemented when working in close proximity or around protected structures:

- Full photographic recording of the structure prior to commencement of works
- Structural assessment of the building prior to commencement of the works (this has already been completed)
- At the start of construction the contractor should install dedicated 2m high ply hoarding protection around the tower
- Contractor should install movement monitors in a number of locations around and on the tower to monitor vibration movement during the works.
- Demolition works in close proximity to the tower should be undertaken by a contractor with substantial experience working on historic structures, and this should experience should be assessed during the contract tendering process.
- The tower and adjoining house should be completely cleared out, I.e. all debris removed from inside, prior to commencement of further works on site.
- The tower should be fully photographed after removal of all internal debris and inspected and recorded by a conservation architect once it has been cleared out.
- The removal of two metre length of the walls and roof directly abutting the protected structure should be taken down by hand, using a hand-held machine to reduce the requirement for larger machinery in such close proximity to the tower.
- Works to repair the tower itself should be carried out by an experienced masonry contractor – who is familiar with protected structures and traditional methods of construction such as masonry repair, pointing with lime mortars.
- The installation of the new roof should be carried out by an experienced roofer, familiar with working with traditional timbers and slate. The repairs to the windows should be carried out by an experienced joiner who is familiar with traditional joinery and traditional windows.
- The new metal stair will be manufactured off site and dropped into place within the tower before the new roof is installed. This approach will minimise impact on the walls of the tower. The stair and landings will be bolted together on site.
- A construction management plan should indicate where all construction traffic will be crossing the site. All construction traffic crossing the site should be kept a minimum distance of 5m away from the tower.

The impacts are assessed under the following table:

Impact Significance Criteria Impact Criteria	**Description**
Profound	An impact which obliterates sensitive characteristics;
Significant	An impact which, by its character, magnitude, duration, or intensity alters a sensitive aspect of the environment;
Moderate	An impact that alters the character of the environment in a manner that is consistent with the existing and emerging trends;
Slight	An impact which causes noticeable changes in the character of the environment without affecting its sensitivities;

Imperceptible	An impact capable of measurement but without noticeable consequences.

The following terms are used to describe the quality of change:

- Positive impact: A change that improved the quality of the environment;
- Neutral impact: A change that does not affect the quality of the environment;
- Negative impact: A change that reduces the quality of the environment;

The follow terms are used to describe the duration of impacts as described in the EPA Guidelines are as follows:

- Temporary impact: lasting one year or less;
- Short-term impact: lasting one to seven years;
- Medium-term impact: lasting seven to fifteen years;
- Long-term impact: lasting fifteen to sixty years;
- Permanent impact: lasting over sixty years.

A summary of the potential impacts is outlined below in Table 15.1, with mitigation measures outlined in Table 15.3.

Proposed Works	Impact Type	Potential Effects
Demolition of modern extensions and accretions to Barrington's Tower	<u>Significant, Positive and Permanent Impact</u> The demolition and removal works will significantly and permanently change the character and nature of the existing arrangement of the buildings at Barrington's Tower. It is a positive impact as it will reinstate the architectural character of the tower.	Removal of inappropriate and poor quality extensions and buildings at the complex may impact on the significant historic fabric, causing damage. It is potentially permanent as damage during construction works on site may result in permanent damage to the structure if the methodology as outlined above in the opening paragraph of section 15.5 is not adhered to during the construction period Also see mitigation measures in table 15.3.
Refurbishment, repair and conservation works at Barrington's Tower	<u>Slight, Positive and Permanent impact</u> The majority of these works are contained within the historic structure, where much original fabric is already lost. There will be a slight visual impact on the external façades where windows are upgraded. The impact is positive as it involves conservation and repair works to safeguard the future of the tower.	Disturbance, damage to historic fabric during the construction process, and / or discovery of further elements of architectural or archaeological note. Discovery of harmful or hazardous materials. Also see mitigation measures in table 15.3
Construction of new residential development – apartment blocks	<u>Moderate, Negative and Short-term Impact</u> Construction of the adjacent development with underground carparking should not have any physical impact on Barrington Tower during the works, if stated mitigation measures are adhered to, but there is potential for impact.	Could cause vibrations and disrupt the stability of Barrington's Tower. It is a short-term potential impact as the impact will be during the construction period of works on site. The methodology as outlined above in the opening paragraph of section 15.5 is not adhered to during the construction period. Also see mitigation measures in table 15.3
Construction Traffic and site access	<u>Moderate, Negative and Short-term</u> The access route from Brennanstown Road should be carefully considered, to ensure it does not come in close proximity to the tower.	Any construction traffic coming in and out of Brennanstown Road could have a negative impact on Barrington's Tower increasing the risk of damage, spread of debris and compromise of the stability of the structure. It is a short-term potential impact as the impact will be during the construction period of works on site when particularly heavy traffic is moving across the wider site.

Table 15.1 Summary of potential impacts during Construction

The wider site, or receiving environment, is of medium significance and sensitivity from a cultural heritage standpoint. There has been significant change on and around the site during the twentieth century, with considerable development along Brennanstown Road, and significant landscape growth, for example within the immediate environs of the tower, which would not have been in place historically. The impacts have been assessed in accordance with Figure 3.5 on page 53 of the 'Environmental Impact Assessment Reports – Draft Guidelines (2017).

The works to the wider side, the construction of the residential blocks, will have a slight impact on the tower during the construction phase, due to the proximity of the works. However the new residential blocks are to be built more than twenty metres away from the tower which is a sufficient distance away from the tower which will be protected by hoarding The installation of vibration monitors by the contractor on the tower itself is still recommended during the construction period and these should be

checked regularly to ensure that excavation for the apartment construction is not causing any movement to the tower.

Operational Phase

The conservation and repair works to Barrington's Tower will be in line with good conservation practice, which is recognised throughout the field of conservation. The works will be carried out in accordance with the Burra Charter (revised 2013) which defines the basic principles and procedures to be followed in the conservation of heritage places. The philosophy of repair will be to do 'as little as possible and as much as necessary' when conserving the tower itself, and this will include the use of like-for-like materials, such as masonry and lime mortars for repair, and the reinstatement of a slate roof on the structure. The most significant architectural aspect of this building are the existing facades, as there is little of historic significance remaining inside the structure, due to fire damage and alteration. The proposals will have imperceptible or slight impacts on the historic facades of the buildings, with any alternations primarily proposed to the interior of the structure, where a new independent stainless steel stair will be added internally. A new roof will be hidden from view behind the existing parapets. There will be significant impact on the setting on the tower as a result of the proposed residential development though it should be noted that the setting of the tower is already highly compromised, with the addition of the house, and the proliferation of vegetative growth surrounding it. The tower was designed to be appreciated from various vantage points within an designed landscape, and to provide views of this designed landscape from its windows and parapets.

The most significant impacts following the construction phase will relate to the altered visual nature of the site, due to the large residential development within its environs, and the removal of the nineteen fifties house extension to the tower, and the repair works to the tower.

Potential visual impact on the setting of Barrington's Tower has been assessed from various locations across the site through the use of 3D studies. The removal of the nineteen fifties house extension to the tower will have a significant impact on the character of the tower, and the impact is considered to be positive, as it will return the tower to its original architectural composition, that of a prospect tower without any extensions or accretions attached to it. The tower originally functioned as a prospect tower, to afford visitors views of the wider demesne of Glendruid, and as an eye-catcher or folly situated within the demesne. It is not feasible to restore the demesne of Glendruid, but it is possible to reintroduce a stair within the tower, providing occasional access for visitors, to afford them views from the tower. Views will be maintained to the north, south, east and west of the tower as indicated in the 3D studies.

A summary of the potential impacts during operation are outlined in Table 15.2 with mitigation measures in Table 15.4.

Impact	Impact Type	Likely Effects
Impact on Setting – Barrington Tower	Significant, Negative and Long-term	Large scale development in and around the historic structure is likely to have a negative long-term impact on the structure, but this can be mitigated through careful design to ensure that the visual impact on the structure is not significant, which has been completed by the design team. See mitigation measures in table 15.4
Impact on views to Barrington Tower	Significant, Neutral and Long-term	Sightlines to Barrington Tower could be affected by any large new buildings in the vicinity, in particular the primary sightlines to the building. It is likely to have a long-term impact on the structure, and this should be mitigated through design. The impact on the views is considered neutral as there are little to no views to or from the tower in the receiving environment. See mitigation measures in Table 15.4
Impact on Barrington's Tower	Significant, Positive and Permanent	Removal of the 1950s extension to the tower will have a significant impact on the character of the tower, which is considered to be positive.
Impact on setting of adjacent historic structures and protected structures	Slight, Neutral and Long-term	Views from the surrounding protected structures will not be impacted by this development due to the distance of these protected structures from the site. Glendruid House is 650m away from Barrington's Tower and Brennanstown House is also half a kilometre away. There will be no impact on views to these historic structures as the development is not positioned behind either of these houses. Impacts on Brennanstown Road is considered to be in line with emerging baseline trends for new residential development in the area, and in line with the adopted Dun Laoghaire Rathdown Development Plan 2022-2028.
Impact on the character of Barrington's due to insertion of new stair	Moderate, Neutral and Long-term	The proposed insertion of the new stair will have an impact on the interior of the tower but only a slight impact externally. The tower contains a badly decayed timber stair at present. Replacement with a reversible, safe stair is considered to be a neutral impact.

Table 15.2 Summary of potential impacts during Operation

15.6 POTENTIAL CUMULATIVE IMPACTS

Any further residential development on site could have a potential cumulative impact on the architectural heritage. No such additional works are planned at this time within the site containing Barrington Tower, so no potential for cumulative impact is anticipated. Future development on sites further afield will not have a culmulative impact on the protected structure.

15.7 MITIGATION MEASURES

Construction Phase

A protective curtilage zone has been established around the protected structure which will be maintained during the construction phase of works. Construction traffic will be directed onto site

through the Brennanstown Road entrance, and no heavy construction works, or minimal construction works, only relating to the protected structure and the removal of the extension, will be undertaken within the vicinity of the tower.

The construction of the residential apartment blocks will have an indirect impact on the protected structure, but these works will be carried out a safe distance away from the protected structure. The demolition of the adjacent house extension should be carefully monitored to ensure no vibration impact on the tower.

A separate site compound should be established for the duration of the works to remove the house extension and carry out the conservation works to the tower, which will likely occur under a separate phase within the main works programme.

Adjacent or nearby protected and historic structures, outside of the proposed site area, will not be significantly impacted during the construction phase of the works due to the geographical distance from the construction compound.

Proposed Works	**Impact Type**	**Mitigation**	**Residual Impact Post Mitigation**
Demolition of modern extension to Barrington's Tower	Significant, Positive and Permanent Impact	Full appraisal of the tower and extension has determined what is historically significant and what is not. A record of the existing structure to be removed, and the tower to be retained will be established prior to works. Full protection of historic fabric will be in place during the works though use of hoarding and protective sheeting. Method statements for sequenced removal of extensions and structures to be submitted to Conservation Architect ahead of works. Suitably qualified contractors will carry out the demolition works, who are familiar with, and experienced in working on historic structures.	Moderate, Positive and Permanent
Insertion of new stair within Barrington's Tower	Moderate, Neutral and Long-term	Protection of the existing historic fabric will be put in place prior to any new construction works undertaken on site. Appropriate conservation methodologies will be submitted and approved prior to construction and insertion of new stair, relating to materials, construction sequencing and protection approaches.	Slight, Neutral and Long-term
Conservation and repair of Barrington's Tower	Slight, Positive and Permanent,	Full record of existing structure prior to commencement of works. Suitably qualified Conservation Architect to oversee all works on site and inspect any findings on site. Ensure suitably qualified contractors carry out proposed works, who are familiar with, and experienced in working on historic structures.	Slight, Positive and permanent
Construction of new residential development – apartment blocks	Moderate, Negative and Short-term	Careful monitoring, installed by the contractor, to ensure no vibration impact on the tower. Suitable construction compound will be established an adequate distance from Barrington's Tower. Protection hoarding will be added around the tower as required.	Slight, Negative and short-term
Construction Traffic and site access	Moderate, Negative and Short-term	Mitigation by Avoidance No construction traffic will be routed in close proximity to the tower. The tower will be fully hoarded to ensure no risk of damage.	Slight, negative and short-term

Table 15.3 Summary of mitigation measures during Construction

Operational Phase

In response to the potential impacts outlined a number of mitigation measures are proposed to ensure minimal disturbance and impact on the protected structure within the site. Early engagement with the design team and client has allowed for a number of these mitigation measures to be incorporated into the design proposals, such as the establishment of appropriate curtilage and protection zone around the protected structure, and the development of suitable proposals for the future use of the tower.

Impact	**Impact Type prior to Mitigation**	**Mitigation**	**Residual Impact Post Mitigation**
Impact on Setting – Barrington's Tower	Significant, Negative and Long-term	A protective curtilage / buffer zone was established during the early design stages and provided to the design team, in order to reduce the visual impact on the setting of tower to an acceptable level. This mitigation measure will reduce the	Moderate, Neutral and Long-term

Impact	Impact Type prior to Mitigation	Mitigation	Residual Impact Post Mitigation
		impact on the setting of the tower to a moderate and acceptable measure.	
Impact on views to Barrington's Tower	Significant, Neutral and Long-term	Significant sight lines to and from Barrington's Tower were established by the Conservation Architect and provided to the design team. These sightlines are to be maintained and one new sightline to Barrington's Tower is included in the design proposals, an axial view from Brennanstown Road to the tower. This mitigation measure will reduce the impact on sightlines to a moderate level. At present the tower is not visible from a number of these locations due to significant overgrowth at the site.	Moderate, Neutral and Long-term
Impact on setting of adjacent historic structures and protected structures	Slight, Neutral and Long-term	The residential blocks have limited impact on the nearby protected structures. The residential blocks have increase in height further south on the site, which slopes away from Brennanstown Road and the nearby protected structures. This mitigation measure will reduce the impact on the occupants of these historic buildings.	Imperceptible, Neutral and Long-term
Impact on Brennanstown Road	Significant, Negative and Permanent	The impact on Brennanstown Road is reduced by the design approach, as the taller residential blocks are located within the site and further south, where the ground slopes down to the luas station. This approach has lessened the impact of the development onto Brennanstown Road, where two residential blocks will be visible to passersby. The overall impact on the road is in line with the current emerging baseline for the road, where significant development has already taken place. The existing gates to the site are not of any historic value and the introduction of a new entrance, which will incorporate stones from the boundary wall, and includes a new view of Barrington's Tower are considered beneficial. These mitigation measures reduce the negative impact on Brennanstown Road.	Significant, Neutral and Permanent
Impact on the character of Barrington's Tower	Moderate, Positive and Long-term	The proposed use and design proposals for the tower have been developed and considered by a RIAI Grade I conservation architect and are considered appropriate to the scale, type and history of the building. The proposals are inherently reversible in nature, with no major impact on external or structural walls	Moderate, Positive and Long-term

Table 15.4 Summary of mitigation measures during Operation

ASSESSMENT OF VIEWS

The assessment of the impact on the views of Barrington's Tower is outlined below. Each view is assessed in terms of visual impact on the protected structure.

Figure 15.1 CGI View 1 - Proposed View from Brennanstown Road

This view is taken from Brennanstown Road and shows the axial view of the tower, framed by two rows of planted trees and a central access route directly up to the tower. This is a new view of the tower, as the tower is not currently visible from Brennanstown road, and therefore not visible to the public. The addition of this view within the development scheme is considered significant and positive in terms of bringing this historic tower into view along Brennanstown Road. The residential blocks are prominent in the view but the tower is given a central position, and the landscaping is designed to enhance and augment the tower setting and position. The impact of any large scale residential development would be considered significant and negative by virtue of its scale and bulk, but due to the careful and considered landscape design, the setting back of the blocks to frame the view of the tower, and the fact that this is a new view, or reinstated view, of the tower from Brennanstown Road, this impact is now considered to be significant, neutral and long-term.

Figure 15.2 CGI View 2 - Proposed View from Brennanstown Road from within the site

This view is taken from further within the site, and shows how prominent the tower becomes on approach between residential blocks A and B.

Figure 15.3 CGI View 3 - Proposed View from the east, looking west at the tower

This view of the tower is taken from the approach along the eastern boundary of the site, with the creche play area seen on the right hand side. The path curves around to lead directly up to Barrington's Tower, and the tower itself is given a soft landscaped setting. As the ground drops away from around the tower a natural mound is created, giving the tower further prominence within the site. This view is considered to have significant impact on the tower, and again any negative impact is mitigated by careful landscaping, well positioned paths and the setting back of the residential blocks, resulting in a neutral impact on the tower.

Figure 15.4 CGI View 4 - Proposed View from the south, looking north at the tower

This view shows the wide open space to the south of the tower, giving it a landscaped parkland setting which is considered a positive impact. This view also demonstrates how the design of Block E was considered, and the way this residential block steps down in deference to the tower. Though large scale residential development around this protected structure could be considered a negative impact, the inclusion of a landscaped open parkland around the tower, and the consideration given to the height of block E has helped to neutralise this impact on the setting of the tower.

Figure 15.5 CGI View 5 - Proposed View from the west, looking east at the tower

This view is taken looking across the children's playground, with Barrington Tower in the back-drop. The creation of an open public space and playground to the west of the tower is a positive design move, establishing this folly once again as a prominent feature within this newly devised landscape. The careful positioning of blocks AB, CD and E is also evident here, all set back from the tower. This view and a number of the other views across the site demonstrate the prominence the tower will be given within the design proposals.

15.8 PREDICTED IMPACTS

There are a number of predicted impacts, post mitigation, on Barrington's Tower due to the proposed development works at this site. These are unavoidable due to the proposed works to and around the protected structure located within the site.

Several of these impacts have also been initially addressed under the Potential impacts and mitigation measures will or have been employed to minimise the impacts.

Construction Phase
A summary of the predicted impacts is outlined in table 15.5 with the assessed likely impacts also noted in the right hand column.

Proposed Works	Impact Type	Likely Effects
Demolition of modern extension (house) to Barrington's Tower	Significant. The demolition and removal works will significantly change the character and nature of the existing arrangement at Barrington's Tower	Positive Will facilitate the repair and conservation of the historically significant Barrington's Tower.
Insertion of new stair to Barrington's Tower	Moderate The insertion of a new stair will result in significant visual impact to the interior of the structure	Positive Removal of the badly damaged and decayed internal fixtures and fittings and insertion of a new stair will allow for the internal masonry walls and windows to be fully conserved and repaired. Construction method statements for works to be submitted to conservation architect for review.
Conservation and repair of Barrington's Tower	Slight The proposed conservation works are contained within the historic structure, where much original fabric is already lost. Windows will be repaired, masonry repointed and a new roof, not visible externally, will be added behind the parapet	Positive Repair and conservation of this protected structure on site, to reinstate it as a prospect tower is a positive effect. This present opportunities for conservators to repair this structure and keep it intact and safeguard it for the future.

Table 15.5 Summary of predicted impacts during construction

Operational Phase
The operational phase predicted impacts are noted in table 15.6 with the likely effects outlined in the right hand column.

Impact	Impact Type	Likely Effects
Demolition works – removal of house extension, and insertion of a new stair within the tower.	Significant	Significant The demolition works will have a significant positive impact on the character and nature of Barrington's Tower as it will result in the removal of inappropriate extensions at the site. The new stair will have minimal impact on the exterior of the tower but will allow for occasional access to the tower.

Impact	Impact Type	Likely Effects
		These works will result in an improvement in current amenities on the site. At present Barrington's Tower is not used and in a state of ongoing decay.
Impact on Setting – Barrington's Tower	Significant	Moderate Position of Blocks AB and CD, and Block E in particular – closest to Barrington's Tower – will have a visual impact on the setting of Barrington Tower. However this impact has been mitigated by design, with the inclusion of open views, and the stepping down of Block E to respond to the tower, and this impact is now considered moderate and acceptable.
Impact on views to Barrington's Tower	Significant	Moderate Sightlines to Barrington's Tower will be affected by the new buildings, but a number of primary sightlines to the structure will be maintained, due to the proposed mitigation measures. A new view of Barrington's Tower will be provided from Brennanstown Road.
Impact on setting of adjacent historic structures and protected structures	Slight	Imperceptible Views from the surrounding protected structures will not be adversely impacted by the development.
Impact on the character of Barrington's Tower due to change of use	Moderate	Moderate The tower was last used for residential purposes, incorporated into a large house extension to the side of the tower. This change of use will in fact change it back to its original function, that of a prospect tower, or folly within a landscape. The character of the tower will be restored, though the landscape into which it once stood is lost.

Table 15.6 Summary of predicted impacts during Operation

15.9 'DO NOTHING' SCENARIO

There will be negative impact on the architectural heritage in a 'do nothing' scenario as the protected structure Barrington's Tower will continue to deteriorate and degrade over time if urgent repair and refurbishment works are not undertaken.

15.10 WORST CASE SCENARIO

The worst case scenario in this project would be irreversible damage to, and / or loss of the protected structure Barrington's Tower. However this potential worst case scenario can be mitigated as described throughout this chapter.

15.11 MONITORING & REINSTATEMENT

On site monitoring will be carried out by an Archaeologist and Conservation Architect throughout the construction phase of the works to ensure adequate protections are put in place, and anything of significance is fully recorded. There are no reinstatement works which will impact on the architectural heritage.

15.12 DIFFICULTIES IN COMPILING INFORMATION

There were no difficulties in compiling information for this EIAR chapter.

15.13 REFERENCES

Maurice Craig's *Classic Irish Houses of the Middle Size:* pp.37-8

James Howley *The Follies and Gardens of Ireland,* Yale Press

Department of Culture, Heritage, and Gaeltacht, *'Architectural Heritage Protection Guidelines for Planning Authorities',* 2011.

The Department of Housing, Planning and Local Government *'Urban Development and Building Heights Guidelines for Planning Authorities'*

16 INTERACTIONS

16.1INTRODUCTION

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.

16.2 ASSESSMENT

Where an interaction is likely, it is given a reference number in the matrix and detail of the interaction is recorded below. The significance, quality – whether it is positive, negative or neutral – and the duration of the interaction is assessed. The interactions are listed in numerical sequence, purely for referencing purposes. Each of these interactions have been addressed in the relevant EIAR chapters.

	Population	Biodiversity	Soil	Hydrology	Noise	Air and Climate	Landscape	Traffic	Waste	Cultural Heritage	Material Assets
Population											
Biodiversity											
Soil	1	9									
Hydrology	2	10	13								
Noise	3	11									
Air and Climate	4		14								
Landscape	5	12	15								
Traffic	6										
Waste	7										
Cultural Heritage							16				
Material Assets	8										

Figure 16.1 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. As a result, the impact will be temporary, imperceptible and neutral/ negative.

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, as outlined in Chapter 7, will be put in place during the construction phase of the development to ensure this does not occur. The correct implementation of these mitigation measures will ensure that the potential impacts on hydrology and water services during the construction phase will be imperceptible and short term.

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. The application of binding noise limits, hours of operation, along with implementation of the mitigation measures, as identified in Chapter 8 and the CEMP, will ensure that noise and vibration impact will have a negative, moderate, and short-term impact on the surrounding environment.

The impact due to the increased traffic associated with the operational development is expected to be neutral, imperceptible, and long-term.

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, and the impact is expected to be imperceptible.

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. As a result, the impact will be temporary, imperceptible and neutral/ negative.

5. Population & Human Health / Landscape
Existing residents and visitors to the Brennanstown Road area interact with the landscape, such that they will be aware of a significant change at this site from a vacant site to a new residential development with a mix of unit types, building heights, open spaces etc. Chapter 10 notes that this change is neutral as the site has a key role in the consolidation of the area.

6. Population & Human Health / Traffic
Chapter 11 notes that, provided the mitigation measures and management procedures outlined in the Construction Management Plan are incorporated during the Construction Phase, the residual impact upon the local receiving environment is predicted to be temporary in the nature and slight in terms of effect.

Once complete, the proposed development will operate well within capacity during the AM and PM peak hours in the 2026 + Proposed Development (Opening Year) scenario and would continue to do so for the future assessments.

7. Population & Human Health / Waste
As noted in Chapter 13, a carefully planned approach to waste management as set out in the mitigation measure, and adherence to the Recourse Waste Management Plan (which include mitigation) during the construction phase will ensure that the effect on the environment will be ***short-term, imperceptible*** and ***neutral***.

During the operational phase, a structured approach to waste management as set out in Section 13.7 and adherence to the OWMP (which include mitigation) 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 effect of the operational phase on the environment will be long-term, imperceptible and neutral.

8. Population & Human Health / Materials Assets
There is the potential for contamination of potable water supply, gas leaks or explosions, loss of supply of services. With the implementation of the mitigation measures in Chapter 14 the impact of the proposed built services on human health is likely to be imperceptible.

9. Biodiversity / Soils
With the protective measures noted above in place during Construction Phase and for excavation works, any potential impacts on soils and geology at the Site and surrounding area will be avoided and there will be no significant adverse impacts on the land, soils and geology of the subject lands are envisaged. There are no predicted significant adverse impacts are predicted on land, soils or geology associated with the Operational Phase of the Proposed Development.

10. Biodiversity / Water
As noted in chapter 5, the proposed site is uphill of the Carrickmines Stream. In the absence of mitigation runoff, the construction elements of the project could impact negatively on the biodiversity within the watercourses and within the shallow marine environment. Following the implementation of the mitigation measures, it is expected that no significant residual effects are likely to arise to biodiversity.

As concluded in the Natura Impact Assessment submitted with the application, following the implementation of the mitigation measures outlined, the construction and presence of this development would not be deemed to have a significant impact on the integrity of European sites.

11. 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 neutral, imperceptabile and long-term.

12. Biodiversity / Landscape
The changes to the landscape of the subject site are predicted to have a neutral imperceptible effect on biodivesity.

The proposed landscape masterplan includes the planting of native trees and other vegetation. This will have a positive, moderate, likely and permanent on biodiversity.

13. Soils / Water
The construction phase could result in uncontrolled sediment erosion, contaminated silty run-off, and pollution of surface waters by mobilised suspended solids. Mitigation measures, as outlined in Chapter 7 and the CEMP, will be implemented during construction to prevent these potential impacts. As a result the impact will be imperceptible and short-term.

14. Soils / Air
Exposed soil during the construction phase of the proposed scheme will give rise to increased dust emissions. Chapter 9 notes that when the dust management measures, as outlined in Chapter 9, are implemented, fugitive emissions of dust from the site will be neutral effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.

15. Soils/Landscape
Residual soils arising as a result of excavation at the development site will be used in landscaping works in the proposed public open spaces as much as possible rather than transporting off-site. This impact will be imperceptible and long-term.

15. Landscape / Cultural Heritage
In conservation terms, the potential impact of the proposed development during construction phase will be positive. The demolition and removal works will significantly change the character and nature of the existing arrangement at Barrington's Tower will facilitate the repair and conservation of the historically significant Barrington's Tower.

The insertion of a new stair will result in significant visual impact to the interior of the structure removal of the badly damaged and decayed internal fixtures and fittings and insertion of a new stair will allow for the internal masonry walls and windows to be fully conserved and repaired. This will have a moderate – positive impact.

The proposed conservation works are contained within the historic structure, where much original fabric is already lost. Windows will be repaired, masonry repointed and a new roof, not visible externally, will be added behind the parapet repair and conservation of this protected structure on site, to reinstate it as a prospect tower is a positive effect. This present opportunities for conservators to repair this structure and keep it intact and safeguard it for the future. This will have a slight – positive impact.

During the operational phase of the development, the position of Blocks AB and CD, and Block E in particular – closest to Barrington's Tower – will have a visual impact on the setting of Barrington Tower. However, this impact has been mitigated by design, with the inclusion of open views, and the stepping down of Block E to respond to the tower, and this impact is now considered moderate and acceptable.

Sightlines to Barrington's Tower will be affected by the new buildings, but a number of primary sightlines to the structure will be maintained, due to the proposed mitigation measures. A new view of Barrington's Tower will be provided from Brennanstown Road.

The tower was last used for residential purposes, incorporated into a large house extension to the side of the tower. This change of use will in fact change it back to its original function, that of a prospect tower, or folly within a landscape. The character of the tower will be restored, though the landscape into which it once stood is lost.

17 SUMMARY OF MITIGATION MEASURES

17.1 INTRODUCTION

Given the complexity of the proposed development and this EIAR, this chapter seeks to provide a complete summary of mitigation measures proposed in Chapters 4 to 16. The appointed contractor will be required to adhere to the mitigation contained in the EIAR. Monitoring of the effectiveness of mitigation measures put forward in the EIAR document by the competent authorities is also integral to the process.

17.2 CONSTRUCTION PHASE

Population and Human Health	A preliminary Construction and Environmental Management Plan (CEMP) has been prepared by AWN and will be implemented during the construction phase to reduce the detrimental effects of the construction phase on the environment and local population and is submitted with this application. While this preliminary CEMP provides the baseline of measures that will be implemented, a more detailed CEMP will be formally agreed in writing with the planning authority in writing prior to the commencement of the development and will incorporate any required updates, such as those amended by any condition of planning. Construction noise and vibration impacts are expected to vary during the construction/demolition phase depending on the distance between the activities and noise sensitive buildings and that best practice control measures will ensure impacts at off-site noise sensitive locations are minimised. These are outlined in detail in Chapter 8. Chapter 11 Traffic and Transportation and the CEMP submitted with the application include traffic management measures to minimise the impact of construction traffic. These measures are put forward to avoid any significant negative environmental impacts on the population and human health. No additional mitigation measures are considered necessary.
Biodiversity	A CEMP was been prepared by AWN Consulting (AWN) on behalf of Cairn Homes Property Limited. The CEMP outlines the following mitigaiotn that would prevent adverse effects on the integrity the conservation objectives of Rockabill to Dalkey SAC: **"Surface Water Management** Run-off into excavations/earthworks cannot be prevented entirely and is largely a function of prevailing weather conditions. Care will be taken to ensure that exposed soil surfaces are stable to minimise erosion. All exposed soil surfaces will be within the main excavation site which limits the potential for any offsite impacts. All run-off will be prevented from directly entering into any water courses as no construction will be undertaken directly adjacent to open water. No significant dewatering will be required during the construction phase which would result in the localised lowering of the water table. There may be localised pumping of surface run-off from the excavations during and after heavy rainfall events to ensure that the excavation is kept relatively dry. The following measures will be put in place during the construction phase to ensure protection of surface waterbodies. Construction works are informed by best practice guidance from Inland Fisheries Ireland on the prevention of pollution during development projects: • Control of Water Pollution from construction Sites, Guidance for consultants and contractors (C532); and • Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (2016). • Environmental Good Practice on Site (3rd edition) (C692). Surface water discharge from the site will be managed and controlled for the duration of the construction works until the permanently attenuated surface water drainage system of the proposed site is complete. A temporary drainage system shall be installed prior to the commencement of the construction works to collect surface water runoff by the site during construction.

It is envisaged that a number of geotextile lined settling basins and temporary mounding's and/or silt fences will be installed to ensure silts do not flow off site during the construction stage. This temporary surface water management facility will throttle runoff and allow suspended solids to be settled out and removed. All inlets to the settling basins will be 'riprapped' to prevent scour and erosion in the vicinity of the inlet.

Pollution Control

Management of Suspended solids in run-off

Any temporary storage of spoil, hardcore, crushed concrete or similar material will be stored as far as possible from any surface water drains and also stored in receptacles where possible. In order to minimise the risk of contamination, the stockpiled material will be removed off-site as soon as possible. Surface water drain gratings in areas near or close to where stockpiles are located will be covered by appropriate durable polyurethane covers or similar.

There will be no direct pumping of silty water from the works to any watercourse. Sediment entrapment facilities will be installed to reduce sediment discharges to downstream properties and receiving waters. All run-off leaving a disturbed area should pass through a sediment entrapment facility before it exits the site and flows downstream such as straw bales, silt fencing, silt barriers and diversion dams.

Concrete Run-off

No wash-down or wash-out of ready-mix concrete vehicles during the construction works will be carried out at the site within 10 meters of an existing surface water drainage point. Wash-outs will only be allowed to take place in designated areas with an impervious surface.

Accidental Spills and Leaks

No bulk chemicals will be stored within the active construction areas. Temporary oil and fuel storage tanks will be kept in the material storage area in suitable containers and will be appropriately bunded as required. Refuelling of vehicles and the addition of hydraulic oils or lubricants to vehicles will take place in designated areas of the site, where possible, which will be kept away from surface water drains.

Spill protection equipment such as absorbent mats, socks and sand will be available to be used in the event of an accidental release during refuelling. Training will be given to appropriate site workers in how to manage a spill event.

The following mitigation measures will be taken at the construction site in order to prevent any spillages to ground of fuels during machinery activities and prevent any resulting soil and/or groundwater quality impacts:

- Refuelling will be undertaken off site where possible;
- Where mobile fuel bowsers are used the following measures will be taken:
  - Any flexible pipe, tap or valve will be fitted with a lock and will be secured when not in use;
  - The pump or valve will be fitted with a lock and will be secured when not in use;
  - All bowsers must carry a spill kit;
  - Operatives must have spill response training; and
  - Portable generators or similar fuel containing equipment will be placed on suitable drip trays.

Monitoring

Weekly checks will be carried out to ensure surface water drains are not blocked by silt, or other items, and that all storage is located at least 10m from surface water receptors. A regular log of inspections will be maintained, and any significant blockage or spill incidents will be recorded for root cause investigation purposes and updating procedures to ensure incidents do not reoccur.

Dust Control Measures

The aim is to ensure good site management by avoiding dust becoming airborne at source. This will be done through good design, planning and effective control strategies. The siting of construction activities and the limiting of stockpiling will take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance. In addition, good site management will include the ability to respond to adverse weather conditions by either restricting operations on-site or using effective control measures quickly before the potential for nuisance occurs.

- During working hours, technical staff will be available to monitor dust levels as appropriate; and
- At all times, the dust management procedures put in place will be strictly monitored and assessed.

The dust minimisation measures should 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 generation. In the event of dust nuisance occurring outside the site boundary, site activities should be reviewed, and procedures implemented to rectify the problem. Specific dust control measures to be employed are presented below.

Site Routes

Site access routes (particularly unpaved areas) can be a significant source of fugitive dust from construction sites if control measures are not in place. The most effective means of suppressing dust emissions from unpaved roads is to apply speed restrictions. Studies show that these measures can have a control efficiency ranging from 25% to 80% [14].

- A speed restriction of 20 km/hr will be applied as an effective control measure for dust for on-site vehicles or delivery vehicles within the vicinity of the site;
- Bowsers will be available during periods of dry weather throughout the construction period. Research shown found that the effect of surface watering is to reduce dust emissions by 50%. The bowser will operate during dry periods to ensure that unpaved areas are kept moist. The required application frequency will vary according to soil type, weather conditions and vehicular use; and
- Any hard surface roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced areas shall be restricted to essential site traffic only.

Excavation

Excavation works during periods of high winds and dry weather conditions can be a significant source of dust.

- During dry and windy periods, and when there is a likelihood of dust nuisance, watering shall be conducted to ensure moisture content of materials being moved is high enough to increase the stability of the soil and thus suppress dust;
- During periods of very high winds (gales), activities likely to generate significant dust emissions will be postponed until the gale has subsided.

The movement of truck containing materials with a potential for dust generation to an off-site location will be enclosed or covered.

Stockpiling

The location and moisture content of stockpiles are important factors which determine their potential for dust emissions. The following measures will be put in place:

- Overburden material will be protected from exposure to wind by storing the material in sheltered parts of the site, where possible;
- Regular watering will take place during dry/windy periods to ensure the moisture content is high enough to increase the stability of the soil and suppress dust
-

Site Traffic on Public Roads

Spillage and blow-off of debris, aggregates and fine material onto public roads will be reduced to a minimum by employing the following measures:

- Vehicles delivering material with potential for dust emissions to an off-site location shall be enclosed or covered at all times to restrict the escape of dust;
- Any hard surface site roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only.
- A power washing facility or wheel cleaning facility will be installed near to the site compound for use by vehicles exiting the site when appropriate, and an example of the washing equipment can be seen in Insert 7.1; and
- Road sweepers will be employed to clean the site access route as required.

General

The pro-active control of fugitive dust will ensure that the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released, will contribute towards the satisfactory management of dust by the construction contractor.

Ecology

The key strategies to be undertaken to minimise impact on the local flora and fauna during site clearing and construction are as follows.

- All site clearance works will comply with current legislative requirements and best practice;
- Taking measures to limit the working area during the construction phase will reduce the impacts of the development on adjacent areas. The construction area will be clearly delimited by the site boundary and machinery should operate only within this allocated site area;
- All re-fuelling of plant, equipment and vehicles will be carried out at the construction site boundary. All fuels, chemicals, liquid and solid waste will be stored in areas bunded in accordance with established best practice guidelines at the construction compound also; and Provision of spill kits;
- Provision of a water and sediment management plan, providing for means to ensure that surface water run-off is controlled such that no silt or other pollutants enter local water courses or drains; a
- The measures outlined in Section 7.6 for the EIAR will ensure that silt run-off and potential flooding risks are minimised which will protect any ecological receptors associated with the site.
- Construction lighting will be designed so as to be sensitive to the potential presence of bats and should adhere to the following guidance:
  - Bats & Lighting: Guidance Notes for Planners, engineers, architects and developers (Bat Conservation Trust, 2010) [15];
  - Guidance Notes for the Reduction of Obtrusive Light GN01 (Institute of Lighting Professionals, 2011) [16];
  - Bats and Lighting in the UK – Bats and the Built Environment Series (Bat Conservation Trust UK, January 2018) [17].
- As outlined in the Bat Assessment prepared by Bat Eco Services [18], an NPWS Derogation License will be required to allow the disturbance to bat roosting as a result of the conservation works on Barrington Tower.
- To ensure that there is a roosting resource available during conservation works of Barrington Tower, a “Bat House” constructed to accommodate the three bat species recorded roosting in Barrington Tower. This will be constructed prior to proposed works on Barrington Tower and it will be located close to woodland and the Loughlinstown River (Ticknick Stream) in order to provide connectivity to suitable foraging and commuting routes. Landscaping and lighting plans adjacent to the proposed location of the “Bat House” has also been sensitively designed to prevent disturbance to roosting bats during the operation of the proposed development site (Bat Assessment, Bat Eco Services 2022).
- A bat scheme will be erected to mitigate the removal of trees. These will be erected prior 6 months to tree felling to allow local bat populations to become aware of it prior to removal of the structure (Bat Assessment, Bat Eco Services 2022).
- An ecologist will be appointed to oversee site clearance, reprofiling, construction and landscaping of the proposed project.
- Tree retention will be carried out as outlined in the arborist report.
- A specific site clearance, reprofiling and phasing plan will be provided to the arborist and project ecologist for approval prior to any site clearance or works commencing on site. No site clearance works will commence on site until approval has been provided by the arborist and project ecologist for the works to commence.
- All site clearance, reprofiling and enabling works will be approved and monitored by the arborist and project ecologist to ensure that the integrity of the remaining habitats on site are maintained.
- All works in the riparian corridor will be carried out in consultation with and to the satisfaction of Inland Fisheries Ireland and the project ecologist, following the best practice guidelines for construction in the vicinity of watercourses. All works on site and in the riparian corridor will include mitigation measures to prevent silt from runoff during works as set out below.
- Abstraction of water from the watercourse will not be permitted.
- Relevant guidelines and legislation (Section 40 of the Wildlife Acts, 1976 to 2012) in relation the removal of woody vegetation to outside bird nesting season will be carried out. Should this not be possible, a pre-works check by a qualified ecologist should be undertaken to ensure nesting birds are absent. If bird nests are present the woody vegetation will not be removed unless a derogation licence has been provided by NPWS and the conditions applied.
- 60 nest boxes placed on site during landscaping to compensate for resource loss.
- Light falling upon any areas of benefit to birds such as hedgerow will not exceed 3 lux to ensure that resting and nesting species are not unnecessarily disrupted.
- A pre construction survey for invasive species, bats and terrestrial mammals will be carried out. This will include an inspection for resting and breeding places for both terrestrial mammals and bats. Should resting or breeding places be found a derogation licence will be acquired from NPWS and conditions followed prior to works commencing in the vicinity of the resting or breeding place.
- Lighting at all stages should be done sensitively on site as directed by the project ecologist, with no direct lighting of hedgerows and treelines.

Land, Soil and Geology	Mitigation measures will be adopted as part of the construction works on the Site. The measures will address the main activities of potential impact which include: • Groundworks including excavation and management and control of soil during bulk excavation and export from the Proposed Development; • Management and control of imported soil and aggregates from off-site sources; • Fuel and Chemical handling, transport and storage; and • Accidental release of contaminants . **Bulk Excavation** . To prevent any potential issues with slope stability during bulk excavation in soil appropriate measures will be implemented by the appointed contractor. There is no identified requirement for mitigation measures for excavation of bedrock. Where required, suitable batters or retained vertical walls will need to be maintained on excavation faces in particular where there are granular soils are present. The geotechnical report (SIL, 2020) sets out recommendations for the management of temporary sloped sides for excavations of 33º, or 1:1.5 and where excavations extend to stiffer CLAY the temporary slope angle could be increased to 45º, or 1:1. The report also recommends that temporary slope protection measures should be considered to minimise the risk of spalling, that excavated surfaces in clay strata should be kept dry to avoid softening prior to formation placement and that relevant laboratory testing should be specified where stability of side slopes to excavations is a concern. The contractor will ensure the specification for any required mitigation measures are overseen by an appropriately qualified geotechnical Engineer to ensure that ground conditions are engineered and controlled appropriately during excavation of soil and bedrock and any potential impacts are avoided. **Soil Structure** The extent of the required work area and batter for bulk excavation at the Site will be minimised where appropriate to prevent unnecessary excavation of soil and tracking over soil and subsoil outside of the excavation work areas as a result of compaction and rutting from construction traffic. Dedicated internal haul routes will established and maintained by the contractor to prevent tracking over unprotected soils. Exclusion zones will be established where soft landscaping is proposed in particular along Site boundaries which are outside of the areas where excavation to ensure soil structure is maintained. **Management of Stockpiles (soil and other materials / wastes)** Segregation and storage of soils for re-use onsite or removal offsite and waste for disposal off site will be segregated and temporarily stored on-site (pending removal or for re-use on-site) in accordance with the CDWMP (AWN Consulting Ltd., 2022) and the CEMP (AWN Consulting Ltd., 2022). The reuse of up to 1,410$m^3$of excavated soil and bedrock for the Proposed Development (i.e., engineered fill, profiling green areas) will be undertaken in accordance with the engineered design and landscape plan for the Proposed Development. Soil including topsoil and subsoil will be segregated and stored appropriately to prevent deterioration of soil structure and quality to ensure the material will be suitable for re-use onsite. Material surplus to onsite requirements will be segregated and stockpiled appropriately for removal offsite in accordance with the resource and material management plan. For any excavated material identified for removal offsite, while assessment and approval of acceptance at a destination re-use, recovery site or waste facility is pending, excavated soil for recovery/disposal shall be stockpiled as follows: • A suitable temporary storage area shall be identified and designated. • All stockpiles shall be assigned a stockpile number. • Material identified for reuse on site, off site and waste materials will be individually segregated; and all segregation, storage & stockpiling locations will be clearly delineated on the Site drawings. • Soil stockpiles will be sealed to prevent run-off from the stockpiled material generation and/or the generation of dust. • Any waste that will be temporarily stored / stockpiled will be stored on impermeable surface high-grade polythene sheeting, hardstand areas or skips to prevent cross-contamination of the soil below or cross contamination with soil. The location and moisture content of storage piles are important factors which determine their potential for dust emissions. • Overburden material will be protected from exposure to wind by storing the material in sheltered regions of the Site;

- Regular watering will take place to ensure the moisture content is high enough to increase the stability of the soil and thus suppress dust.
- Stockpiles will not be located near Site boundaries or sensitive receptors and a set-back of 100m will be maintained from any boundary with offsite receptors.

When a stockpile has been sampled for classification purposes, it shall be considered to be complete and no more soil shall be added to that stockpile prior to removal off site. An excavation/stockpile register shall be maintained on-site
Waste will be stored on-site, including concrete, asphalt and soil stockpiles, in such a manner as to:

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

Export of Resource and (soil and bedrock) and Waste
All surplus materials and any waste will be removed off-site in accordance with the requirements outlined in the CDWMP (AWN Consulting Ltd., 2022) and the CEMP (AWN Consulting Ltd., 2022) and will be managed in accordance with all legal obligations. It will be the contractor's responsibility to either; obtain a waste collection permit or, to engage specialist waste service contractors who will possess the requisite authorisations, for the collection and movement of waste off-site.

The re-use of soil offsite will be undertaken in accordance with all statutory requirements and obligations including where appropriate re-use as by-product in accordance with Article 27 of the European Communities (Waste Directive) Regulations 2011 (SI No. 126 of 2011) as amended.

Any surplus soil not suitable for re-use as a by-product and other waste materials arising from the Construction Phase will be removed offsite by an authorised contractor and sent to the appropriately authorised (licensed/permitted) receiving waste facilities. As only authorised facilities will be used, the potential impacts at any authorised receiving facility sites will have been adequately assessed and mitigated as part of the statutory consent procedures.

Any waste soils will be transported under a valid waste collection permit issued under the Waste Management (Collection Permit) Regulations 2007, as amended and will be delivered to an appropriately authorised waste management facility.

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

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

Public roads outside the Site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary. The wheels of all Lorries will be cleaned prior to leaving the Site so that traffic leaving the Site compound will not generate dust or cause the build-up of aggregates and fine material in the public domain. A wheel-wash will be installed at the egress point if required and a road sweeper will be deployed to ensure that public roads are kept free of debris.

Import of Aggregates
Contract and procurement procedures will ensure that all aggregates and fill material required are sourced from reputable suppliers operating in a sustainable manner and in accordance with industry conformity and compliance standards and statutory obligations.
The importation of aggregates will be subject to management and control procedures which will include testing and assessment of the suitability for use in accordance with engineering and environmental specifications for the Proposed Development including the suitability of material that may be imported in accordance with an Article 27 By-Product Notification. Therefore, any unsuitable material will be identified and avoided prior to importation to the Site.

Handling of Chemicals, and Fuel
Fuel, oils and chemicals used during construction are classified as hazardous.

Storage of fuel hazardous will be undertaken with a view to protecting any essential services (electricity, water etc.) and the receiving water environment.

Bulk quantities of fuel will not be stored at the Site and fuel required for plant and equipment will be delivered directly from a delivery tanker. Fuel will only be stored in the quantities required for emergency use.

	Oils and chemicals used and stored on-site will be sealed, secured and stored in a dedicated internally bunded chemical storage cabinet unit or inside concrete bunded areas to prevent any seepage to ground. There will be clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage. All drums to be quality approved and manufactured to a recognised standard. If drums are to be moved around the Site, they will be secured and moved on spill pallets. Drums will be loaded and unloaded by competent and trained personnel using appropriate equipment. • Bunds will comply with the requirements of Environmental Protection Agency guidelines 'Storage and Transfer of Materials for Scheduled Activities' (EPA, 2004) and Enterprise Ireland. Best Practice Guide BPGCS005. Oil Storage Guidelines. All tank and drum storage areas will, as a minimum, be bunded to a volume not less than the greater of the following: • 110% of the capacity of the largest tank or drum within the bunded area; or • 25% of the total volume of substance that could be stored within the bunded area. • Vehicle or equipment maintenance work will take place in a designated impermeable area within the Site; • Emergency response procedures will be put in place, in the unlikely event of spillages of fuels or lubricants; • Spill kits including oil absorbent material will be provided so that any spillage of fuels, lubricants or hydraulic oils will be immediately contained; • In the event of a leak or spill from equipment in the instance of a mechanical breakdown during operation, any contaminated soil will be removed from the Site and compliantly disposed off-site. Residual soil will be tested to validate that all potentially contaminated material has been removed. This procedure will be undertaken in accordance with industry best practice procedures and EPA guidelines; • Site staff will be familiar with emergency procedures for in the event of accidental fuel spillages; and • All staff on-site will be fully trained on the use of equipment to be used on-site. • Portable generators or similar fuel containing equipment will also be placed on suitable drip trays or bunds. Refuelling of plant and vehicles during the Construction Phase will only be permitted at designated refuelling station locations onsite. Each station will be fully contained and equipped for spill response and a specially trained and dedicated Environmental and Emergency Spill Response team will be appointed by the Contractor before the commencement of works onsite. A procedure will be prepared by the appointed contractor which will be adhered to during refuelling of on-site vehicles and plant. This will include the following: • Fuel will be delivered to plant on-site by dedicated tanker; • All deliveries to on-site vehicles will be supervised and records will be kept and retained onsite of delivery dates and volumes; • The driver will be issued with, and will carry at all times, absorbent sheets and granules to collect any spillages that may accidentally occur; • Where the nozzle of a fuel pump cannot be placed into the tank of a machine then a funnel will be used; and • All re-fuelling will take place in a designated impermeable area to be specified by the contractor. In addition, oil absorbent materials will be kept on-site in close proximity to the re-fuelling area. **Welfare Facilities** Welfare facilities have the potential, if not managed appropriately, to release organic and other contaminants to ground or surface water courses. All waste from welfare facilities will be managed in accordance with the relevant statutory obligations through either a temporary connection to mains foul sewer (subject to receipt of the relevant consent from IW) which will be constructed in accordance with IW and WCC guidelines or by tankering of waste offsite by an appropriately authorised waste contractor. **Concrete Works** The cementitious grout and other concrete works during the Construction Phase, will avoid any contamination of ground through the use of appropriate design and methods implemented by the Contractor and in accordance with industry standards. All ready-mixed concrete shall be delivered to the Site by truck. Concrete mixer trucks will not be permitted to wash out on-site with the exception of cleaning the chute into a container which will then be emptied into a skip. A suitable risk assessment for wet concreting shall be completed prior to works being carried out.
Hydrology and Hydrogeology	All construction activities will be managed in accordance with detailed procedures to be prepared by the appointed contractor taking account of the requirements of the Construction Environmental Management Plan (CEMP) (AWN Consulting Limited, 2022) for the Proposed Development and the design avoidance and mitigation measures outlined in this EIAR Chapter. **Surface and Groundwater Management**

It is expected that groundwater will be encountered during the construction works in particular the excavation for the basement, underground attenuation tank and other structures in the central portion of the Site. Where working in the dry is required, impermeable barriers may be considered by the contractor methodology. As outlined in Section 7.5 there may be a localised impact on groundwater levels with localised mounding of groundwater levels if any such impermeable barriers are used. The Hydrogeological Assessment (Enviroguide Consulting, 2022) (refer to Appendix 7-1) identifies that incorporating standard construction and drainage measures such as groundwater drainage layers around impermeable subsurface structures will minimise impacts of groundwater mounding.

The dewatering methodologies implemented by the contractor will ensure that the identified potential localised impact on the local groundwater levels and flow regime is prevented. Therefore, there will be no impact on habitats and receptors along Site boundaries and offsite associated with any required dewatering.

The methodologies to be implemented by the contractor could include the requirement for discharge of groundwater downgradient of the dewatering works area to minimise any hydrogeological impact on sensitive receptors. Where water is pumped from the excavations, water will be managed through robust dewatering and water treatment methodologies in accordance with best practice standards (CIRIA – C750) and regulatory consents. Discharge of groundwater to ground as part of the dewatering will be undertaken in accordance with the EPA (2011) '*Guidance on the Authorisation of Discharges to Groundwater*'.

Where necessary, the water from dewatering or works areas will be stored and treated onsite (e.g. in settlement/filtration tanks or hydrocarbon separation systems as appropriate) to remove sediment or other potentially contaminating compounds. In the even that treated water is unsuitable for discharge to ground in accordance with EPA guidance (EPA, 2011) water will tankered offsite or discharged to foul sewer under consent of from Irish Water in accordance with Local Government (Water Pollution) Act 1977, as amended. Any such discharge to sewer is likely to be subject to conditions regarding the flow (rates of discharge, quantity etc.); effluent quality prior to discharge and pre-treatment and monitoring requirements.

Straw bales or silt fences will be appropriately located near water-courses to prevent untreated surface and surface water run-off entering any watercourse. A buffer zone of 10m will be established between the silt trap and the watercourse with natural vegetation left intact. The Contractor will be required in accordance with the CEMP to ensure that no contaminated water/liquids leave the Proposed Development Site (as surface water and surface water run-off or otherwise), enter the local drainage system or direct discharge drainage ditches or water courses.

A regular review of weather forecasts of heavy rainfall will be conducted during works, and a contingency plan will be prepared for before and after such events to minimise any potential nuisances. As the risk of the break-out of silt laden run-off is higher during these weather conditions, no work will be carried out during such periods where possible.

Any erosion control measures (i.e. silt-traps, silt-fencing and swales) will be maintained during the Construction Phase.

If a discharge licence is obtained from Irish Water for discharges to sewer, specified monitoring will be undertaken by the contractor in accordance with the licence conditions.

Groundwater level monitoring prior to construction is recommended to ensure up to date information on groundwater levels is compiled prior to commencing construction.

Management of In-stream Works
A 10m buffer will be retained on either side of the Carrickmines Stream south of the Proposed Development Site and construction works and site traffic will only be permitted within this 10m buffer to facilitate instream works to enable construction of the outfall drainage to the Carrickmines Stream.

All instream works or works carried out adjacent to the watercourse, will follow the guidelines published by Inland Fisheries Ireland (IFI) Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters (2016) and The National Roads Authority (now Transport Infrastructure Ireland) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes.

Surplus Soil and Stone
Surplus soil and stone materials will be stockpiled pending removal offsite or reuse onsite and will be located in in designated areas that will be identified in the contractor's CEMP. There will be no storage of materials within 10m of any surface water features/drainage/ditches. Where necessary, stockpiles will be surrounded with silt fencing to filter out any suspended solids from surface water arising from these materials.

Importation of Soil and Aggregate

Contract and procurement procedures will ensure that all aggregates and fill material required are sourced from reputable suppliers operating in a sustainable manner and in accordance with industry conformity and compliance standards and statutory obligations.
The importation of aggregates will be subject to management and control procedures which will include testing and assessment of the suitability for use in accordance with engineering and environmental specifications for the Proposed Development including the suitability of material that may be imported in accordance with an Article 27 By-Product Notification. Therefore, any unsuitable material will be identified and avoided prior to importation to the Site.

Concrete Works and use of Cementitious Material
The use of cementitious grout to be used during the construction of the basement and drainage channels and connections to Carrickmines Stream south of the Site, will avoid any contamination of ground through the use of appropriate design and methods implemented by the Contractor and in accordance with industry standards.

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

If cast-in-place concrete or grout is required, all work will be carried out in dry conditions and be effectively isolated from any water courses or drainage ditches. Pouring of concrete for aprons, sills, and other works should be carried out in dry conditions and allowed cure for 48 hours before re-flooding. Pumped or tremied concrete should be monitored carefully to ensure no accidental discharge into the watercourses. Concrete works for in-stream works will be carried out in accordance with the procedures outlined above under “Management of In stream Works”.

Piling Methodology

The proposed piling methodology will minimise the potential for introduction of any temporary conduit between surface and potential sources of contamination at the ground surface and underlying groundwater. The piling method will be determined by the contractor however the method will include procedures to ensure any potential impact to water quality is prevented. These will include preventing surface runoff or other piling/drilling fluids from entering the pile bores. Where there is a requirement to use lubricants, drilling fluids or additives the contractor will be required to use water-based, biodegradable and non-hazardous compounds.

Boreholes

Existing monitoring boreholes that are no longer required at the Site will be decommissioned in accordance with the specifications outlined in EPA Advice Noted 14 (EPA, 2013). This will remove any potential direct conduit for contaminants to enter the groundwater directly.

Handling of fuels and Hazardous Materials
Fuel, oils and chemicals used during construction are classified as hazardous.

Storage of fuel hazardous will be undertaken with a view to protecting any essential services (electricity, water etc.) and the receiving water environment.

Bulk quantities of fuel will not be stored at the Site and fuel required for plant and equipment will be delivered directly from a delivery tanker. Fuel will only be stored in the quantities required for emergency use.

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

All drums to be quality approved and manufactured to a recognised standard. If drums are to be moved around the Site, they will be secured and moved on spill pallets. Drums will be loaded and unloaded by competent and trained personnel using appropriate equipment.

- Bunds will comply with the requirements of Environmental Protection Agency guidelines ‘Storage and Transfer of Materials for Scheduled Activities’ (EPA, 2004) and Enterprise Ireland. Best Practice Guide BPGCS005. Oil Storage Guidelines. All tank and drum storage areas will, as a minimum, be bunded to a volume not less than the greater of the following:
- 110% of the capacity of the largest tank or drum within the bunded area; or
- 25% of the total volume of substance that could be stored within the bunded area.
- Vehicle or equipment maintenance work will take place in a designated impermeable area within the Site;
- Emergency response procedures will be put in place, in the unlikely event of spillages of fuels or lubricants;

	• Spill kits including oil absorbent material will be provided so that any spillage of fuels, lubricants or hydraulic oils will be immediately contained; • In the event of a leak or spill from equipment in the instance of a mechanical breakdown during operation, any contaminated soil will be removed from the Site and compliantly disposed off-site. Residual soil will be tested to validate that all potentially contaminated material has been removed. This procedure will be undertaken in accordance with industry best practice procedures and EPA guidelines; • Site staff will be familiar with emergency procedures for in the event of accidental fuel spillages; and • All staff on-site will be fully trained on the use of equipment to be used on-site. • Portable generators or similar fuel containing equipment will also be placed on suitable drip trays or bunds. Refuelling of plant and vehicles during the Construction Phase will only be permitted at designated refuelling station locations onsite. Each station will be fully contained and equipped for spill response and a specially trained and dedicated Environmental and Emergency Spill Response team will be appointed by the Contractor before the commencement of works onsite. A procedure will be prepared by the appointed contractor which will be adhered to during refuelling of on-site vehicles and plant. This will include the following: • Fuel will be delivered to plant on-site by dedicated tanker; • All deliveries to on-site vehicles will be supervised and records will be kept and retained onsite of delivery dates and volumes; • The driver will be issued with, and will carry at all times, absorbent sheets and granules to collect any spillages that may accidentally occur; • Where the nozzle of a fuel pump cannot be placed into the tank of a machine then a funnel will be used; and • All re-fuelling will take place in a designated impermeable area to be specified by the contractor. In addition, oil absorbent materials will be kept on-site in close proximity to the re-fuelling area. **Welfare Facilities** Welfare facilities have the potential, if not managed appropriately, to release organic and other contaminants to ground or surface water courses. All waste from welfare facilities will be managed in accordance with the relevant statutory obligations through either a temporary connection to mains foul sewer (subject to receipt of the relevant consent from IW) which will be constructed in accordance with IW and DLRCC guidelines or by tankering of waste offsite by an appropriately authorised waste contractor.
Noise and Vibration	**Noise** The contract documents will clearly specify the construction noise criteria included in this chapter which the construction works must operate within. The Contractor undertaking the construction of the works will be obliged to take specific noise abatement measures and comply with the recommendations of BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites - Noise and the European Communities (Noise Emission by Equipment for Use Outdoors) Regulations, 2001. These measures will ensure that: • No plant used on site will be permitted to cause an ongoing public nuisance due to noise; • The best means practicable, including proper maintenance of plant, will be employed to minimise the noise produced by on site operations; • All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the contract; • Compressors will be attenuated models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers; • Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use; • Any plant, such as generators or pumps that is required to operate outside of normal permitted working hours will be surrounded by an acoustic enclosure or portable screen; BS 5228 -1:2009+A1 2014 includes guidance on several aspects of construction site practices, which include, but are not limited to: • Selection of quiet plant • Control of noise sources • Screening • Hours of work • Liaison with the public

Further comment is offered on these items in the following paragraphs, however specific control measures relating to construction activities undertaken by the contractor will be set out within the Construction Environmental Management Plan (CEMP) to be prepared in advance of the works. An Outline Construction Environmental Management Plan (OCEMP) has been prepared as part of this application to address the key environmental impacts and sets out the key environmental controls. In relation to noise and vibration control the OCEMP includes outline best practice measures from BS 5228 (2009 +A1 2014). These are also discussed in the following sections.

Noise control measures that will be considered include the selection of quiet plant, enclosures and screens around noise sources, limiting the hours of work and noise monitoring. The contractor will be required to conduct construction noise predictions prior to works taking place and put in place the most appropriate noise control measures depending on the level of noise reduction required at any one location.

Selection of Quiet Plant

The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. The least noisy item of plant will be selected wherever possible. Should a particular item of plant already on the site be found to generate high noise levels, the first action will be to identify whether or not said item can be replaced with a quieter alternative.

For static plant such as compressors and generators used at work areas such as construction compounds etc., the units will be supplied with manufacturers' proprietary acoustic enclosures where possible.

In order to reduce noise levels during the works phases with highest noise levels (site clearance, demolition, ground breaking etc.) when occurring along the closest boundaries, the contractor will evaluate the choice of excavation, breaking or other working method taking into account various ground conditions and site constraints. Where possible, where alternative lower noise generating equipment that would economically achieve, in the given ground conditions, equivalent structural / excavation / breaking results, these will be selected to minimise potential disturbance.

The decision regarding the excavation techniques, rock breaking, crushing etc. to be used on a site will normally be governed by other engineering, environmental constraints. In these instances, it may not be possible for technical reasons to replace a noisy process by a quieter alternative. Even if it is possible, the adoption of a quieter method may prolong the overall process, the net result being that the overall disturbance to the community will not necessarily be reduced.

General Comments on Noise Control at Source

If replacing a noisy item of plant is not a viable or practical option, consideration will be given to noise control "at source". This refers to the modification of an item of plant, or the application of improved sound reduction methods in consultation with the supplier or the best practice use of equipment and materials handling to reduce noise.

- For mobile plant items such as cranes, dump trucks, excavators and loaders, the installation of an acoustic exhaust and/or maintaining enclosure panels closed during operation can reduce noise levels by up to 10 dB. Mobile plant will be switched off when not in use and not left idling;
- For piling plant, noise reduction can be achieved by enclosing the driving system in an acoustic shroud. For steady continuous noise, such as that generated by diesel engines, it is possible to reduce the noise emitted by fitting a more effective exhaust silencer system or utilising an acoustic canopy to replace the normal engine cover;
- For percussive tools such as pneumatic concrete breakers, a number of noise control measures include fitting muffler or sound reducing equipment to the breaker 'tool' and ensuring any leaks in the air lines are sealed. Erection of localised screens around breaker or drill bit when in operation in close proximity to noise sensitive boundaries are other suitable forms of noise reduction;
- For all materials handling, the contractor will ensure that best practice site noise control measures are implemented including ensuring that materials are not dropped from excessive heights and drop chutes/dump trucks are lined with resilient materials, where relevant.
- Where compressors, generators and pumps are located in areas in close proximity to noise sensitive properties/ areas and have potential to exceed noise criterion, these will be surrounded by acoustic lagging or enclosed within acoustic enclosures providing air ventilation;
- Resonance effects in panel work or cover plates can be reduced through stiffening or application of damping compounds; rattling and grinding noises can be controlled by fixing resilient materials in between the surfaces in contact;
- Demountable enclosures can also be used to screen operatives using hand tools and may be moved around site as necessary;

- All items of plant will be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.

Screening

Typically screening is an effective method of reducing the noise level at a receiver location and can be used successfully as an additional measure to other forms of noise control. The effectiveness of a noise screen will depend on the height and length of the screen, its mass, and its position relative to both the source and receiver.

The length of the screen should in practice be at least five times the height, however, if shorter sections are necessary then the ends of the screen will be wrapped around the source. BS 5228 -1:2009+A1 states that on level sites the screen should be placed as close as possible to either the source or the receiver. The construction of the barrier will be such that there are no gaps or openings at joints in the screen material. In most practical situations the effectiveness of the screen is limited by the sound transmission over the top of the barrier rather than the transmission through the barrier itself. In practice, screens constructed of materials with a mass per unit of surface area greater than 10 kg/m^2 will give adequate sound insulation performance.

Construction noise calculations have assumed a partial line of sight (-5dB) is achieved using a solid 2.4m high standard construction site hoarding. It will be a requirement for works occurring in proximity to the closest noise sensitive locations (NSL1) that the line of sight is further blocked such that a reduction of at least 10dB is achieved between the noise sensitive façade and construction activities. A reduction of this order can be achieved using a higher perimeter screen or using localised screening around specific items of plant.

Annex B of BS 5228-1:2009+A1:2014 (Figures B1, B2 and B3) provide typical details for temporary and mobile acoustic screens, sheds and enclosures that can be constructed on site from standard materials.
In addition, careful planning of the site layout will also be considered. The placement of temporary site buildings such as offices and stores between the site and sensitive locations can provide a good level of noise screening during the phasing of works.

Hours of Work

Construction noise impacts will be controlled through strict working hours. In line with the Constriction Environmental Management Plan: “Site development and building works will only be carried out between the hours of 0800 to 1800 Mondays to Fridays inclusive and between 0800 and 1400 hours on Saturdays There will be no construction works carried out on Sundays or public holidays. Deviation from these times will only take place when written approval is granted by DLRCC in exceptional circumstances”

Consideration will be given to the scheduling of activities in a manner that reflects the location of the site and the nature of neighbouring properties. Each potentially noisy event/activity will be considered on its individual merits and scheduled according to its noise level, proximity to sensitive locations and possible options for noise control.

Liaison with the Public

Clear forms of communication will be established between the contractor and noise sensitive areas in proximity so that residents or building occupants are aware of the likely duration of activities likely to generate higher noise or vibration.

The duration of piling, excavation, breaking and other high noise or vibration activities works is usually short in relation to the length of construction work as a whole, and the amount of time spent working near to sensitive areas can represent only a part of the overall period. Subjective impacts during these phases can be significantly reduced if timelines and potential impacts are known in advance.

A designated noise liaison officer will be appointed to site during construction works. All noise complaints will be logged and followed up in a prompt fashion by the liaison officer.

All construction works will be required to operate within the Construction Noise Limits Outlined in Table 8.1 of the EIAR. The contractor will be required to take specific noise abatement measures and comply with the recommendations of BS 5228-1:2009+A1:2014

Vibration

	On review of the likely vibration levels associated with construction activities, it is concluded that the construction of the proposed development will not give rise to vibration that is either significantly intrusive or capable of giving rise to structural or cosmetic damage to adjacent buildings. In the case of vibration levels giving rise to human discomfort, in order to minimise such impacts, the following measures shall be implemented during the construction period: • A clear communication programme will be established to inform adjacent building occupants in advance of any potential intrusive works which may give rise to vibration levels likely to exceed perceptible levels. The nature and duration of the works will be clearly set out in all communication circulars; • Alternative less intensive working methods and/or plant items shall be employed, if significant thresholds are exceeded; • Appropriate vibration isolation shall be applied to plant, if significant thresholds are exceeded. Barrington Tower is a protected structure which is to be retained, restored and re-used within the proposed development. Where proposed works have the potential to be at or to exceed the vibration limit values at the tower base, monitoring will be undertaken at the protected structure. All construction works will be required to operate within the Construction Vibration Limits outlined in Table 8.3 of the EIAR.
Air and Climate	*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 9.2. In summary the measures which will be implemented will include: • Prior to demolition blocks should be soft striped inside buildings (retaining walls and windows in the rest of the building where possible, to provide a screen against dust). • During the demolition process, water suppression should be used, preferably with a hand-held spray. Only the use of cutting, grinding or sawing equipment fitted or used in conjunction with a suitable dust suppression technique such as water sprays/local extraction should be used. • Drop heights from conveyors, loading shovels, hoppers and other loading equipment should be minimised, if necessary fine water sprays should be employed. • Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic. • Any road that has the potential to give rise to fugitive dust must be regularly watered, as appropriate, during dry and/or windy conditions. • Vehicles exiting the site shall make use of a wheel wash facility where appropriate, prior to entering onto public roads. • Vehicles using site roads will have their speed restricted, and this speed restriction must be enforced rigidly. On any un-surfaced site road, this will be 20 kph. • Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary. • Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods. • During movement of materials both on and off-site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions. At all times, these procedures will be strictly monitored and assessed. In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust would be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations. *Climate* Impacts to climate during the construction stage are predicted to be imperceptible however, good practice measures can be incorporated to ensure potential impacts are lessened. These include: • Prevention of on-site or delivery vehicles from leaving engines idling, even over short periods. • Ensure all plant and machinery are well maintained and inspected regularly. • Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site.

Landscape and Visual Impact	No mitigation measures are recommended for landscape and visual impact mitigation other than (a) standard best practice construction site management, and (b) implementation of the proposed tree protection measures contained in Appendix 1 of the Tree Survey and Arboricultural Report prepared by The Tree File Ltd.
Traffic and Transportation	It is considered that a Construction Management Plan (CMP) will be prepared by the appointed contractor in order to minimise the potential impact of the construction phase of the proposed development on the safety and amenity of other users of the public road. The CMP will consider the following mitigation measures: • Dust and dirt control measures such as dampening down during dry periods, using dust covers on trucks, road sweeping on public roads and wheel wash facilities at the site exit. • Noise assessment and control measures such as dampers on rock breaking equipment, regular maintenance of machinery, restrictions on working hours. • Routes to be used by vehicles which will be primarily using Brennanstown West and Glenamuck Road to the M50. • Working hours of the site to comply with DLRCC Development Plan requirements, 08:00 to 19:00 Monday to Friday and 08:00 to 14:00 on Saturdays with no working on Sundays • Programme of construction traffic /deliveries to avoid peak periods. • • Facilities for loading and unloading to be provided within the site with the controlled access to the site set back from the public road to ensure space for vehicles to stop without blocking traffic flows on Brennanstown Road • Facilities for parking cars and other vehicles either on site or at a suitable off site location. A Preliminary Construction Management Plan has been prepared and is submitted with this application. The purpose of this plan is to provide a guide to the appointed contractor who will be responsible for preparing and agreeing the final plan with the Local Authority. This preliminary Construction Management Planoutlines proposals in relation to construction traffic and associated construction activities that impact the surrounding roads network. Care will be taken to ensure existing pedestrian and cycling routes are suitably maintained or appropriately diverted as necessary during the construction period, and temporary car parking is provided within the site for contractor's vehicles. It is likely that construction will have an imperceptible impact on pedestrian and cycle infrastructure. During works on Brennanstown Road along the site frontage and during the construction of the signalised junction and signal controlled pedestrian crossing single lane traffic will be temporally put into place with stop/go boards or temporary traffic signals. Full details will be agreed with DLRCC as part of the road opening licence which is standard procedure for works on public roads. Through the implementation of the CMP it is anticipated that the effect of traffic during the construction phase will have a slight effect on the surrounding road network for a period of approximately 24 months.
Material Assets	**Surface Water** • The contractor will appoint a suitably qualified person to oversee the implementation of measures for the prevention of pollution to the receiving surface water environment. • To minimise the adverse effects, the prevailing weather conditions and time of year is to be taken into account when the site development manager is planning the stripping back of the site. • Regular testing of surface water discharges will be undertaken at the outfall from the subject site. The location for testing and trigger levels for halting works will be agreed upon between the project ecologist and the site foreman at the commencement of works. • Where silt control measures are noted to be failing or not working adequately, through regular monitoring by the site team, works will cease in the relevant area. The system is cleaned and works can then recommence. • All fuels and chemicals will be bunded, and where applicable, stored within double skinned tanks / containers with the capacity to hold 110% of the volume of chemicals and fuels contents. Bunds will be located on flat ground a minimum distance of 50 m from any watercourse or other water conducting features, including the cut off trenches. • Site stripping will be minimised as far as practicable. • All existing services will be located using service records, GPR surveys and slit trenches to ensure that their position accurately identified before excavation works commence. • Foul and surface water pipes will be carefully laid to minimise the potential for cross-connections which results in contamination of receiving watercourses. • Site personnel inductions are to be conducted such that all site personnel are made aware of the procedures the best practice in relation to the management of surface water runoff. • Where possible, precast concrete units are to be used to avoid on-site "wet" mix concrete usage. In situ concrete pours are to be managed in accordance with best practice to avoid overspills • Concrete truck and wheel wash down facilities are to be provided in designated areas. Discharge from these areas is to be directed into the settlement ponds/silt traps. • Topsoil for landscaping will be located in such a manner as to reduce the risk of washing away into local drainage or watercourses.

	Foul Water • All existing services will be located using service records, GPR surveys and slit trenches to ensure that their position accurately identified before excavation works commence. • Foul water pipes to be laid with sufficient falls to ensure self-cleansing velocity • Foul pipes will be carefully laid to minimise the potential for cross connections. **Water Supply** • All existing services will be located using service records, GPR surveys and slit trenches to ensure that their position accurately identified before excavation works commence. • All water mains will be cleaned, sterilised, and tested to the satisfaction of the Irish Water/Local Authority prior to connection to the public water main. • All connections to the public water main will be carried out under the supervision of the Irish Water/Local Authority. **ESB Network** • All existing services will be identified using ESB service record maps. CAT survey to be carried prior to excavation to accurately identify cable routes indicated on ESB maps. • All connections to the ESB mains will be carried out and tested by ESB personnel **Gas** • All existing services will be located using service records, GPR surveys and slit trenches to ensure that their position is accurately identified before excavation works commence. • All connections to the public Gas main will be carried out under the supervision of GNI and will be tested and certified in accordance with their requirements. **Telecommunications – EIR** • All existing services will be identified using Open EIR service record maps. • All connections to the Open EIR network will be carried out and tested by EIR personnel.
Waste	The following mitigation measures will be implemented during the construction phase of the proposed development: As previously stated, a project specific RWMP has been prepared in line with the requirements of the 'Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects' (EPA 2021) and is included as Appendix 13.1. The mitigation measures in the RWMP will be implemented in full and form part of mitigation strategy for the site. Adherence to the high-level strategy and the mitigation measures presented in this RWMP will ensure effective waste management and minimisation, reuse, recycling, recovery and disposal of waste material generated during the excavation and construction phases of the proposed development. • Prior to commencement, the appointed contractor(s) will be required to refine/update the RWMP (Appendix 13.1) in agreement with DLRCC, detailing specific measures to minimise waste generation and resource consumption, and provide details of the proposed waste contractors and destinations of each waste stream. • The contractor will be required to fully implement the RWMP throughout the duration of the proposed construction phase. A quantity of topsoil, sub soil, clay and made ground will need to be excavated to facilitate the proposed development. The project engineers have estimated that most of the c. 65,100m^3 of excavated material, with the exception of c. 1,410 m^3 which will be retained and reused onsite for fill, will need to be removed off-site. Correct classification and segregation of the excavated 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. 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. The following waste types, at a minimum, will be segregated: o Concrete rubble (including ceramics, tiles, and bricks); o Plasterboard; o Metals; o Glass; and o Timber

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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 Resource Manager (RM) 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 suitably 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.
Nearby sites requiring clean fill material will be contacted to investigate reuse opportunities for clean and inert material, if required. If any of the material is to be reused on another site as by-product (and not as a waste), this will be done in accordance with Article 27 of the EC (Waste Directive) Regulations (2011). EPA approval should be obtained prior to moving material as a by-product. However, it is not currently anticipated that Article 27 will be used.

These mitigation measures will ensure that the waste arising from the construction phase of the proposed development is dealt with in compliance with the provisions of the Waste Management Act 1996 as amended, associated regulations and the Litter Pollution Act 1997 and the ‘EMR Waste Management Plan 2015-2021’. It will ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved and will promote more sustainable consumption of resources.
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<tr><td>Cultural Heritage – Archaeology</td><td>Archaeology
All topsoil stripping associated with the development will be monitored by a suitably qualified archaeologist. This will include monitoring of any slab removal or foundation excavation following demolition of the modern buildings on site. If any features of archaeological potential are discovered during the course of the works further archaeological mitigation will be required, such as preservation in-situ or by record. Any further mitigation will require approval from the National Monuments Service of the Department of Housing, Local Government and Heritage.

Cultural Heritage Barrington’s Tower will be located within a buffer zone, within which no construction activity will take place. Similarly, no construction traffic will be routed within the buffer zone. The protected structure will be protected by hoarding. Chapter 15 details the conservation of the structure during the construction phase, which will result in a positive impact on the Protected Structure.</td></tr>
<tr><td>Cultural Heritage – Architectural Heritage</td><td>A protective curtilage zone has been established around the protected structure which will be maintained during the construction phase of works. Construction traffic will be directed onto site through the Brennanstown Road entrance, and no heavy construction works, or minimal construction works, only relating to the protected structure and the removal of the extension, will be undertaken within the vicinity of the tower.

The construction of the residential apartment blocks will have an indirect impact on the protected structure, but these works will be carried out a safe distance away from the protected structure. The demolition of the adjacent house extension should be carefully monitored to ensure no vibration impact on the tower.

A separate site compound should be established for the duration of the works to remove the house extension and carry out the conservation works to the tower, which will likely occur under a separate phase within the main works programme.

Adjacent or nearby protected and historic structures, outside of the proposed site area, will not be significantly impacted during the construction phase of the works due to the geographical distance from the construction compound.

<table>
<tr><th>Proposed Works</th><th>Impact Type</th><th>Mitigation</th><th>Residual Impact Post Mitigation</th></tr>
<tr><td>Demolition of modern extension to Barrington’s Tower</td><td>Significant, Positive and Permanent Impact</td><td>Full appraisal of the tower and extension has determined what is historically significant and what is not.
A record of the existing structure to be removed, and the tower to be</td><td>Moderate, Positive and Permanent</td></tr>
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			retained will be established prior to works. Full protection of historic fabric will be in place during the works though use of hoarding and protective sheeting. Method statements for sequenced removal of extensions and structures to be submitted to Conservation Architect ahead of works. Suitably qualified contractors will carry out the demolition works, who are familiar with, and experienced in working on historic structures.		
	Insertion of new stair within Barrington's Tower	Moderate, Neutral and Long-term	Protection of the existing historic fabric will be put in place prior to any new construction works undertaken on site. Appropriate conservation methodologies will be submitted and approved prior to construction and insertion of new stair, relating to materials, construction sequencing and protection approaches.	Slight, Neutral and Long-term	
	Conservation and repair of Barrington's Tower	Slight, Positive and Permanent,	Full record of existing structure prior to commencement of works. Suitably qualified Conservation Architect to oversee all works on site and inspect any findings on site. Ensure suitably qualified contractors carry out proposed works, who are familiar with, and experienced in working on historic structures.	Slight, Positive and permanent	
	Construction of new residential development – apartment blocks	Moderate, Negative and Short-term	Careful monitoring, installed by the contractor, to ensure no vibration impact on the tower. Suitable construction compound will be established an adequate distance from Barrington's Tower. Protection hoarding will be added around the tower as required.	Slight, Negative and short-term	
	Construction Traffic and site access	Moderate, Negative	Mitigation by Avoidance No construction traffic will be routed in close proximity to the tower.	Slight, negative and short-term	

		and Short-term	The tower will be fully hoarded to ensure no risk of damage.		

17.3 OPERATIONAL PHASE

Population and Human Health	The proposed development has been designed to avoid negative impacts on population and human health through the provision of various physical and social infrastructure as part of the development as are outlined in Chapter 3 of this EIAR. Chapter 9 Climate and Air Quality notes the proposal includes operational phase mitigation by design measures to minimise the impact on air quality and climate. These include thermally efficient glazing, thermal insultation, natural gas heating, inclusion of electric car charging points. Chapter 11 Traffic and Transportation has been prepared for the proposed development with the aim of encouraging sustainable travel practices for all journeys. Increased sustainable travel practices will also reduce the negative impact of traffic emissions on the air quality. No additional mitigation measures are considered necessary.
Biodiversity	The following is taken from the Bat Assessment by Dr. Tina Aughney It is important that any proposed lighting for the proposed development is wildlife friendly and that there is a provision for continued dark zones to facilitate movement of light sensitive bat species such as brown long-eared bats and Daubenton's bats. The Site Lighting Report has taken into consideration the "Bats and artificial lighting in the UK: bats and the built environment series. Guidance Note 09/2018". This BCT (2018) guidelines provides a list of recommendations in relation to luminaire design, which is based on the extensive research completed to-date on the potential impact of lighting on bats and therefore provides best practice mitigation measures. Nocturnal mammals are impacted by lighting. Therefore it is important that lighting installed within the proposed development site is completed with sensitivity for local wildlife while still providing the necessary lighting for human usage. It is also important that developments reduce their impact on the night sky and reduce sky glow. The "Dark Sky" principal should be followed – i.e., no upward lighting to reduce light pollution. The following principles will be followed: - Luminaire design for any street lighting or lighting on buildings is extremely important to achieve an appropriate lighting regime. Luminaires come in a myriad of different styles, applications and specifications which a lighting professional can help to select. The following 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 have dimming capability. o A warm white spectrum (2700 & 2200 Kelvins will be used to reduce the blue light component of the LED spectrum). The following text is taken from the Site Lighting Report: "2700K colour temperature luminaires are proposed throughout the site except in the West boundary of the site. In the West boundary which is stated as BAT path in the Ecological report, in order to reduce the impact on the BAT life 2200K luminaries are proposed in that area". o Luminaires will feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats. o Column heights will be carefully considered to minimise light spill. The shortest column height allowed will be used and these will either be 5m or 4m columns along pathways. 4m columns will be used in bat sensitive areas. Bollard lighting will be used for pedestrian areas and 1m bollards will be used. o Only luminaires with an upward light ratio of 0% and with good optical control will be used. o Luminaires will be mounted on the horizontal, i.e. no upward tilt. o Any external security lighting will be set on motion-sensors and short (1min) timers. The intensity of external lighting should be limited to ensure that skyglow does not occur in order to reduce light pollution. o Accessories such as baffles, hoods or louvres will be used to reduce light spill and direct it only to where it is needed. In addition the Site Lighting Report states that "Minimum lux level to be used or as required by Health & Safety especially along the perimeters." - "It is proposed to provide 8m high column-type light fittings roadways to achieve 15lux average Illumination levels. - It is proposed to install 5m and 4m column light fitting and 1m bollards to illuminate the pathways around the development to achieve 5 LUX average. The luminaire will be installed with a DALI ballast and Eco Step Dim controller to reduce the LUX level during no human presence.

	This lighting design will ensure that a LUX level of 0 will be provided within 5m of the proposed site boundary to ensure that there is no spillage onto surrounding landscape. These LUX levels coupled with the design of the luminaires will reduce the potential impact of the outdoor lighting plan on local bat populations. This design will also ensure that there are Dark zones around the boundary of the proposed development site. The bat house will be located in a dark area along the south-eastern boundary of the site with tree planting to buffer if from light spill from adjacent apartment blocks. Monitoring is recommended post-construction works. This monitoring will involve the following aspects: - In relation to the bat house, monitoring is required for a total of 3 years. A temperature data logger will be installed and maintained for a total of 3 years. Monitoring will involve winter checks (1 per year) summer surveys (2 internal surveys and 1 emergence survey per summer) to determine the level of bat usage of the Bat House. - The bat loft in Barrington Tower will be surveyed within one year of completion. Register bat loft with Bat Conservation Ireland. This surveying will be undertaken for a minimum of 2 years and will involve two emergence surveys (coincide with bat house monitoring). - Inspection of bat boxes will be undertaken within one year of erection of bat box scheme. Register bat box scheme and additional roosts with Bat Conservation Ireland. This inspection will be undertaken for a minimum of 2 years.
Land, Soil and Geology	There is no requirement for mitigation measures for the Operational Phase of the Proposed Development.
Hydrology and Hydrogeology	The design for the basements will incorporate groundwater drainage to prevent any issues associated with localised groundwater mounding and hydrostatic pressure where the basement is below the groundwater table (Enviroguide Consulting, 2022). The basement design and construction will incorporated adequately waterproofing of basement structure to prevent any groundwater seepage or ingress into the basement(Waterman-Moylan, 2022b). Ongoing regular operational monitoring and maintenance of drainage and the SuDS measures as specified the Engineering Assessment Report (Waterman-Moylan, 2022) and in accordance with CIRIA SuDS Manual C753 which will be incorporated into the overall management strategy for the Proposed Development. This will ensure no impacts on water quality and quantity (flow regime) for the Operational Phase of the Proposed Development. There is no other requirement for mitigation measures for the Operational Phase of the Proposed Development.
Noise and Vibration	**Additional Traffic on Adjacent Roads** During the operational phase of the development, noise mitigation measures with respect to the outward impact of traffic from the development are not deemed necessary. **Building Services Plant** Taking into account that sensitive receivers within the development are much closer than off-site sensitive receivers, once the relevant noise criterion (i.e. 40 dB $L_{Aeq,15min}$ at noise sensitive locations within the proposed development itself) is achieved within the development it is expected that there will be no negative impact at sensitive receivers off site, and therefore no further mitigation required. *Inward Noise Impact* At detailed design stage, a glazing acoustic performance specification and vent specifications such as those in section 8.6 will ensure suitable internal noise levels within the living spaces. No mitigation measures are required in respect of noise in external amenity areas.
Air and Climate	No mitigation measures are required for the operational phase of the proposed development as it is predicted to have an imperceptible impact on ambient air quality and climate.
Landscape and Visual Impact	The potential landscape and visual effects of the proposal in the operational phase have been classified as positive or neutral. No negative effects have been identified. This is a reflection of the embedded mitigation measures in the design. Therefore no mitigation measures are recommended for landscape and visual effects.
Traffic and Transportation	The proposed development is situated adjacent to suitable infrastructure and transport services for travel by sustainable modes. A key barrier to modal shift towards sustainable modes of travel is often a lack of information about potential alternatives to the car. As such, it is proposed that residents will be made aware of potential alternatives including information on walking, cycle routes and public transport.

	Residents will be encouraged to avail of these facilities for travel to and from work. Provision of this information would be made during the sales process and will be included in the new homeowner's pack upon the sale of each unit, as this represents the best opportunity to make residents aware and to secure travel behaviour change. It is anticipated that this measure may help to reduce the level of traffic at the proposed development, thus providing mitigation against any traffic and transport effects of the development.
Material Assets	**Surface Water** • The proposed development will result in increased impermeable areas and there is potential for an increase in the risk of higher rates of surface water runoff leading to increased downstream flooding. • There is a potential impact for the discharge of contaminants from the proposed development and road surfaces to the surrounding drainage networks/watercourse. These would include particulates, oil, soluble extracts from the bitumen binder etc. The quality of runoff from the site would be dependent on the time of year, weather, particulate deposition from the atmosphere and any gritting or salting carried out by the Local Authority. The time of year has a major bearing on the quality of storm water run-off - in particular the first rains after a prolonged dry period where accumulated deposits of rubber, particulates, oils, etc. are, washed away. • Stagnation of the water and siltation within the attenuation areas may occur. **Foul Water** • Blockages may occur within the pipe network and the wastewater could become septic. • Foul water could be connected to the surface water drainage network on-site. • Increased flows to the wastewater network and the Shanganagh Treatment Plant. **Water Supply** • There will be an increased demand for water once the development is occupied. **Electricity** • Additional power will be required for the grid for the proposed developments. The increase in demand is considered to be slight, negative and long-term impact. **Gas** • The increased demand on the GNI network is to be assessed by GNI in order to ensure there is ample capacity for the development. Any issues with demands are to be corresponded to the design team and the client prior to installation of network. • All requirements to increase the networks capacity will be undertaken by GNI. • Ventilation to the Gas skid to be maintained all year round. No additional landscaping is to be put in place that may mitigate the free area serving the ductwork. **Telecommunications** • The increased demand on existing telecommunications infrastructure is considered to be imperceptible.
Waste	A project specific OWMP has been prepared and is included in Appendix 13.2. The mitigation measures outlined in the OWMP will be implemented in full and form part of mitigation strategy for the site. • The Operator/Facilities Management of the site during the operational phases will be responsible for ensuring – allocating personnel and resources as needed – the ongoing implementation of this OWMP, ensuring a high level of recycling, reuse and recovery at the site of the proposed development. In addition, the following mitigation measures will be implemented: • The Operator/Facilities Management will ensure on-Site segregation of all waste materials into appropriate categories, including (but not limited to): o Organic waste; o Dry Mixed Recyclables; o Mixed Non-Recyclable Waste; o Glass; o Waste electrical and electronic equipment (WEEE);

<table>
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o Batteries (non-hazardous and hazardous);
o Cooking oil;
o Light bulbs;
o Cleaning chemicals (pesticides, paints, adhesives, resins, detergents, etc.);
o Furniture (and from time-to-time other bulky waste); and
o Abandoned bicycles

• The Operator/Facilities Management will ensure that 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;
• The Operator/Facilities Management will ensure that all waste collected from the site of the proposed development will be reused, recycled, or recovered, where possible, with the exception of those waste streams where appropriate facilities are currently not available; and
• The Operator/Facilities Management will ensure that all waste leaving the site will be transported by suitable permitted contractors and taken to suitably registered, permitted, or licensed facilities.

These mitigation measures will ensure the waste arising from the proposed Development during the operational phase is dealt with in compliance with the provisions of the Waste Management Act 1996 as amended, associated regulations, the Litter Pollution Act 1997, the EMR Waste Management Plan 2015 – 2021 and the DLRCC waste bye-laws. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved.
</td></tr>
<tr><td>Cultural Heritage – Archaeology</td><td>Archaeology
As there are no potential impacts on the archaeological resource during the operation phase of the proposed development, no mitigation is deemed necessary.

Cultural Heritage
The visual impacts and impacts on the setting of Barrington’s Tower have been mitigated through design. Significant sight lines to and from Barrington’s Tower were identified by the Conservation Architect and heeded by the design team (Chapter 15).</td></tr>
<tr><td>Cultural Heritage – Architectural Heritage</td><td>In response to the potential impacts outlined a number of mitigation measures are proposed to ensure minimal disturbance and impact on the protected structure within the site. Early engagement with the design team and client has allowed for a number of these mitigation measures to be incorporated into the design proposals, such as the establishment of appropriate curtilage and protection zone around the protected structure, and the development of suitable proposals for the future use of the tower.

<table>
<tr><th>Impact</th><th>Impact Type prior to Mitigation</th><th>Mitigation</th><th>Residual Impact Post Mitigation</th></tr>
<tr><td>Impact on Setting – Barrington’s Tower</td><td>Significant, Negative and Long-term</td><td>A protective curtilage / buffer zone was established during the early design stages and provided to the design team, in order to reduce the visual impact on the setting of tower to an acceptable level. This mitigation measure will reduce the impact on the setting of the tower to a moderate and acceptable measure.</td><td>Moderate, Neutral and Long-term</td></tr>
<tr><td>Impact on views to Barrington’s Tower</td><td>Significant, Neutral and Long-term</td><td>Significant sight lines to and from Barrington’s Tower were established by the Conservation Architect and provided to the design team. These sightlines are to be maintained and one new sightline to Barrington’s Tower is included in the design proposals,</td><td>Moderate, Neutral and Long-term</td></tr>
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			an axial view from Brennanstown Road to the tower. This mitigation measure will reduce the impact on sightlines to a moderate level. At present the tower is not visible from a number of these locations due to significant overgrowth at the site.		
	Impact on setting of adjacent historic structures and protected structures	Slight, Neutral and Long-term	The residential blocks have limited impact on the nearby protected structures. The residential blocks have increase in height further south on the site, which slopes away from Brennanstown Road and the nearby protected structures. This mitigation measure will reduce the impact on the occupants of these historic buildings.	Imperceptible, Neutral and Long-term	
	Impact on Brennanstown Road	Significant, Negative and Permanent	The impact on Brennanstown Road is reduced by the design approach, as the taller residential blocks are located within the site and further south, where the ground slopes down to the luas station. This approach has lessened the impact of the development onto Brennanstown Road, where two residential blocks will be visible to passersby. The overall impact on the road is in line with the current emerging baseline for the road, where significant development has already taken place. The existing gates to the site are not of any historic value and the introduction of a new entrance, which will incorporate stones from the boundary wall, and includes a new view of Barrington's Tower are considered beneficial. These mitigation measures reduce the negative impact on Brennanstown Road.	Significant, Neutral and Permanent	
	Impact on the character of Barrington's Tower	Moderate, Positive and Long-term	The proposed use and design proposals for the tower have been developed and considered by a	Moderate, Positive and Long-term	

			RIAI Grade I conservation architect and are considered appropriate to the scale, type and history of the building. The proposals are inherently reversible in nature, with no major impact on external or structural walls		