Environmental Impact Assessment Report

Volume 1: Written Statement incl. Non-Technical Summary

For AZRA Property Company Limited.

Proposed Large-scale Residential Development consisting of 716no. residential units and 1no. childcare facility.

In the Townlands of Castlefarm, Rusk, Clonee and Loughsallagh, Dunboyne, County Meath

Prepared By: -

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In Association with: -

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1 INTRODUCTION

This Environmental Impact Assessment Report (EIAR) presents the assessment of environmental impacts and applicable mitigation measures associated with the residential development on lands south of Station Road, Dunboyne(hereafter referred to as 'the Proposed Development'). This EIAR for the Proposed Development has been prepared on behalf of AZRA Property Company Limited (hereafter referred to as 'the Applicant'). This EIAR accompanies a Large-scale Residential Development (LRD) to Meath County Council.

This chapter has been prepared by Stephen Little, EIAR Manager, with assistance from Naoise O'Connor, EIAR Co-ordinator at Stephen Little & Associates. Stephen has over 30 years' professional experience of town planning in Ireland, is a Corporate Member of both the Irish Planning Institute and the Royal Town Planning Institute and holds a Diploma in EIA Management (UCD). Naoise has 3 years' professional experience in the planning field, has a MRUP – Masters in Regional and Urban Planning.

1.1 Summary of the Proposed Development

Chapter 3: Description of Proposed Development of this EIAR sets out the detailed description of the Proposed Development. The description of the Proposed Development can be summarised as: -

Permission is sought for a period of 10 Years for a proposed development on a site of approximately 16.92Ha consisting of 716no. residential units in a mix of houses, duplex and apartment buildings ranging in height from 2 to 7 storeys overall; comprising of 155no. 2 storey houses; 517no. apartments accommodated in 8no. buildings ranging in height from 5 to 7 storeys; 44no. duplex units accommodated in 2no. 3 storey terraced buildings ; 1no. childcare facility (c.602sqm) located at ground floor level of Block B1; public open space; communal and private open space; public lighting; car parking, including basement car parking under some of the apartments; secure bicycle parking; and all associated and ancillary site development and infrastructural works, hard and soft landscaping and boundary treatment works, provision of c. 470m in length of distributor road, compensatory storage measures at Castle Stream and improvement works to two no. roundabouts on the R147 (Old Navan Road). Vehicular, cyclist and pedestrian access to serve the development will be provided from Station Road via existing access road permitted under Meath County Council Reg. Ref. RA180561.

1.2 Aim of the EIAR

An EIAR is defined in the Draft Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2017) as: -

> *"A statement of the effects, if any, which proposed development, if carried out, would have on the environment."*

The preparation of this EIAR is in accordance with Directive 2011/92/EU as amended by Directive 2014/52/EU (the Directive), the Planning and Development Act 2000, as amended and the Planning and Development Regulations 2001, as amended. It is also in accordance with the guidelines listed at paragraph **Error! Reference source not found.**.

The prescribed range of environmental factors are as follows: -

> *"The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors: -*
>
> *a) population and human health.*
>
> *b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC.*
>
> *c) land, soil, water, air and climate.*

d) material assets, cultural heritage and landscape.

e) the interaction between the factors referred to in points (a) to (d)"

In addition, the guidelines quote Article 5(1) of the Directive when describing the contents of an EIAR, as follows: -

"the developer shall include at least: -

a) a description of the project comprising information on the site, design, size and other relevant features of the project.

b) a description of the likely significant effects of the project on the environment.

c) a description of the features of the project and/or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment.

d) a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment.

e) a non-technical summary of the information referred to in points (a) to (d); and

f) any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected."

Article 94 of the Planning and Development. Regulations 2001, as amended, provides for the information to be contained in an EIAR as follows: -

"94. An EIAR shall take into account the available results of other relevant assessments under European Union or national legislation with a view to avoiding duplication of assessments and shall contain—

a) the information specified in paragraph 1 of Schedule 6,

b) any additional information specified in paragraph 2 of Schedule 6 relevant to the specific characteristics of the development or type of development concerned and to the environmental features likely to be affected,

c) a summary in non-technical language of the information required under paragraphs (a) and (b),

d) a reference list detailing the sources used for the descriptions and assessments included in the report, and

e) a list of the experts who contributed to the preparation of the report, identifying for each such expert—

(i) the part or parts of the report which he or she is responsible for or to which he or she contributed,

(ii) his or her competence and experience, including relevant qualifications, if any, in relation to such parts, and

(iii) such additional information in relation to his or her expertise that the person or persons preparing the EIAR consider demonstrates the expert's competence in the preparation of the report and ensures its completeness and quality."

1.3 EIAR Guidance

This EIAR has been completed in accordance with the requirements as set out in the EIA Directive (2014/52/EU) and relevant guidelines and documentation, including: -

- Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2022).
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out environmental impact assessment (Department of Housing, Planning and Local Government , August 2018),
- Department of Housing, Planning and Local Government (2018) Circular PL 05/2018 - Transposition into Planning Law of Directive 2014/52/EU amending Directive 2011/92/EU on the effects of certain public and private projects on the environment (the EIA Directive) and

Revised Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment.

- Advice Notes for Preparing Environmental Impact Statements Draft (EPA, 2015).
- Guidance on the preparation of Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU) (European Commission, 2017).
- EU Commission's SEA Implementation Guidance from 2003 (Paragraphs 5.25 and 5.26) refer to chapter on human health.
- Circular PL 1/2017 – Implementation of Directive 2014/52/EU on the effects of certain public and private projects on the environment (EIA Directive).
- Circular PL 8/2017 – Implementation of Directive 2014/52/EU – Advice on Electronic Notification Requirements.

1.4 The EIAR Process

1.4.1 Introduction

This section demonstrates the process that has been carried out by the Applicant and Design Team in the preparation of this EIAR. As described and shown Figure 1.1, the EIAR forms a part of the EIA process.

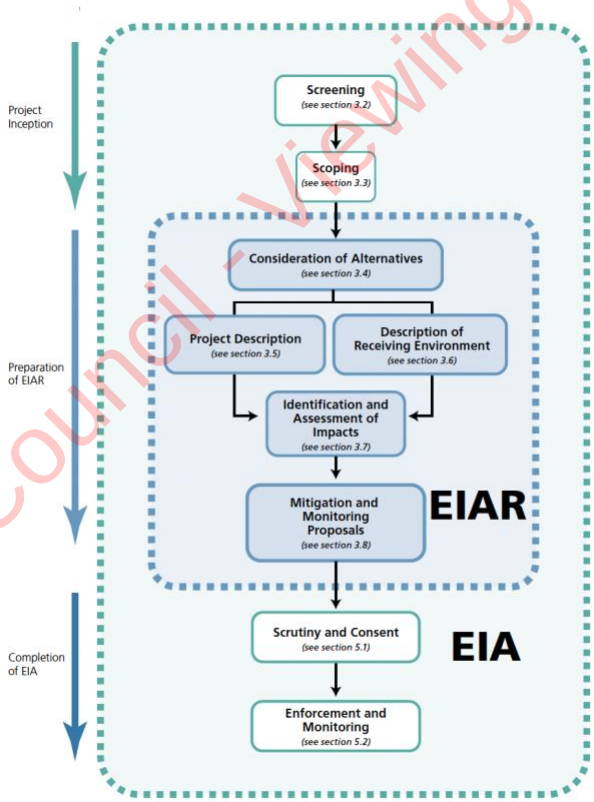


Figure 1.1: EIA Process - Extract taken from Figure 2.2, page 11 of the Draft EPA Guidelines 2017.

Further explanation of the terms referred to in Figure 1.1 is provided below: -

Screening: -

"The process of assessing the requirement for a project to be subject to Impact Assessment based on project type and scale as well as the significance or environmental sensitivity of the receiving environment."

Scoping: -

"The process of identifying the significant issues which should be addressed by a particular Impact Assessment as well as the means or methods of carrying out the assessment."

Environmental Impact Assessment Report (EIAR): -

"A statement of the effects, if any, which proposed development, if carried out, would have on the environment."

Environmental Impact Assessment (EIA): -

"The process of examining the anticipated environmental effects of proposed project - from consideration of environmental aspects at design stage, through consultation and preparation of an Environmental Impact Assessment Report (EIAR), evaluation of the EIAR by a Competent Authority, the subsequent decision as to whether the project should be permitted to proceed, encompassing public response to that decision."

Competent Authority Decision

If, during the review, the Competent Authority determines that the information presented in an EIAR is not sufficient for it to make a determination, then the developer may be asked to provide further information.

If granting permission, the Competent Authority may attach conditions to the consent. The conditions will typically seek to ensure adherence to mitigation and monitoring measures presented in the EIAR. These may be augmented and modified by the Competent Authority.

If refusing the Competent Authority may cite specific evidence from the EIAR such as the non-conformity of potential impacts with official standards, impractical mitigation measures or uncertainty about environmental interactions.

1.5 Need for this EIAR

The revised EIA Directive (Directive 2011/92/EU, as amended by Directive 2014/52/EU) uses the term environmental impact assessment report (EIAR) rather than the previous environmental impact statement (EIS). Where current national guidelines and regulations refer to an Environmental Impact Statement or EIS, this can be taken to mean an Environmental Impact Assessment Report (EIAR).

Section 172 of Part X of the Planning and Development Act, 2000, as amended by regulation 17 of the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018) sets out the requirement for an EIA as follows: -

"172 (1) An environmental impact assessment shall be carried out by the planning authority or the Board, as the case may be, in respect of an application for consent for proposed development where either—

(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 equal or exceed, as the case may be 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 equal or exceed, as the case may be 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 equal or exceed, as the case may be,

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 Fifth Schedule of the Planning and Development Regulations lists classes of development where an EIA is mandatory under Part 1 and where an EIA may be required under Part 2. Where a project falls within a criterion for a type of development and / or exceeds a threshold as listed in Part 1 or Part 2, then it must be subjected to EIA.

Schedule 5 (Part 2) of the Planning & Development Regulations 2001 – 2018 set mandatory thresholds for each project class. Sub-section 10(b)(iii) and (iv) addresses 'Infrastructure Projects' and requires that the following class of project be subject to EIA: (b)(i) **Construction of more than 500 dwelling units**. Category 10(b)(iv) refers to 'Urban development which would involve an area greater than 2 hectares in the case of business district, 10 hectares in the case of other parts of a built-up area and **20 hectares elsewhere**.'

The proposed number of residential units is 716no. in total and therefore falls within the threshold requiring an EIAR as it comprises of 500no. dwellings or more. Furthermore the site area the proposed development is c. 16.92 Ha and therefore above the threshold requiring an EIAR a combined area greater than 10 Ha.

As such, an EIAR is submitted to Meath County Council with this LRD Planning Application.

1.6 EIAR Layout & Structure

The composition of this EIAR has been prepared in the context of the EPA Guidelines (2022) and the screening and scoping stages described above. The layout and structure of this EIAR is laid out under 2 volumes, each containing specific sections as follows: -

- **Volume 1:** Written Statement, including Non-Technical Summary.
- **Volume 2:** Appendices.

Following on from the layout, the structure of the EIAR is shown in Table 1.1 below.

Chapter No.	EIAR Chapter Name	Consultant
1	Introduction	Stephen Little & Associates Chartered Town Planners & Development Consultants
2	Non-Technical Summary	Stephen Little & Associates Chartered Town Planners & Development Consultants with input from the consultants outlined below.
3	Description of Proposed Development	Stephen Little & Associates Chartered Town Planners & Development Consultants.
4	Main Alternatives	Stephen Little & Associates Chartered Town Planners & Development Consultants.
5	Population & Human Health	AWN Consulting Ltd.
6	Biodiversity	Altemar
7	Land, Soil & Geology	AWN Consulting Ltd.
8	Water	AWN Consulting Ltd.
9	Wind	B-Fluid
10	Climate (Air Quality)	AWN Consulting Ltd.
11	Climate (Climate Change)	AWN Consulting Ltd.
12	Climate (Sunlight)	Digital Dimensions
13	Climate (Daylight)	Digital Dimensions

Chapter No.	EIAR Chapter Name	Consultant
14	Air (Noise & Vibration)	AWN Consulting Ltd.
15	Landscape and Visual Impact	Parkhood
16	Material Assets (Transportation)	Waterman Moylan Consulting Engineers
17	Material Assets (Waste)	AWN Consulting Ltd.
18	Material Assets (Utilities)	Waterman Moylan Consulting Engineers
19	Cultural Heritage (Archaeological & Architectural)	John Cronin and Associates
20	Risk Management (Major Accident & Disaster)	Stephen Little & Associates Chartered Town Planners & Development Consultants.
21	Summary of Mitigation Measures	Stephen Little & Associates Chartered Town Planners & Development Consultants.
22	Summary of Cumulative Impacts & Interactions	Stephen Little & Associates Chartered Town Planners & Development Consultants.
23	Summary of Residual Impacts	Stephen Little & Associates Chartered Town Planners & Development Consultants.
24	Bibliography	Stephen Little & Associates Chartered Town Planners & Development Consultants.
-	Overall Co-ordination and Management of the EIAR	Stephen Little & Associates Chartered Town Planners & Development Consultants.

Table 1.1: Environmental Impact Assessment chapters.

The relevant experts involved in the preparation of this EIAR can be found in Table 1.2 below.

Name	Years Exp.	Professional Qualifications	Professional Affiliations	Role
Stephen Little & Associates Chartered Town Planners & Development Consultants				
Stephen Little	30	Dip. Env. Mgmnt, BA (Hons), Dip. TP, Dip. EIA Mgmnt	MRTPI, MIPI	EIAR Manager Editorial Responsibility
Naoise O'Connor	3	Masters in Urban and Regional Planning	-	EIAR Co-ordinator. Introduction, Non-Technical Summary, Description of Development, Population & Human Health, Examination of Alternatives, Risk Management (Major Accidents).
AWN Consulting				
Chonaill Bradley	7+	BScEnv	AssocCIWM	Material Assets (Waste)
Natalie Machado	2	MBA in Project Management & Environmental Sustainability, BSc in Biological Sciences	Society of Environmental Toxicology and Chemistry (SETAC) Europe	Population & Human Health
Marcello Allende	16	BSC, BEng Water Resources Engineering	Engineers Ireland (MIEI) International Association of Hydrogeologists (IAH)	Land, Soil & Geology and Water
Avril Challoner	11	PhD, BEng (Hons), CSci, CEnv	Member of the Institute of	Climate (Air Quality) and Climate (Climate Change)

Name	Years Exp.	Professional Qualifications	Professional Affiliations	Role
			Environmental Management and Assessment, Member of the Institute of Air Quality Management	
Jennifer Harmon	21	BSc, Hons, Environmental Science, HDip Acoustics	MIOA	Air (Noise and Vibration)
Altemar				
Bryan Deegan	27	M.Sc. Environmental Science, Trinity College Dublin. BSc (Hons.) in Applied Marine Biology. National Diploma in Applied Aquatic Science. National Certificate in Science	MCIEEM-Member of the Chartered Institute of Ecology and Environmental Management	Biodiversity (and Natura Impact Statement)
Wateman Moylan				
Joe Gibbons	36	Dip Eng (Civil) CEng, MICE	Chartered Engineer	Material Assets (Transportation) and Material Assets (Utilities)
John Cronin & Associates				
John Cronin	29	BA degree in Archaeology (University College Cork, 1991), Master's degree in Regional and Urban Planning (University College Dublin 1993) Master's degree in Urban and Building Conservation (School of Architecture, University College Dublin 1999)	Member of Institute of Irish Archaeologists	Cultural Heritage
Dr. Caroline McGrath	15	BA degree in Early and Modern Irish (Trinity College Dublin, 2003), Doctorate degree in Celtic Studies (University of Ulster, 2007) Master's degree in Professional Archaeology (Queen's University Belfast, 2015).	-	Cultural Heritage
Tony Cummins	28	BA degree in Archaeology (University College Cork, 1992), Master's degree in Archaeology (University College Cork, 1994).	-	Cultural Heritage
Digital Dimensions				
John Healy	30+	Dip Arch Tech, MSc Environmental Design of Buildings, PG Dip Digital Media.	-	Climate (Sunlight), Climate (Daylight)
Parkhood				
Andrew Bunbury	30	BA DIP LA CMLI	Landscape Institute	Landscape and Visual Impact Assessment
Conor Thallon	15	BA DIP LA CMLI	Landscape Institute	Landscape and Visual Impact Assessment
B-Fluid				

Name	Years Exp.	Professional Qualifications	Professional Affiliations	Role
Arman Safdari	11	Phd Mech, MSc Mech Eng.	MIEI	Wind
Cristina Paduano	18	Phd Mech, MSc Mech Eng.	MIEI	Wind

Table 1.2: List of EIAR Experts.

1.7 Structure of Each Environmental Topic

Each environmental topic (Chapters 5 – 19) of this EIAR has been structured in accordance to the EPA Guidelines 2022, under the headings below.

1.7.1 Introduction

All of the relevant introductory text and descriptions for the chapter are located under this Section.

1.7.2 Methodology

An outline of the methodology employed in the assessment, including where possible a reference to the EPA guidelines.

1.7.3 Receiving Environment (Baseline Situation)

Existing Environment relevant to the environmental factor being assessed for this project.

A dynamic description of the specific environment into which the proposal will fit, taking account of other developments likely to occur. The particular aspects of the environment, for each topic, are discussed in terms of their context, character, significance and sensitivity.

1.7.4 Characteristics of the Proposed Development

Detailed descriptions / descriptions outside the scope of the relevant environmental factors being assessed should be removed. These may be referred to the main project description under Chapter 3: Description of Proposed Development. This chapter also includes description of exempted development and future development on/near the application site.

The characteristics relevant to the environmental factors being assessed should be considered for the Construction and Operational Phases.

1.7.5 Potential Impacts the Proposed Development

The potential impact of the proposed development includes a general description of the possible types of impacts that projects of this kind would be likely to produce, for Construction and Operational Phases.

This includes a consideration of the 'Do-Nothing' impact. The 'Do-Nothing' impact describes the environment, as it would be in the future if no development of any kind were carried out.

Potential impacts without mitigation measures are considered in this section: -

- Construction Phase Impacts.
- Operational Phase Impacts.
- Do-nothing impacts.

1.7.6 Mitigation Measures

A description of any specified remedial or reductive measures considered necessary, resulting from the assessment of potential impacts.

A description of any post development monitoring of effects on the environment which might be necessary, covering the monitoring methods and the agencies responsible for their implementation.

Where required, a description of reinstatement measures and the agencies responsible for their implementation.

All of the proposed mitigation measures of this EIAR are grouped into Chapter 18: Summary of Mitigation Measures.

1.7.7 Predicted Impact of the Proposed Development

An assessment of the specific impacts of the subject proposal on the environment, as found by expert analysis and judgment, having regard to the receiving environment, the characteristics of the proposal, the potential impacts and any mitigation measures.

The predicted impacts, for both construction and operational stages, are assessed having regard to their character, magnitude, duration, consequences and significance.

A **'Worst Case'** impact is also considered for both the construction and operational phases of the development: -

- Construction Phase.
- Operational Phase.
- Worst Case impact.
- Interactions.
- Cumulative.

All of the Predicted Impacts measures of this EIAR are grouped into Chapter 21: Summary of Mitigation Measures.

Interactions and Cumulative Impacts are examined under Chapter 22: Summary of Residual Impacts and Cumulative Impacts.

1.7.8 Monitoring

Required where impact pre-mitigation is potentially significant. Allows for assessment of effectiveness of mitigation measures.

1.7.9 Difficulties Encountered

Required where impact pre-mitigation is potentially significant.

1.7.10 Bibliography

A list of reference material used in compiling the chapter. This will feed into Chapter 23: Bibliography.

1.8 Assessment of Impacts

Clarity of method, language and meaning are vital to accurately explain the full range of effects. Adherence to a systematic method of description can be of considerable assistance in this matter.

The relevant terms listed in the table below can be used to consistently describe specific effects. All categories of terms do not need to be used for every effect.

1.8.1 Quality of Effects

With regards to the **'Quality of Effects'**, it is crucial that any such effects are clearly identified, especially to non-specialist readers.

These effects which may occur can be characterised into 3 types: positive, negative or neutral.

Firstly, if the proposed element of the project improves the quality of the receiving environment it is seen as a Positive Effect.

Secondly, where such a change does not affect the quality of the receiving environment it can be described as a Neutral Effect.

Finally, Negative / Adverse Effects can be described as a change, which reduces the quality of the environment.

1.8.2 Describing the Significance of Effects

In terms of **'Describing the Significance of Effects'**, it is outlined under the EIAR Guidelines that such effects are specific to each different environmental topic.

The EIAR Guidelines state that in the absence of specific definitions, there are 7 potential useful definitions set out under Table 1.3.

Type of Effects	Description of Effect
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 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 most of a sensitive aspect of the environment.
Profound Effects	An effect which obliterates sensitive characteristics.

Table 1.3: Describing the Significance of Effects.

1.8.3 Describing the Extent and Context of Effects'

When **'Describing the Magnitude of Effects'**, the characteristics of which should address the: Extent (i.e. Describe the size of the area, the number of sites, and the proportion of a population affected by an effect), Duration (i.e. time period, please refer to Section 1.8.5 below for more detail), Frequency (i.e. its recurrence) and Context (i.e. whether the foregoing magnitudes will conform or contrast with established baseline conditions).

1.8.4 Describing the Probability of Effects'

In **'Describing the Probability of Effects'**, a clear description of effects as outlined above enables the Competent Authority (An Bord Pleanála) to decide the balance of risk over advantages when making a decision. The probability is broken into 2 no. types: -

- The Likely Effects in so far as: The effects can reasonably be expected to occur as a result of the planning project if all mitigation measures are properly implemented.
- The Unlikely Effects in so far as: The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.

1.8.5 Describing the Duration and Frequency of Effects

In describing the Duration of Effects, it is crucial to acknowledge that different environmental topics have varying concepts of 'Duration'. Therefore, it is acknowledged under EIAR Draft Guidelines 2017, that the following timescales as shown under Table 1.4 below provides a broad definition of useful times: -

Description of Effect	Timescale for each effect
Momentary Effects	Seconds to Minutes
Brief Effects	Less than a day
Temporary Effects	Less than a year
Short-term Effects	Lasting 1 to 7 years
Medium-term Effects	Lasting 7 to 15 years
Long-term Effects	Lasting 15 to 60 years
Permanent Effects	Lasting over 60 years
Reversible Effects	Effects that can be undone, 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 1.4: Describing the Duration and Frequency of Effects.

1.8.6 Describing the Types of Effects

Under the Guidelines, Describing the Types of Effects are identified into 8 different types of, and inter-related effects: -

- **'Indirect Effects'** (also referred to as Secondary Effects) – impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
- **'Cumulative Effects'** – The addition of many minor or significant effects of other projects, to create larger, more significant effects.
- **'Do Nothing Effects'** – The environment as it would be in the future should no project of any kind be carried out.
- **'Worst case Effects'** – The effects arising from a project in the case where mitigation measures substantially fail. It can also be a worst case assumption where there is uncertainty in the assessment or in the effectiveness of mitigation measures.
- **'Indeterminable Effects'** – When the full consequences of a change in the environment cannot be described.
- **'Irreversible Effects'** – When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.

- **'Residual Effects'** – The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
- **'Synergistic Effects'** – Where the resultant effect is of greater significance than the sum of its constituents, (e.g. combination of SOx and NOx to produce smog).

1.8.7 Determining Significance

The above Sections 1.8.1 – 1.8.6 above provide a helpful guide in determination of the significance of the impact. The language described in the above Sections has been used in the preparation of this EIAR.

Figure 1.2 taken from the EPA Draft Guidelines (2017) illustrated how the character of a predicted impact to the sensitivity of the receiving environment can determine the significance of the impact.

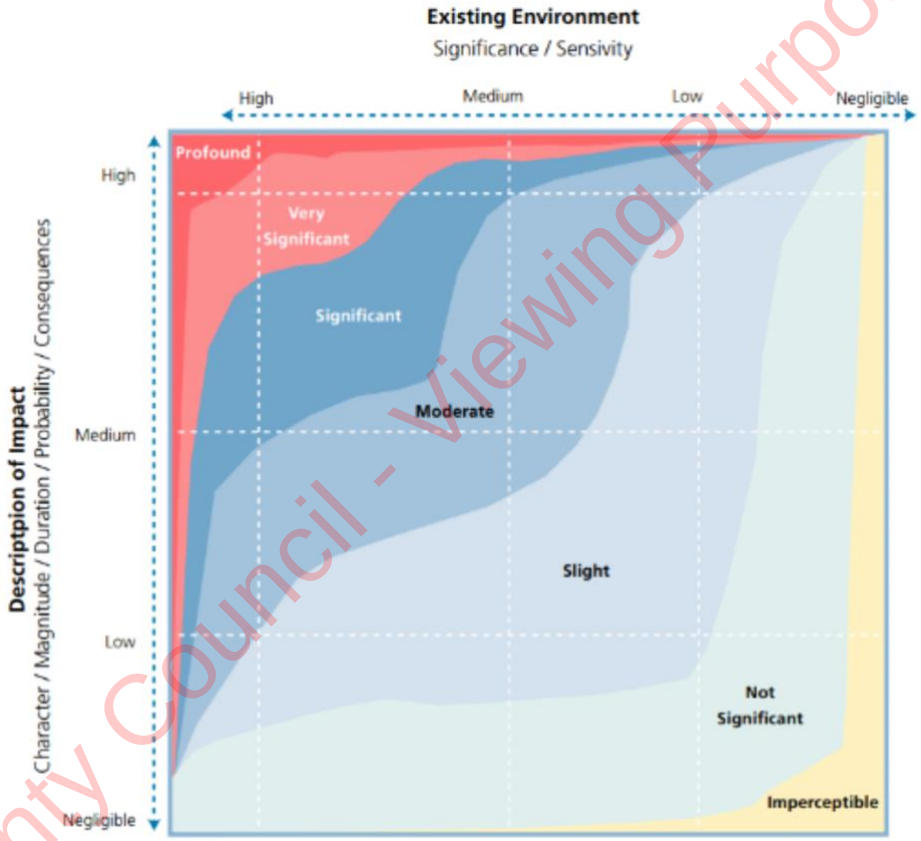


Figure 1.2: Chart showing typical classifications of the significance of impacts (Figure 3.5, Draft EPA Guidelines 2017, page 53).

1.9 Public & Stakeholder Consultation

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

1.9.1 Submissions in relation to the EIAR

Statutory / Public Consultation

This EIAR and application will be available for inspection free of charge or purchased on payment of a specified fee (which fee shall not exceed the reasonable cost of making such a copy) during public opening hours excluding Bank Holidays at the following location: -

- The Offices of Meath County Council, Buvinda House, Dublin Road, Navan, Co. Meath

The application and EIAR may also be viewed at / downloaded from the following website: -

- http://www.oakfielddunboyne.com/

EIAR Portal

As of the 1 September 2018, there is an obligation on the applicant, where an EIAR has been prepared, to submit the relevant information to the EIA Portal.

The Applicant has submitted an application form, a copy of the public notice and a site location plan to the Department of Housing Planning and Local Government.

A copy of this submission and acknowledgement receipt issued by the Department of Housing Planning and Local Government accompanies the planning application.

1.10 Statement of Difficulties Encountered

No exceptional difficulties were experienced in compiling the necessary information for the proposed development. Where any specific difficulties were encountered these are outlined in the relevant chapter of the EIAR.

1.11 Forecasting Methods Used

The methods employed to forecast the effects on the various aspects of the environment are standard techniques used by each of the particular individual disciplines.

The general format followed was to identify the receiving environment, to add to that a project of the 'loading' of the proposed development on the various aspects of the environment considered, to put forward amelioration measures as necessary to lessen or remove a potential impact, and thereby to arrive at a net predicted impact.

1.12 Quotations

EIAR's by their nature contain statements about the proposed development, some of which are positive and some less than positive. Selective quotation or quotations out of context can give a misleading impression of the findings of the study.

Therefore, the study team urge that quotations should, where reasonably possible, be taken from the conclusions of specialists' section or from the non-technical summary and not selectively.

1.13 Errors

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

2 NON-TECHNICAL SUMMARY

This Environmental Impact Assessment report (EIAR) has been prepared to support the proposed Station Road, Dunboyne Large-Scale Residential Development (LRD) application for residential development and associated infrastructure in the townlands of Castlefarm, Rusk and Clonee and Loughsallagh, Dunboyne, Co. Meath.

The EU Directive requires the production of a Non-Technical Summary as part of the production of an EIAR. The Non-Technical Summary ensures that the public is made aware of the environmental implications of any decisions on new developments to take place. The Non-Technical Summary is laid out in a similar, but summarised format to the main EIAR, describing the project, exiting environment, impacts and mitigation measures.

Assessments have been conducted in an integrated, collaborative and analytical process in accordance with the Guidelines on the environmental topics to be examined. This seeks to identify the potential for significant adverse environmental impacts arising from the proposed project. Where significant adverse environmental impacts have been identified as potentially occurring during the construction and operational phases of the development, specified ameliorative, remedial or reductive measures are identified.

2.1 Purpose of the EIAR

The objective of this EIAR is to identify and predict the likely environmental impacts of the proposed development as well as to describe the means and extent by which they can be reduced or ameliorated, to interpret and communicate information about the likely impacts; and to provide an input into the decision making and planning process.

2.2 A Note on Quotations

Environmental Impact Assessment Reports by their nature contain statements about the proposed development, some of which are positive and some less positive. Selective quotation or quotations out of context can give a misleading impression of the findings of the study.

Therefore, the study team urge that quotations should, where reasonably possible, be taken from the overall conclusions of specialists' section or from the non-technical summary, and not selectively from the body of the individual chapters.

2.3 The Requirement for an EIAR

The process to determine whether an EIA is required for a proposed development is called Screening. This is dependent on the mandatory legislative threshold requirements or the type and scale of proposed development and significance or environmental sensitivity of the receiving environment.

Annex I of the EIA Directive 85/337/EC requires as mandatory the preparation of an EIA for all development projects listed therein. Schedule 5 (Part 1) of the Planning & Development Regulations 2001-2018 brought Annex 1 of the EIA Directive directly into Irish planning legislation. The Directive prescribes mandatory thresholds in respect to Annex 1 projects. Annex II of the EIA Directive provides EU Member States discretion in determining the need for an EIA on a case-by-case basis for certain classes of project having regard to the overriding consideration that projects likely to have significant effects on the environment should be subject to EIA.

Schedule 5 (Part 2) of the Planning & Development Regulations 2001 – 2018 set mandatory thresholds for each project class. Sub-section 10(b)(iii) and (iv) addresses 'Infrastructure Projects' and requires that the following class of project be subject to EIA: (b)(i) **Construction of more than 500 dwelling units**. Category 10(b)(iv) refers to 'Urban development which would involve an area greater than 2 hectares in the case of business district, 10 hectares in the case of other parts of a built-up area and 20 hectares elsewhere.'

There is a total of 715no. residential units proposed in total and the scheme therefore falls within the threshold requiring an EIAR as it comprises of 500no. dwellings or more.

2.4 Description of Proposed Development

The proposed development is on a site of approximately 16.92Ha overall and consists of 716no. dwellings in a mixture of terraced, semi-detached and detached houses, duplexes and apartments as follows:

- 517no. apartment units are accommodated in 8no. buildings of 4-7 storeys in height comprising: 10no. 1-bed apartments, 202no. 2-bed apartments and 24no. 3-bed apartments accommodated in 4no. 4-6 storey apartment blocks (Blocks A1, A2, A3 and A4); 55no. 1-bed apartments, 80no. 2-bed apartments and 12no. 3-bed apartments accommodated in 2no. 6-7 storey apartment blocks (Blocks B1 and B2); 36no. 1-bed apartments, 78no. 2-bed apartments and 20no. 3-bed apartments accommodated in 2no. 4-5 storey apartment blocks (Blocks C1 and C2). Resident's amenities are also provided within the apartment blocks, including a gym.
- 44no. duplex units accommodated in 2no. 3 storey terraces consisting of 22no. 1 bed dwellings, 18no. 2 bed dwellings and 4no. 3 bed dwellings.
- 155no. 2-storey houses consisting of 8no. 2-bedroom houses, 69no. 3-bedroom houses, 74no. 4-bedroom houses and 4no. 5-bedroom houses.

The proposed development also includes: -

- 1no. childcare facility (c. 602sqm) located at ground floor level of Apartment Block B1 and an associated outdoor play space (c. 114.67 sqm)

All ancillary and associated site development and landscape works, including: -

- site boundary treatments, including 1.8m-2.0m high boundary along western boundary with rail line
- Communal amenity open space (c. 13,643sqm)
- Public open space (c. 28,930sqm)
- Provision of 887no. car parking spaces (355no. in a basement), including 12no. creche car parking spaces.
- Provision of secure bicycle parking spaces, including creche bicycle parking spaces, including ancillary storage facilities.
- 3no. ESB substations
- Provision of foul drainage pumping station
- Provision of c. 470m of new distributor road, including a bridge crossing the Castle Stream.
- Provision of a 200mm diameter watermain in existing section of southern distributor road adjacent to recently constructed Castle Farm development (Castle Farm Meadows and Castle Farm Paddocks).
- Alterations to the recently constructed junction of southern distributor road permitted under Meath County Council Reg. Ref. RA180561 adjacent to the Castle Farm development and L2228 (Station Road) to provide a signalised junction with pedestrian crossings, including ancillary adjustments to road markings on both roads.
- Bin storage facilities.
- Provision of a compensatory flood storage area adjacent to Castle Stream

Vehicular, cyclist and pedestrian access to serve the development will be provided from L2228 (Station Road/Clonee Road) via existing access road permitted under Meath County Council Reg. Ref. RA180561, all in the Townlands of Castlefarm, Rusk and Clonee, Dunboyne, County Meath.

Alterations are also proposed to 2 no. roundabouts on the R147 (Old Navan Road) including enlarging the roundabout at the junction of the R147 (Old Navan Road) and L2228 (Station Road) and, widening of approach roads of the roundabout (including adjustments to footpaths and revised road markings) at the junction of the R147 and R156 (including northbound slip road to M3); both with ancillary site development and landscape works and being in the townlands of Clonee and Loughsallagh, Dunboyne, Co. Meath.

2.5 Examination of Alternatives (Chapter 4)

Potential alternatives to the proposed development were considered as the scheme progressed. The 'Do-Nothing' alternative was explored, with a conclusion that a do-nothing approach would be contrary to the development plan objectives for this site to deliver development at this highly accessible location.

A number of site layout and alternative designs were considered during the iterative design process in consultation with Meath County Council. Further design alterations were informed by the Opinion of Meath County Council on foot of LRD application meeting held on 14 February 2023.

The development as now proposed is considered to have arrived at an optimal solution in respect of making efficient use of zoned, serviceable lands whilst also addressing the potential impacts on the environment relating to residential, visual, natural and environmental amenities and infrastructure.

It is considered that the proposed development is consistent with relevant planning policy and minimises the potential for environmental impacts.

2.6 Population and Human Health (Chapter 5)

Introduction

This chapter has been prepared to assess the likely significant impacts on Population and Human Health in respect of the Proposed Development.

Human health should be considered in the context of environmental pathways which may affect health such as air quality, noise, water and soil quality. All can contribute to negative effects on human health by facilitating the transport of contaminants or pollutants. An evaluation of the effects of these pathways on health, by considering the accepted standards of safety in dose, exposure or risk of air quality and noise levels for example, is considered appropriate, as these standards have been arrived at via scientific and medical research. Where these topics are dealt with in further detail elsewhere in this EIA Report, the relevant chapters have been cross referenced in this Chapter to provide the Planning Authority with a context for their determination.

Baseline Environment

<u>Population Health Sensitivity</u>

The selection Electoral Divisions (ED) within the study area has included ED the that are either entirely contained withing or partially within 1 km of the proposed development site. In the case of the proposed development, the site is located within Dunboyne (ED 11009), Republic of Ireland, County Meath.

The study area, Dunboyne ED, has seen a higher population growth when compared to ROI in the 2022 sensus. The Pobal HP Deprivation Index shows the area to be 'Marginally Above Average'. There is a low age dependency ratio. A high proportion [59.38%] describes their health status as 'Very Good' and low proportion as 'Bad' or 'Very Bad'. The data shows that the study area has a lower % of Persons with a disability than the national average; indicating that for persons within the area there is a relatively limited restrictions on daily activity.

Location and Character of the Local Environment

The site extends to over 16.15 ha. on adjacent lands located to the south east of Dunboyne townland, Co Meath. The site is surrounded to the south, north west and east by Greenfields, by some dwellings to north and to the west, and bounded to the west by a train line which connects Dunboyne station to Dublin via the M3 Parkway Service. The site is c. 1.27km distance from the village of Dunboyne and c. 1.1km from Clonee.

According to the adopted Meath County Development Plan 2021-2027, for Dunboyne, Clonee and Pace, the subject lands are classified as A2 zones, destined for new residential areas, being the proposed development in alignment with the county development plan.

There are no protected Recreational Waters or Bathing Waterbodies, no extractive industries, active quarries, or areas of geological heritage within the Study Area.

The Proposed Development site is not at risk of any major accidents, hazards of natural disasters. The site is not a Seveso facility and is not within the consultation distance of any Seveso facility.

Potential Impacts of the Proposed Development

Construction Phase

The main potential impacts on population and human health from the proposed development are potential for spills/leaks, air emissions, noise, visual, and traffic impacts:

- Construction will have an indirect positive effect on support industries and local services;
- Whilst the physical construction stage works will have a notable impact on the landscape in the immediate context of the proposed development
- Risk of accidental pollution from Land and Water emissions on human health
- 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;
- A variety of items of plant, with associated noise impacts, will be in use, such as excavators, lifting equipment, dumper trucks, compressors and generators;
- Construction traffic also impact in an increased noise and vibration levels
- Road traffic is a major cause of adverse health effects;
- There is a negligible risk of natural disasters or major accidents as a result of proximity to Seveso sites, and the Proposed Development is classified as appropriate for its flood zonation.

These potential impacts are ***short-term*** to ***temporary*** and range from ***positive*** to ***negative***, and ***imperceptible*** to ***significant.***

Operational Phase

The main potential impacts on population and human health from the proposed development are potential for spills/leaks, air emissions, noise, visual, and traffic impacts:

- When operational, the proposed development will create 710no.husing units, a childcare facility, community open spaces and public open spaces with a positive impact.
- A reduction in water quality via unmitigated pollutants has the potential to lead to negative impacts on human health and populations;
- Modelling indicate that traffic pollutant emissions will be in compliance with the relevant air quality standards.
- Additional operational traffic levels can have adverse impact on noise emissions.
- Additional traffic may have an impact on the surrounding road network and could contribute to increased congestion.

- There is a negligible risk of natural disasters or major accidents as a result of proximity to Seveso sites, and the Proposed Development is classified as appropriate for its flood zonation; and

These potential impacts are ***long-term*** and **range** from ***negative*** to, ***positive*** and ***imperceptible*** to ***significant.***

Mitigation and Residual Effects (Post-Mitigation)

Construction Phase

The mitigation measures to address the potential impacts on Population and Human Health from the construction phase of the Proposed Development and post-mitigation residual effects include:

- Subsoils and topsoil are to be retained on site and reused to ensure no requirement for moving material off site.
- Implementation of all mitigation measures outlined within the Construction Environmental Management Plan (CEMP), as well as any additional measures required pursuant to planning conditions which may be imposed.
- Dust mitigation measures will be implemented to ensure that no significant nuisance occurs at nearby sensitive receptors;
- Various mitigation measures will be considered and applied during the construction of the proposed development the specific details will be set out in the noise and vibration management plan to be adopted by the contractor;
- Varied shifts start and end times for the construction staff to ensure construction flows do not overlap with the surrounding road network peak periods;

The residual effects following the implementation of mitigation measures are ***local*** to ***regional, temporary*** to ***short-term, and*** range from ***positive*** to ***negative***, and ***imperceptible*** to ***moderate***.

Operational Phase

The mitigation measures to address the potential impacts on Population and Human Health from the construction phase of the Proposed Development and post-mitigation residual effects include:

- Extensive planting to improve landscape
- Proposed development stormwater drainage network design including sustainable drainage systems (SuDS).
- Future junction signalisation and junctions' upgrade
- Inclusion of a Travel Plan to the application

The residual effects following the implementation of mitigation measures are ***long-term*** and range from ***positive*** to ***neutral***, and ***imperceptible*** to ***moderate.***

Cumulative Impact of the Proposed Development

Construction Phase

In a worst-case scenario, multiple developments in the area could be developed concurrently or overlap in the construction phase and contribute to additional impacts in terms of traffic, dust, and noise.

The implementation of mitigation measures within each chapter and detailed in Section 5.5.1; as well as the compliance of adjacent development with their respective planning permissions, will ensure there will be minimal cumulative potential for change in soil quality or the natural groundwater regime during the construction phase of the proposed development. The cumulative impact is considered to be ***neutral*** and ***imperceptible***.

Regarding Water impacts, the implementation of the mitigation measures contained CEMP will result in minimal cumulative potential for change in surface water quality or the natural hydrological regime. The cumulative impact is considered to be ***neutral*** and ***imperceptible***.

There are no predicted cumulative impacts arising from the construction phase of the proposed development respective to Traffic.

Contractors for the Proposed Development will be contractually required to operate in compliance with a project-specific CEMP and Construction Traffic Management Plan which will include the mitigation measures outlined in this EIA Report. The construction phase for the overall development of the applicant owned lands would be restricted by the same binding limits for noise, dust, and emissions to water.

According to the IAQM guidance (2014) should the construction phase of the proposed development coincide with the construction phase of any other developments within 350m then there is the potential for cumulative construction dust related impacts to nearby sensitive receptors. However, provided the mitigation measures outlined in Section **Error! Reference source not found.** and Appendix 11.1, are implemented throughout the construction phase of the proposed development significant cumulative dust impacts are not predicted. The predicted residual cumulative air quality impacts during the construction phase are ***short-term, direct, negative, localised and imperceptible.***

The residual noise and vibration impact from the various projects with potential for cumulative impacts have been assessed. There are no residual significant cumulative impacts forecast. The residual effects are ***negative, slight*** to ***moderate*** and ***temporary to short-term***.

Operational Phase

There are no other large projects proposed within this area of the aquifer so no cumulative impact on recharge to the aquifer. All developments are required to manage groundwater discharges. As such there will be no cumulative impact to groundwater quality and therefore there will be no cumulative impact on the Groundwater Body Status. The operation of the proposed development is concluded to have a ***long-term, imperceptible*** significance with a ***neutral*** impact on soil and water quality.

All developments are required to manage groundwater discharges in accordance with S.I. 272 of 2009 and S.I. 77 of 2019. As such there will be no cumulative impact to groundwater quality and therefore there will be no cumulative impact on the Surface Waterbody Status. The cumulative impact is considered to be ***neutral*** and ***imperceptible.***

The cumulative impact for air emissions is included within the operational stage impact for the proposed development. The impact is predicted to be ***long-term, negative*** and ***imperceptible*** with regards to air quality.

The residual noise and vibration impact associated with the operational phase of the proposed project and the projects assessed for cumulative impacts are ***negative, not significant*** and ***long-term***.

2.7 Biodiversity (Chapter 6)

Introduction

The Biodiversity assessment has been undertaken by Altemar Limited. It assesses the biodiversity value of the proposed development area and the potential impacts of the development on the ecology of the surrounding area and within the potential zone of influence (ZOI). Standard construction and operational phase control measures, in addition to monitoring measures are detailed, to minimise potential effects of the proposed development and to improve the biodiversity potential of the proposed development site post construction.

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.

Assessment Methodology

A pre-survey biodiversity data search was carried out in March 2021 and updated in June 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. Four site surveys of the site were undertaken within the appropriate seasonal timeframe for terrestrial fieldwork. Field surveys were carried out as outlined in Table 6.1. All surveys were carried out in the appropriate seasons.

Table 6.1. Field Surveys

Area	Surveyors	Survey Dates
Terrestrial Ecology	Bryan Deegan (MCIEEM)	03rd September 2021, 22nd April 2022 23rd April 2023
Bat Fauna	Bryan Deegan (MCIEEM)	3rd September 2021, 22nd April 2022, 01st June 2023
Mammal Assessment	Bryan Deegan (MCIEEM)	20th March 2021, 22nd April 2022, 23rd April 2023
Amphibian Survey	Bryan Deegan (MCIEEM)	20th March 2021, 22nd April 2022,23rd April 2023.
Bird Assessment	Bryan Deegan (MCIEEM)	20th March 2021, 03rd September 2021, 22nd April 2022, 23rd April 2023.

Receiving Environment

Zone of Influence

The potential ZOI of the project was deemed to be the site within the site outline with potential for downstream impacts to the marine environment via the proposed in-stream works and foul and surface water drainage strategy.

Designated sites

The proposed development is not within a designated site. There is one Natura 2000 site (Rye Water Valley/Carton SAC) within 15km and three National conservation sites (Royal Canal pNHA, Rye Water Valley/Carton pNHA, and Liffey Valley pNHA) within five kilometres of the proposed development site. There is a direct pathway from the works on site to the South Dublin Bay and River Tolka SPA, 16.2km from the site. There in an indirect pathway to the South Dublin Bay SAC, North Dublin Bay SAC and North Bull Island SPA via the marine environment.

Habitat & 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.

Evaluation of Habitats

The proposed development site consists of built land, arable crops, amenity grassland agricultural grassland, watercourses, hedgerows and treelines. No habitats of conservation importance were noted on site. However, the oak treeline, pond and watercourses would be considered to be of local ecological importance.

Plant Species

No rare or plant species of conservation value were noted during the field assessment. Records of rare and threatened species from NBDC and NPWS were examined. No rare or threatened plant species were recorded in the vicinity of the proposed site. No invasive plant species that could hinder removal of soil from the site during groundworks, such as Japanese knotweed, giant rhubarb, Himalayan balsam or giant hogweed were noted on site. However, a treeline of mature oak is noted within the site and would be considered to be of local importance.

Fauna

No rare or threatened faunal species were recorded within the proposed development site based on NBDC records. No resting or breeding places of mammals of conservation importance have been noted on site. However, evidence of otter activity has been noted on the upstream boundary of the Castle Stream. In addition, a single badger paw print was noted on the south eastern section of the site. It is expected that the site forms part of the foraging range of a wider badger community. A frog spawning area was noted in a pool in the south west corner of the site, proximate to the railway. No bird species of conservation importance have been noted on site. However, Barn swallow (*Hirundo rustica*) (Amber listed) and sand martin (*Riparia riparia*) (Amber listed) were noted overhead. Four bat species was noted foraging on site (Soprano Pipistrelle, Common Pipistrelle, Lesser Noctule, and Brown Long-eared Bat). Bat foraging was noted on site and noted to be particularly active in the vicinity of the oak treeline in the centre of the site. Trees of bat roosting potential are noted on site. However, no bats were noted emerging from trees on site.

Potential Impact of the Proposed Development

Construction Stage

In the absence of mitigation, the construction of the proposed development would 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, excavations, in-stream and roundabout works, the construction of bridges, and the building phases of the proposed development.

Construction phase mitigation measures are required on site particularly as reprofiling of the site is proposed which will remove/alter existing terrestrial habitats and can lead to silt laden and contaminated runoff to the watercourses traversing the subject site and proximate surface water drainage networks. In the absence of mitigation measures, there is the potential for contaminated surface water runoff to enter the onsite watercourses, drainage ditch network, and proximate surface water drainage networks with the potential for downstream impacts on the River Tolka and designated conservation sites located within Dublin Bay. In addition, habitats of local importance are on site and need to be protected. Bats, frogs, badgers and otters are noted on site and need to be protected during the construction stage.

The proposed development is not within a designated conservation site. The nearest designated conservation site is Royal Canal pNHA (2.9 km). The nearest Natura 2000 site is South Dublin Bay and River Tolka Estuary SPA (16.3 km). In-stream works and runoff during site re-profiling and construction of project elements could impact on the Castle Stream Tributary, the Castle Stream, River Tolka, and the surface water network with water quality impacts into the marine environment from the proposed development site. In the absence of mitigation, impacts on the watercourses would be seen as the primary pathway for impacts on conservation sites. Given the scale of the proposed development, the nature of the construction works (which include in-stream works), and recognising that it is proposed to direct surface water drainage to onsite watercourses, drainage ditch network, and proximate surface water drainage networks, out of an abundance of caution it is considered that the potential ZOI of the proposed works extends beyond the site outline to include the onsite watercourses, the River Tolka, and designated conservation sites located within Dublin Bay. In the absence of mitigation, there is the potential for dust and contaminated surface water runoff to enter the River Tolka with the potential for downstream impacts on downstream conservation sites.

Operational Stage

Once constructed all onsite drainage will be connected to separate foul and surface water systems. Surface water runoff will comply with SUDS. Key habitats including the oak treeline and River Tolka will be maintained. The biodiversity value of the site would be expected to improve as the landscaping matures.

Mitigation Measures (Ameliorative, Remedial or Reductive Measures)

Construction Stage

- A project ecologist will be appointed to oversee all works.
- The watercourses onsite and drains will be protected from dust, silt and surface water throughout the works.
- Local silt traps established throughout site.
- Mitigation measures on site include dust control, stockpiling away from watercourse and drains
- Stockpiling of loose materials will be kept to a minimum of 40m from watercourses and drains.
- Stockpiles and runoff areas following clearance will have suitable barriers to prevent runoff of fines into the drainage system and watercourses.
- Fuel, oil and chemical storage will be sited within a bunded area. The bund will be at least 50m away from drains, ditches or the watercourse, excavations and other locations where it may cause pollution.
- Bunds will be kept clean and spills within the bund area will be cleaned immediately to prevent groundwater contamination. Any water-filled excavations, including the attenuation tank during construction, that require pumping will not directly discharge to the stream. Prior to discharge of water from excavations adequate filtration will be provided to ensure no deterioration of water quality.
- Petrochemical interception and bunds in refuelling area
- On-site inspections to be carried out by project ecologist prior to commencement of works on site. This will include mammal, amphibian and tree inspections for bats. Should the resting or breeding places of any mammals or amphibians be noted during the on site inspections NPWS will be informed and relevant licences will be acquired from NPWS prior to works commencing in these areas in compliance with legislation and NPWS guidelines.
- All instream and drainage ditch works will be carried out in consultation with Inland Fisheries Ireland under an approved methodology submitted to Inland Fisheries Ireland prior to commencement.
- Daily turbidity, oxygen and photographic monitoring of watercourses (upstream, within & downstream of works) will take place during works and the results supervised by the project ecologist. This would be particularly important following high rainfall events and works within the riparian zone. It is recommended that sufficient baseline readings are made prior to construction commencing to understand the existing turbidity on site. This will be carried out in consultation with the project ecologist and linked to areas of work on site. All records will be kept for inspection by Inland Fisheries Ireland if required.
- Prior to site clearance the ecologist and arborist will assess the site works and oversee habitat protection measures. These would include tree protection measures in the vicinity of the oak treeline and riparian corridor.
- Mitigation measures outlined in the bat survey report will be followed this include the control of light spillage on site into adjacent habitats to avoid light contamination of the surrounding treelines and woodlands. Lighting on site will be subject to approval of the ecologist and during construction will not involve the lighting of the treelines and bat foraging corridor.
- Relevant guidelines and legislation (Section 40 of the Wildlife Acts, 1976 to 2012) in relation to the removal of trees and timing of nesting birds will be followed e.g. do not remove trees or

shrubs during the nesting season (1st March to 31st August). Should this not be possible, vegetation will be inspected by an ecologist for nesting birds prior to removal.

- Frog habitat will be protected from on site works in consultation with the project ecologist.

Operational Stage

- A project ecologist will be appointed to oversee completion of all landscape, lighting and drainage works.
- Petrochemical interception will be inspected by the project ecologist to ensure compliance with Water Pollution Acts.
- Post Construction assessment/compliance with proposed lighting strategy Mitigation During Operation
- Mitigation measures will be in place to comply with Water Pollution Acts.
- No external lighting will be in place on the apartments facing the treeline.
- Any internal lighting from stairwells within buildings proximate to the oak treeline will comply with bat lighting guidelines and will have shields in place where possible and in discussion with the ecologist, to prevent external spill to the treeline.
- Upon moving in, residents within the apartment blocks will be provided with an information pack in relation to the sensitivities of the treeline and bat foraging. This will outline measures in relation to ensure lighting spill is contained and recommendations for enhancing biodiversity including the use of scented plants for attracting insects.

Residual Impact of the Proposed Development

The construction and operational mitigation proposed for the development satisfactorily addresses the mitigation of potential impacts on the sensitive receptors through the design and the application of construction and operational phase controls. In relation to bats foraging on site in the vicinity of the oak treeline would be reduced and this would be considered to be a moderate adverse/negative/site/long term/ not significant impact on bats. The overall impact on the ecology of the proposed development will result in a low Adverse / Negative/ site/ not significant / long term impact on the ecology of the area and locality overall. This is primarily as a result of the loss of terrestrial habitats including arable land and hedgerows on site, supported by the creation of an improved biodiversity focused riparian corridor, additional biodiversity features, standard construction and operational controls and a sensitive native landscaping strategy.

2.8 Land, Soil & Geology (Chapter 7)

This chapter of the EIAR has been prepared by AWN Consulting Ltd. which assesses and evaluates the likely significant impacts of the proposed development on the land, soil, geological and hydrogeological aspects of the site and surrounding area associated with the proposed development at Station Road, Dunboyne, Co. Meath and associated ancillary building structures, and improvement works to two no. roundabouts on the R147.

Receiving Environment

The Proposed Development site extends to over 16.92 ha. on adjacent lands located in the Townlands of Castlefarm, Rusk and Clonee, Dunboyne, County Meath on lands generally bound to the east and south by agriculturally zoned lands, to the west by the Iarnród Éireann rail line, and to the north by the residential development permitted under Meath County Council (MCC) Reg. Ref. RA180561, agricultural lands and the L2228 (Station Road/Clonee Road). Improvement works to two no. roundabouts on the R147 (Old Navan Road) are located in at lands in the townlands of Loughsallagh and Clonee, Dunboyne, County Meath. There is an existing townland boundary which passes through the site, and which has a ditch with some water flow during periods of wet weather.

The site is currently occupied by multiple greenfield lands separated by ditches and hedgerow which are currently used for agricultural purposes. The existing landscape in the area of the proposed works is a mixture of agricultural land, railway and residential housing.

The natural overburden consist low permeability cohesive deposits associated to till derived from limestones and alluvial deposits associated to the Dunboyne Stream. Subsoil has been identified up to depths ranging between 1.7 to 4.2 mbgl. This soil has been noted as sandy gravelly Clay and some granular deposits. This indicates a 'High' to 'Extreme' Aquifer Vulnerability classification due to thickness and type of overburden present.

The bedrock beneath the site is Carboniferous Dark limestone (Lucan Formation), this is a (Ll) Locally Important Aquifer which are generally moderately productive only in local zones. Regional groundwater flow would most likely be to the east-northeast towards the junction between Dunboyne Stream and River Tolka and towards Dublin Bay, following the regional topography.

Based on the low-level detection of constituents of concern below the available soil standards and guideline values, the subsoil and local aquifer are considered to be relatively clean. According to the WAC analysis undertaken, all subsoils can be classified as Inert.

Review of the hydrogeology and geology in the surrounding region indicates that there are no sensitive receptors such as groundwater-fed wetlands, Council Water Supplies/ Group Water Schemes or geological heritage sites which could be impacted by this development. No evidence of disposal of waste material was identified the location area proposed for excavation. As mentioned above, collection and analysis of representative soil for a wide range of parameters shows no evidence of contamination.

The bedrock aquifers underlying the Proposed Development site are classified as a "Locally Important Aquifer – Bedrock which is Generally Moderately Productive only in Local Zones" (capable of good well yields) according to the GSI (2023).

The Dublin GWB was given a classification of "Good" for the last WFD cycle (2016-2021). Presently, the groundwater body in the region of the site (Dublin GWB) is classified as being under 'Review' per the WFD Risk Score system in order to determine whether or not the GWB has achieved its objectives and has either no significant trends or improving trends. The site is not located near any public groundwater supplies or group schemes and there are no groundwater source protection zones in the immediate vicinity of the site.

Potential Impacts of the Proposed Development

Construction Phase

In absence of mitigation measures, the construction phase would present potential impacts associated to the following activities:

- Excavation and Infilling.
- Accidental Spills, discharges, and Leaks

Without the consideration and employment of mitigation measures the potential impacts during the construction phase on land, soils and geology, hydrogeology (groundwater) are **negative**, **not significant** and **short term**.

Operational Phase

In absence of mitigation methods, the operational phase would present potential impacts associated to the following activities:

- Accidental Leaks /Unmitigated spills.
- Slight increase in hardstanding.

In the absence of mitigation measures (or design measures) the potential impacts during the operational phase on land, soils, geology and hydrogeology are **negative**, **imperceptible**, and **long-term**.

Mitigation and Residual Effects (Post-Mitigation)

Construction Phase

In order to reduce impacts on the soils, geological and hydrogeological environment, a number of mitigation measures will be adopted as part of the construction works on site.

- Implementation of a Construction & Environmental Management Plan (CEMP).
- Control of soil excavation.
- Regular source of fill and aggregates.
- Surface water management during construction.
- Fuel and chemical handling.

The predicted impact on the geological and hydrogeological environment during the construction phase is **neutral**, **imperceptible** and **short-term**, the magnitude of impact is considered **negligible**.

Operational Phase

A number of design measures will be put in place to minimise the likelihood of any spills entering the soil and groundwater environment to include the design of the car park with hydrocarbon interceptors. In the event of an accidental leakage of oil from the parking areas, this will be intercepted by the drainage infrastructure proposed.

The proposed surface water drainage system comprises infiltration areas which operate at a feasible rate. Multiple design/SuDS measures will be put in place (permeable pavement, attenuation tank, roadside swales/ filter drains, petrol interceptor and detention basins, etc.). No further mitigation measures are to be required during the operational phase.

The predicted impact on the geological and hydrogeological environment during the construction phase is **neutral**, **imperceptible** and **short-term**, the magnitude of impact is considered **negligible**.

Cumulative Impact of the Proposed Development

As has been identified in the receiving environment section, all cumulative developments that are already built and in operation contribute to the characterisation of the baseline environment. There are existing residential and commercial developments close by, along with the multiple permissions remaining in place in the area. Multiple developments in the area could potentially be developed concurrently or overlap in the construction phase.

Construction Phase

Contractors for the Proposed Development will be contractually required to operate in compliance with the CEMP which includes the mitigation measures outlined in this EIA report. Other developments will also have to incorporate measures to protect soil and water quality in compliance with legislative standards for receiving water quality (European Communities Environmental Objectives (Groundwater) Regulations (S.I. 9 of 2010 and S.I. 266 of 2016). As a result, there will be minimal cumulative potential for change in soil quality or the natural groundwater regime. The cumulative impact is considered to be ***neutral*** and ***imperceptible***.

Operational Phase

There are no other large projects proposed within this area of the aquifer so no cumulative impact on recharge to the aquifer. All developments are required to manage groundwater discharges in accordance with S.I. 9 of 2010 and S.I. 266 of 2016 amendments. As such there will be no cumulative impact to groundwater quality and therefore there will be no cumulative impact on the Groundwater Body Status. The operation of the proposed development is concluded to have a ***long-term***, ***imperceptible*** significance with a ***neutral*** impact on soil and water quality.

2.9 Water (Chapter 8)

Introduction

This chapter of the EIAR has been prepared by AWN Consulting Ltd. which assesses and evaluates the likely significant impacts of the proposed development on the land, soil, geological and hydrogeological aspects of the site and surrounding area associated with the proposed development at Station Road, Dunboyne, Co. Meath and associated ancillary building structures, and improvement works to two no. roundabouts on the R147.

Receiving Environment

The Proposed Development site extends to over 16.92 ha. on adjacent lands located in the Townlands of Castlefarm, Rusk and Clonee, Dunboyne, County Meath on lands generally bound to the east and south by agriculturally zoned lands, to the west by the Iarnród Éireann rail line, and to the north by the residential development permitted under Meath County Council (MCC) Reg. Ref. RA180561, agricultural lands and the L2228 (Station Road/Clonee Road). Improvement works to two no. roundabouts on the R147 (Old Navan Road) are located in at lands in the townlands of Loughsallagh and Clonee, Dunboyne, County Meath.

There are 2 no. existing streams/watercourses along the boundary of the subject site. One is located along the northern boundary (Dunboyne Stream [also known as Castle Stream]) and the second is located along the southern and east boundary. It is noted that both of these will be retained and will have a 10m riparian corridor.There is an existing townland boundary which passes through the site and which has a ditch with some water flow during periods of wet weather.

The site is currently occupied by multiple greenfield lands separated by ditches and hedgerow which are currently used for agricultural purposes. The existing landscape in the area of the proposed works is a mixture of agricultural land, railway and residential housing.

The natural overburden consist low permeability cohesive deposits associated to till derived from limestones and alluvial deposits associated to the Dunboyne Stream. Subsoil has been identified up to depths ranging between 1.7 to 4.2 mbgl. This soil has been noted as sandy gravelly Clay and some granular deposits. This indicates a 'High' to 'Extreme' Aquifer Vulnerability classification due to thickness and type of overburden present.

The bedrock beneath the site is Carboniferous Dark limestone (Lucan Formation), this is a (Ll) Locally Important Aquifer which are generally moderately productive only in local zones. Regional groundwater flow and surface water flow is to the east-northeast towards the junction between Dunboyne Stream and River Tolka and towards Dublin Bay, following the regional topography.

Based on the low-level detection of constituents of concern below the available soil standards and guideline values, the subsoil and local aquifer are considered to be relatively clean. According to the WAC analysis undertaken, all subsoils can be classified as Inert.

Review of the hydrogeology and geology in the surrounding region indicates that there are no sensitive receptors such as groundwater-fed wetlands, Council Water Supplies/ Group Water Schemes or geological heritage sites which could be impacted by this development. No evidence of disposal of waste material was identified the location area proposed for excavation. As mentioned above, collection and analysis of representative soil for a wide range of parameters shows no evidence of contamination.

The bedrock aquifers underlying the Proposed Development site are classified as a "Locally Important Aquifer – Bedrock which is Generally Moderately Productive only in Local Zones" (capable of good well yields) according to the GSI (2023).

The Dublin GWB was given a classification of "Good" for the last WFD cycle (2016-2021). Presently, the groundwater body in the region of the site (Dublin GWB) is classified as being under 'Review' per the WFD Risk Score system in order to determine whether or not the GWB has achieved its objectives and has either no significant trends or improving trends. The site is not located near any public groundwater supplies or group schemes and there are no groundwater source protection zones in the immediate vicinity of the site.

Potential Impacts of the Proposed Development

Construction Phase

In absence of mitigation measures, the construction phase would present potential impacts associated to the following activities:

- Excavation and Infilling.
- Accidental Spills, discharges, and Leaks

Without the consideration and employment of mitigation measures the potential impacts during the construction phase on land, soils and geology, hydrogeology (groundwater) are **negative**, **not significant** and **short term**.

Operational Phase

In absence of mitigation methods, the operational phase would present potential impacts associated to the following activities:

- Accidental Leaks /Unmitigated spills.
- Slight increase in hardstanding.

In the absence of mitigation measures (or design measures) the potential impacts during the operational phase on land, soils, geology and hydrogeology are **negative**, **imperceptible**, and **long-term**.

Mitigation and Residual Effects (Post-Mitigation)

Construction Phase

In order to reduce impacts on the soils, geological and hydrogeological environment, a number of mitigation measures will be adopted as part of the construction works on site.

- Implementation of a Construction & Environmental Management Plan (CEMP).
- Control of soil excavation.
- Regular source of fill and aggregates.
- Surface water management during construction.
- Fuel and chemical handling.

The predicted impact on the geological and hydrogeological environment during the construction phase is **neutral**, **imperceptible** and **short-term**, the magnitude of impact is considered **negligible**.

Operational Phase

A number of design measures will be put in place to minimise the likelihood of any spills entering the soil and groundwater environment to include the design of the car park with hydrocarbon interceptors. In the event of an accidental leakage of oil from the parking areas, this will be intercepted by the drainage infrastructure proposed.

The proposed surface water drainage system comprises infiltration areas which operate at a feasible rate. Multiple design/SuDS measures will be put in place (permeable pavement, attenuation tank, roadside swales/ filter drains, petrol interceptor and detention basins, etc.). No further mitigation measures are to be required during the operational phase.

The predicted impact on the geological and hydrogeological environment during the construction phase is **neutral**, **imperceptible** and **short-term**, the magnitude of impact is considered **negligible**.

Cumulative Impact of the Proposed Development

As has been identified in the receiving environment section, all cumulative developments that are already built and in operation contribute to the characterisation of the baseline environment. There are existing residential and commercial developments close by, along with the multiple permissions remaining in place in the area. Multiple developments in the area could potentially be developed concurrently or overlap in the construction phase.

Construction Phase

Contractors for the Proposed Development will be contractually required to operate in compliance with the CEMP which includes the mitigation measures outlined in this EIA report. Other developments will also have to incorporate measures to protect soil and water quality in compliance with legislative standards for receiving water quality (European Communities Environmental Objectives (Groundwater) Regulations (S.I. 9 of 2010 and S.I. 266 of 2016). As a result, there will be minimal cumulative potential for change in soil quality or the natural groundwater regime. The cumulative impact is considered to be ***neutral*** and ***imperceptible***.

Operational Phase

There are no other large projects proposed within this area of the aquifer so no cumulative impact on recharge to the aquifer. All developments are required to manage groundwater discharges in accordance with S.I. 9 of 2010 and S.I. 266 of 2016 amendments. As such there will be no cumulative impact to groundwater quality and therefore there will be no cumulative impact on the Groundwater Body Status. The operation of the proposed development is concluded to have a ***long-term***, ***imperceptible*** significance with a ***neutral*** impact on soil and water quality.

2.10 Wind (Chapter 9)

Introduction

A wind microclimate study has been carried out to consider the possible wind patterns formed under both mean and peak wind conditions typically occurring on the site area, accounting for a scenario where the proposed development is inserted in the existing environment (potential impact) and, for a scenario where the proposed development is analysed together with the existing environment and any permitted and proposed development (not constructed yet or future development) that can be influenced by the wind patterns generated by the proposed one (cumulative impact).

The potential receptors include those areas, in the surrounding of the development, which can be exposed to potential risks generated by the elevated wind speed or building massing wind effects. Potential receptors for the wind assessment are all pedestrian circulation routes, building entrances and leisure open areas within the site and in neighbouring adjacent areas. The pedestrian level is considered at 1.5m above ground.

In addition to the roads and entrances, some sensitive receptors for this assessment are the “Public Open Space”, “Communal Open Space”, “Courtyard” which will be used by public for long term sittings and need to be particularly comfortable/safe.

Methodology

The method for the study of wind microclimate combines the use of Computational Fluid Dynamics (CFD) to predict wind velocities and wind flow patterns, with the use of wind data from suitable meteorological station and the recommended comfort and safety standards (Lawson Criteria). The effect of the geometry, height and massing of the proposed development and existing surroundings including topography, ground roughness and landscaping of the site, on local wind speed and direction is considered as well as the pedestrian activity to be expected (sitting, standing, strolling and fast walking).

The results of the assessment are presented in the form of contours map of the Lawson criteria at pedestrian level.

“Lawson Comfort and Distress Criteria” has been adopted for wind microclimate studies as a means of assessing the long term suitability of urban areas for walking or sitting, accounting for both microclimatic wind effects (i.e. site location and prevailing winds) and microclimatic air movement associated with wind forces influenced by the localised built environment forms and landscaping effects.

- Topography of the site with buildings (proposed and adjacent existing/permitted developments massing, depending on the scenario assessed “*baseline, proposed or cumulative*”) have been modelled using CFD OpenFOAM Software.

- Suitable wind conditions have been determined based on historic wind data. Criteria and selected wind scenarios included means and peaks wind conditions that need to be assessed in relation to the Lawson Criteria.
- Computational Fluid Dynamics (CFD) has been used to simulate the local wind environment for the required scenarios ('baseline, proposed, cumulative").
- The impact of the proposed development massing on the local wind environment has been determined (showing the wind flows obtained at pedestrian level).
- Potential receptors (pedestrian areas) have been assessed through review of external amenity/public areas (generating the Lawson Comfort and Distress Map).
- Potential mitigation strategies for any building related discomfort conditions (where necessary) have been explored and their effect introduced in the CFD model produced.

The significance of on-site measurement locations are defined by comparing the wind comfort/safety levels with the intended pedestrian activity at each location, using the table provided by the Lawson Comfort and Distress Criteria.

The significance of off-site measurement locations are defined by comparing the wind comfort/safety levels with the intended pedestrian activity at each location, prior and after the introduction of the proposed development.

Impacts of Proposed Development

The wind microclimate of the proposed development is comfortable and usable for pedestrians. As the result of the proposed development construction, the wind on the surrounding urban context is also mitigated when compared with the baseline situation (existing scenario). In this sense the proposed development has a beneficial effect on the surrounding wind microclimate and can create comfortable pedestrian areas and public spaces.

The analysis carried out have shown that the proposed development does not impact or give rise to negative or critical wind speed profiles at the nearby adjacent roads, or nearby buildings. Moreover, in terms of distress, no critical conditions were found for "Frail persons or cyclists" and for members of the "General Public" in the surrounding of the development.

The assessment of the conditions on the courtyards has shown that no area is unsafe, and no conditions of distress are created by the proposed development and the areas are usable during the appropriate period of the year.

Residual Impacts

Wind cannot be eliminated or totally mitigated as it depends on weather conditions which could vary. The data of the historical wind conditions collected and reported in the previous sections, show that the wind speeds likely to occur on the site are below critical values, and that pleasant and comfortable microclimate can be maintained for most of the time and under the most frequent wind scenarios.

Gusts and storms can still occur however, and they can create unpleasant and sometimes unsafe conditions. The pedestrian activities concerning the Lawson Comfort and Distress Criteria are not in general carried out during those weather conditions.

Having considered the above, no further changes to the development design and further increasing of the landscaping is suggested, as safety and pedestrian comfort is maintained in accordance with Lawson Comfort and Distress Criteria.

2.11 Climate (Air Quality) (Chapter 10)

The assessment of Air Quality is contained within Chapter 10.

Existing Environment

Baseline air quality data and data available from similar environments indicate that levels of nitrogen dioxide, carbon monoxide, benzene and particulate matter less than 10 microns and less than 2.5 microns are generally well below the National and European Union (EU) ambient air quality standards.

Impact Assessment

Do Nothing

Under the Do-Nothing scenario the proposed development will not be constructed. In this scenario, ambient air quality at the site will remain as per the baseline and will change in accordance with trends within the wider area. As the site is zoned for development, in the absence of the proposed development it is likely that a development of a similar nature would be constructed in the future in line with national policy and the development plan objectives. Therefore, the construction and operational phase impacts outlined in this assessment are likely to occur in the future even in the absence of the proposed development.

Construction Phase

The greatest impact to air quality during the construction phase of the proposed development is from dust emissions. There are a number of residential properties bordering the proposed site. The UK Institute of Air Quality Management guidance was used to assign a high level of sensitivity to dust soiling impacts to the area in the immediate vicinity of the proposed development. The local area is considered of low sensitivity to human health impacts from dust emissions.

The scale and nature of the construction works were reviewed, and it was determined that a high level of dust control was required for the construction phase of the proposed development. Once the dust mitigation measures outlined in Chapter 10 Section 10.6 and Appendix 10.1 are implemented, dust emissions are predicted to be short-term, negative, localised and imperceptible and will not cause a nuisance at nearby sensitive receptors.

The best practice dust mitigation measures that will be put in place during construction of the proposed development will ensure that the impact of the development complies with all EU ambient air quality legislative limit values which are based on the protection of human health. Therefore, the impact of construction of the proposed development is likely to be short-term, negative and imperceptible with respect to human health.

Construction stage impacts to air quality are considered short-term and imperceptible due to the scale and nature of the works.

Operational Phase

Potential impacts to air quality during the operational phase of the proposed development are as a result of increased traffic volumes on the local road network. The changes in traffic flows were assessed against the document Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106 screening criteria for an air quality assessment. It was determined by Waterman Moylan that the proposed development will result in the operational phase traffic increasing by more than 1,000 AADT on a number of road links. Therefore, in accordance with the TII scoping criteria a detailed air dispersion modelling assessment of operational phase traffic emissions was conducted. Overall, the potential impact of the proposed development on ambient air quality in the operational stage when compared to the EU limit values is considered long-term, localised, neutral and non-significant.

Cumulative Impact

Cumulative construction phase impacts can occur if the construction phase overlaps with the construction phase of other developments within 350 m. This can result in cumulative dust impacts on nearby sensitive receptors. Provided the dust mitigation measures are implemented throughout the construction phase of the proposed development cumulative dust impacts are not predicted at nearby receptors.

Cumulative impacts have been included as part of the traffic assessment for the operational phase. It was predicted that there will be an imperceptible impact to air quality during the operation of the proposed development.

Mitigation

Construction Phase

A detailed dust management plan has been included in Appendix 10.1 of Chapter 10 and will be incorporated into the overall Construction Environmental Management Plan for the site. The measures outlined in the plan will be in place for the duration of the construction phase to ensure no significant dust impacts occur.

Operational Phase

There are no mitigation measures proposed for the operational phase of the development as it is predicted to have an imperceptible and neutral impact to air quality.

Residual Impact Assessment

Once the dust mitigation measures outlined in Appendix 10.1 are implemented dust related impacts during the construction phase are predicted to be short-term, direct, negative, localised and imperceptible.

The impact to air quality as a result of increased traffic volumes during the operational phase of the proposed development is localised, neutral, direct, imperceptible and long-term.

Monitoring

Monitoring is not recommended for the proposed development.

2.12 Climate (Climate Change) (Chapter 11)

The assessment of Climate is contained within Chapter 11.

Existing Environment

Ireland declared a climate and biodiversity emergency in May 2019 and in November 2019 there was European Parliament approval of a resolution declaring a climate and environment emergency in Europe. This, in addition to Ireland's current failure to meet its EU binding targets under Regulation 2018/842 results in changes in GHG emissions either beneficial or adverse being of more significance than previously considered prior to these declarations.

Data published in 2022 (EPA, 2023) predicts that Ireland exceeded (without the use of flexibilities) its 2021 annual limit set under EU's Effort Sharing Decision (ESD) (EU 2018/842) by 3.29 Mt CO_2eq. The sector with the highest emissions in 2021 (of total excluding LULUCF) was agriculture at 38% of the total, followed by transport at 17.7%. For 2021 total national emissions (excluding LULUCF) were estimated to be 62.11 Mt CO_2eq. (EPA, 2023).

The EPA's Critical Infrastructure Vulnerability to Climate Change report (EPA, 2021b) assesses the future performance of Irelands critical infrastructure when climate change is considered. Fluvial

flooding and coastal inundation/coastal flooding are considered the key climate change risks, with respect to road infrastructure, with snowstorm and landslides being medium risks. Extreme winds and heatwaves/droughts are considered low risk to road infrastructure. One of the key outputs of the research was a framework that will provide quantitative risk-based decision support for climate change impacts and climate change adaptation analysis for infrastructure.

Impact Assessment

Do Nothing

Under the Do Nothing scenario the proposed development will not be constructed. In the Do-Nothing scenario, no construction works will take place and the site will remain as it currently is. The climate baseline will continue to develop in line with the identified trends. This scenario is considered neutral in relation to climate.

Construction Phase

The assessment set out in the TII guidance document PE-ENV-01104 (TII, 2022a) aims to quantify the difference in GHG emissions between the Proposed Development and the baseline scenario (the alternative project/solution in place of the Proposed Development). PE-ENV-01104 (TII, 2022a) recommends the calculation of the construction stage embodied carbon using the TII Online Carbon Tool (TII, 2022b), in addition to this OneClickLCA Carbon Designer Tool for Ireland was utilised for the building elements of the proposed development. The proposed development is estimated to result in total construction phase GHG emissions of 17,154 tonnes embodied CO_{2eq} for the product and construction processes, equivalent to an annualised total of 0.42% of the 2030 Buildings (Residential) or industrial sector budgets (both have same 2030 budget) when annualised over the lifespan.

Operational Phase

There is the potential for release of a number of greenhouse gas emissions to atmosphere during the full lifecycle of the proposed development including construction, operation and decommissioning. Maintenance of materials including road surfaces has been included in the operational phase calculations.

There is the potential for increased traffic volumes to impact climate during the operational phase. It is predicted that in 2026 the proposed development will increase CO_2 emissions by 0.00009% of the EU 2026 target. Similarly low increases in CO_2 emissions are predicted to occur in 2041 with emissions increasing by 0.00006% of the EU 2030 target.

The vulnerability of the proposed development to climate change and the sensitivity and exposure of the development to various climate hazards has been determined. The following climate hazards have been considered in the context of the proposed development: flooding (coastal, pluvial or fluvial); extreme heat; extreme cold; wildfire; drought; extreme wind; lightning, hail, landslides, fog, wildfire and landslides. In order to inform the risk a full and detailed hydraulic model will therefore be developed to expand upon the existing level of detail for the area and include the local watercourses that flow through the site. This modelling was completed for both the Mid-End Future Scenario (additional 20%) and High-End Future Climate Scenarios (additional 30%). The final attenuation storage has been designed to cater for the 1% AEP flood events plus an allowance for an additional 20% climate change factor. In relation to extreme temperatures, both extreme heat and extreme cold, these have the potential to impact the building materials and some related infrastructure. However, high quality, durable building materials will be selected for the proposed development. The assessment concluded that the proposed development has a worst-case medium vulnerability of drainage to flooding.

Cumulative Impact

With respect to the requirement for a cumulative assessment PE-ENV-01104 (TII, 2022a) states that *"for GHG Assessment is the global climate and impacts on the receptor from a project are not geographically constrained, the normal approach for cumulative assessment in EIA is not considered applicable."*

Mitigation

Construction Phase

Measures to reduce the embodied carbon of materials and the operational energy usage have been or will be incorporated into the detailed design to ensure the lifecycle carbon of the proposed development is minimised. During the construction phase best practice measures shall be implemented on site to prevent significant GHG emissions and reduce impacts to climate.

Operational Phase

As per the proposed projects Energy Analysis Report prepared by IN2 Engineering Design Partnership, the design takes consideration of Part L Compliance. A number of incorporated design mitigation measures that have been incorporated into the design of the development to reduce the impact on climate wherever possible. For example, adequate attenuation and drainage have been incorporated into the design of the development to avoid potential flooding impacts as a result of increased rainfall events in future years.

Residual Impact Assessment

Once mitigation measures are put in place, the effect of the proposed development in relation to GHG emissions is considered long-term, minor adverse and not significant in EIA terms.

In relation to climate change vulnerability, it has been assessed that there is a low risk as a result of future climate change hazards with the exception of flood risk which has a medium risk. This risk will be mitigated where possible to reduce the vulnerability of the site. Design mitigation measures have been put in place to ensure buildings on the site have added resilience to potential flooding. These measures include a minimum finished floor level for the proposed development is set 500 mm above the fluvial 1% AEP plus MRFS climate change water level.

Monitoring

Monitoring is not recommended for the proposed development.

2.13 Climate (Daylight) (Chapter 12)

Digital Dimensions have been commissioned to assess any potential effect on the Daylight of neighbouring properties. This section has been prepared by John Healy - Diploma Architectural Technology, M.Sc Environmental Design of Buildings, PG Dip Digital Media. John has experience of working as a Daylight and Sunlight consultant for in excess of 10 years.

The potential for a development to effect daylight diminishes with distance. The relationship is that at three times the height of the building away from the development there will be no noticeable change in daylight levels to neighbouring windows. The relationship between the proposed development and the existing neighbouring properties is that the existing buildings adjacent to the proposed development are at a substantial distance beyond three times the height of the proposed development and no existing property will experience any reduction in daylight. The effect of the proposed residential development on the daylight of adjacent buildings will be neutral.

The effect on daylight at the point of the completed development represents the greatest obstruction to daylight and this is not projected to change over the operational stage of the development.

2.14 Climate (Sunlight) (Chapter 13)

Digital Dimensions have been commissioned to assess any potential effect on the Sunlight of neighbouring properties. This section has been prepared by John Healy - Diploma Architectural Technology, M.Sc Environmental Design of Buildings, PG Dip Digital Media. John has experience of working as a Daylight and Sunlight consultant for in excess of 10 years.

The 21st of March (Equinox) is the recommended day for shadow diagrams because it is the day of equal day and night. On March 21st there is no additional shading on any of the adjacent building or residential amenity area from the proposed development. At an average level of shadow over the course of the year, the effects from shadows of the proposed development are brief and not significant.

The BRE guidelines gives guidance on quantifying the potential effect on internal sunlight and sunlight to amenity areas. The shadow study shows that there is no additional shadow on any building or amenity area. The effect from the proposed development on the internal sunlight or the sunlight to amenity areas in adjacent properties is neutral.

The effect on daylight at the point of the completed development represents the greatest obstruction to daylight and this is not projected to change over the operational stage of the development.

2.15 Air (Noise & Vibration) (Chapter 14)

Chapter 14 of the EIAR provides information on the assessment of noise and vibration impacts on the surrounding environment during the construction and operational phases of the proposed mix use development.

The existing and future noise and vibration environments across the development site and in the vicinity of the nearest existing noise sensitive locations (NSLs) are dictated by transportation sources in the study area including road traffic and rail pass bys. The noise environment across the development site

The construction phase will involve site clearance, building construction work, road works, and and landscaping. The assessment has determined that whilst there will be increased construction related noise at the closest noise sensitive locations to the proposed development, the works can be controlled to within the adopted construction noise thresholds at existing NSLs surrounding the development site. There are no construction vibration sources that will give rise to any significant vibration impacts.

The use of best practice noise control measures, hours of operation, scheduling of works within appropriate time periods, strict construction noise limits will ensure impacts are controlled to within the adopted criteria. Similarly, vibration impacts during the construction phase will be well controlled through the use of low vibration generating equipment.

Once operational there are no noise sources associated with the proposed development that will give rise to any significant noise impacts. Operational activities are those which form part of the existing surrounding environment at neighbouring residential areas (estate vehicle movements, children playing etc.) and hence no significant impact is expected from this area of the development site. The predicted change in noise levels associated with additional traffic in the surrounding area once the development is operational, is not significant when added to existing traffic flows along the surrounding road network.

An assessment of inward noise levels from existing and future rail noise on the proposed development has been undertaken. Both existing and future noise levels are defined as low across the majority of the site and provide a good quality residential amenity. Buildings along the western site boundary with the Irish Rail line are of moderate noise level. With the use of standard double glazed units to the western building facades, acceptable internal noise levels during day and night-time periods are achieved.

Cumulative noise levels associated with the construction phase of the proposed development and the adjacent proposed developments have been considered. Once cumulative construction impacts are considered and managed during the construction phase potential cumulative impacts on nearby sensitive receptors can operate within the construction noise thresholds adopted.

During the operational phase, cumulative impacts associated with the proposed development combined with adjacent planned and existing sites has been considered and assessed. The impact is determined to be not significant in terms of noise level increases.

2.16 Landscape and Visual Impact Assessment (Chapter 15)

Baseline Landscape and Visual Setting

The Application Site comprises 16.92 hectares of land set to the south of Station Road (L2228) in the townland of Castlefarm, Rusk and Clonee to the south-east of Dunboyne in Co. Meath. The site comprises farmlands set out across four medium to large fields that are used for arable and pasture farming purposes. OSI maps indicate that the southern fields were historically on the eastern edge of a wider demesne associated with Rusk House in the 19th century. The site is privately owned and there is no public access, paths or rights or way.

A Tree Survey (Andy Boe 2022) noted that *"The amenity value of the majority of the trees should be considered low to medium due to being mostly self-seeded and unmaintained"* and *"The remaining contribution of the majority of the trees is very limited with the exception of the Oak woodland to the South of the site."*

The Application Site comprises a rural landscape set on the urban periphery and, in broad terms, the landscape value and quality would be categorised as medium based on its "everyday" character and undesignated status in landscape or amenity terms. The gently rolling landscape, while attractive in its own right does not possess many notable features other than hedgerows and the line of Oaks (which are to be retained) and it would not be considered unique or rare in this part of Ireland. The cores of the fields are intensely managed arable lands and there is little in the way of any species or landscape diversity away from hedgerows and ditches that would result in a higher category of value.

The south and east of Dunboyne is characterised by extensive housing estates that have been built out over the last couple of decades with retail, commercial and institutional development aligning the main roads leading from the town centre. Built-up townscape, infrastructure and vegetation are features of the landscape / townscape around Balbriggan and this ensures that views consistently change in context, scale and extent with many views of the Application Site, even from close proximity locations closed off.

Maps available from the Environmental Protection Agency (EPA) indicate no protected landscapes, environment or ecology areas on or close to the Application Site. There are no designated views or prospects listed in the Development Plan close enough to be affected by activity on the site.

Predicted Landscape and Visual Effects

As part of the design process for the residential development on these lands, existing environmental / technical constraints and assets were reviewed with the design team and the landscape design considerations focused on retention of key areas of existing vegetation/ trees, provision of public realm areas, open spaces, playgrounds, and linkages / connectivity within the proposed development site that would be accessible to all members of the community. The objectives include creation of different landscape treatments including avenue tree types and building types to create identifiable character zones.

There is likely to be temporary moderate adverse effects during the construction period though the most appreciable aspects of this will not be easily discerned from publicly accessible areas within the wider Dunboyne townscape or any farmland areas to its south-east periphery (that would be subject to very few visual receptors) and only the new access to the north towards Station Road being evident.

The most appreciable effects inevitably relate to the scale and nature of the proposed residential development which will result a mix of 716no. residential units occupying the majority of the site footprint although in excess of 20% is to be set out as public open space. At the core of the site is a large rectilinear public open space which has capacity and scale to accommodate informal and various amenity and landscape / parkland areas. While having a major effect on the Application Site area, the proposed development, associated parklands, open space and public realm landscapes will include

positive and significant elements that will contribute to the amenity, character and broader environment of this part of Dunboyne.

The most notable natural features on the site, namely the mature trees and boundary hedgerows are to be retained within areas of public open space. The proposals include for planting over 600 no. standard tree and – in conjunction with more general woodland, shrub and hedgerow planting – this will contribute to far more significant vegetation cover on this site than it had a present.

The low-lying topography and existing vegetation ensure the majority of areas within the Dunboyne area including the vast majority of the town will experience no or negligible effects due to the proposal being visually obscured or not being a significant factor in any view or association with any visual amenity provision.

While recognising there are localised significant landscape and visual impacts, the proposed development, while sizeable, can be accommodated and absorbed into this part of Dunboyne without causing any significant detrimental or unacceptable landscape or visual effects.

2.17 Material Assets (Transportation) (Chapter 16)

This chapter of the EIAR has been prepared by Waterman Moylan Consulting Engineers and presents the traffic and transportation assessment of the receiving environment for the construction and operational phases of the proposed development.

The proposed development consists of the construction of 716 no. residential units, the extension of the Southern Distributor Road (SDR) and upgrade works to two roundabouts. It is envisaged that the proposed development will be delivered in an organised manner following planning approval. In the subject traffic analysis, it was assumed that the first c. 200 residential units will be in place by 2026, whilst the overall development will be constructed by 2031.

The construction traffic to/from the proposed development is predicted to result in an additional 40-45 HGV arrivals/departures per day and c. 40-60 car trips which are envisaged to occur mostly outside the typical peak hours of the local road network. The impact of the construction traffic on the local assessed road network is considered to be slight negative in terms of significance and medium-term in terms of duration.

Prior to the construction, a detailed Construction Environment Management Plan (CEMP), a detailed Construction Management Plan (CMP) and a detailed Construction Traffic Management Plan (CTMP) will be prepared by the main contractor to provide mitigation measures to further minimise the effects of the construction phase of the proposed development. Some monitoring is advised during the construction phase including vehicle routes and parking, roads conditions, and construction hours.

To understand the traffic impacts during the operational phase of the proposed development, five junctions have been modelled using ARCADY, TRANSYT and PICADY traffic modelling software. The analysis results have shown that the effects of the proposed development during the operational phase with regards to peak hour traffic will be momentary in terms of duration – occurring for less than an hour during the peak periods of the road network, and significant in terms of magnitude, which will alter the baseline condition, requiring upgrades to junctions. Outside the peak hours, however, the effects are likely to be permanent in terms of duration, but imperceptible or not significant in terms of magnitude.

The proposed upgraded junctions would be able to cater for the additional traffic arising from the proposed development and also from the residential zoned lands in Dunboyne. Therefore, whilst the estimated traffic increase over the baseline conditions is considered moderate, the proposed upgraded junctions would have a positive impact in terms of quality, increasing the capacity of the road network to accommodate the proposed and potential future developments.

The proposed development site is located c. 500m from the closest bus stops on L2228 Station Road and c. 800m away from the Dunboyne railway station. The extension of the Southern Distributor Road and provision of adequate pedestrian and cyclist facilities as part of the proposed development, will tie into the existing facilities along the L2228 Station Road and will results in a positive and permanent effect in terms of sustainable transport options.

A Travel Plan has been prepared to provide guidance on how to create a positive atmosphere for residents/visitors of the proposed development with regards to transportation and accessibility. The Plan promotes sustainability, the enhancement in the use of public transport and reduction in the use of private car. The Travel Plan should be monitored and updated at regular intervals to enable tracking in terms of car and bicycle parking occupancy, the use of private car and use of public transport.

2.18 Material Assets (Waste) (Chapter 17)

AWN Consulting undertook the waste management assessment. The receiving environment is largely defined by Meath County Council (MCC) as the local authority responsible for setting and administering waste management activities in the area through regional and development zone specific policies and regulations.

Baseline Environment

The current site is a greenfield site that is not generating any waste.

Potential Impacts of the Proposed Development

Construction Phase

During the construction phase the mismanagement of waste, including the inadequate storage of waste, inadequate handling of hazardous waste, the use of inappropriate or insufficient segregation techniques, and the use of non-permitted waste contractors, would likely lead to negative impacts such as waste unnecessarily being diverted to landfill, litter pollution which may lead to vermin, runoff pollution from waste and illegal dumping of waste. In the absence of mitigation, the effect on the local and regional environment is likely to be long-term, significant and negative.

Operational Phase

The potential impacts on the environment during the operational phase of the proposed development would be caused by improper, or lack of waste management. In the absence of mitigation, the effect on the local and regional environment is likely to be long-term, significant and negative.

Mitigation and Residual Effects (Post Mitigation)

Construction Phase

During the construction phase, typical construction waste materials will be generated which will be source segregated on-site into appropriate skips/containers, within designated waste storage areas and removed from site by suitably permitted waste contractors as required, to authorised waste facilities, by appropriately licensed waste contractors. While the accurate keeping of waste records will be undertaken. All waste leaving the site will be recorded and copies of relevant documentation maintained.

This will all be overseen by the main contractor, who will appoint a construction phase Resource Manager 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 on site.

A carefully planned approach to waste management and adherence to the site-specific Resource and Waste Management Plan (Appendix 15.1) and chapter 15 during the construction phase, this will ensure that the effect on the environment will be short-term, neutral and imperceptible.

Operational Phase

During the operational phase, waste will be generated by the residents and childcare tenants. Dedicated waste storage areas (WSAs) have been allocated throughout the development for the use of residents and tenants. The WSAs have been appropriately sized to accommodate the estimated waste arisings from the development. The WSAs have been allocated to ensure a convenient and efficient management strategy with source segregation a priority. Waste will be collected from the

designated waste collection areas for shared WSAs and on the curb for individual WSAs by permitted waste contractors and removed off-site for re-use, recycling, recovery and/or disposal.

An Operational Waste Management Plan (OWMP) or Strategy has been prepared and is included as Appendix 15.2. The OWMP provides a strategy for segregation (at source), storage and collection of wastes generated within the development during the operational phase including Organic waste; Dry Mixed Recyclables, Mixed Non-Recyclable Waste, Glass, Waste electrical and electronic equipment (WEEE) including computers, printers, cooking oil, Cleaning chemicals (paints, adhesives, resins, detergents, etc.), Furniture (and from time-to-time other bulky waste) and Abandoned bicycles.

This OWM Plan/Strategy will be supplemented, as required, by the operator with any new information on waste segregation, storage, reuse and recycling initiatives that are subsequently introduced.

Provided the mitigation measures outlined in the OWMP (Appendix 15.2) and in chapter 15 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, neutral and imperceptible.

Cumulative Impact of the Proposed Development

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. Due to the high number of waste contractors in the MCC region, as provided from the National Waste Collection Permit Office and the EPA, 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 of the developments.

Other developments in the area will be required to manage waste in compliance with national and local legislation, policies and plans which will mitigate against any potential cumulative effects associated with waste generation and waste management. As such the cumulative effect will be short-term, imperceptible 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 mitigate any potential cumulative impacts associated with waste generation and waste management. As such the cumulative effect will be a long-term, imperceptible and neutral.

2.19 Material Assets (Utilities) (Chapter 18)

Waterman Moylan Consulting Engineers has been commissioned to assess the likely impact of the proposed development on the material assets serving the subject lands relating to surface water drainage, water supply, foul sewerage, electricity, gas and telecommunications.

In terms of surface water, the site currently drains at an unrestricted rate to Castle Stream to the north of the site and a number of ditches, one through the centre of the site and another two to the south and east. There are no underground public surface water pipes within the subject site. It is proposed, as part of the development to discharge surface water runoff from site via 6 No. Hydrobrakes which will restrict the overall outfall to the greenfield run-off rate for the site.

There is an existing 525mm diameter combined sewer traversing the site from west to east along the northern boundary. As part of the proposed works, it is proposed to divert the existing sewer into the proposed road to the north. This diversion will be subject to a diversion agreement with Irish Water. A pre-connection enquiry has been submitted to Irish Water which outlines the proposals for waste water drainage from the development. Irish water responded and confirmed that a connection is feasible.

Irish Water have also been contacted with the proposal for the provision of water supply to the development. There is an existing 200mm dia. uPVC watermain on Station Road to the north of the subject. Irish Water responded to say that the upsize the existing 200mm diameter watermain to a 400mm diameter watermain over a length of 1.1km will be required to facilitate the proposed development. This work will be carried out directly by Irish Water as part of the Connection Agreement Process.

Water demand will increase as a result of the proposed development. However, on completion of the upgrade works noted above, there is sufficient capacity available in the public water supply network to cater for the increased demand.

Gas Networks Ireland maps show that there are existing gas pipes on Station Road, to the north of the site. No works are proposed to this Gas Main.

The ESB maps show that There are a number of existing ESB lines in the vicinity of the development site. Most notably there are high voltage overhead cables crossing the site east/west. The developer has considered the overhead lines and will limit the rotation of cranes and identify safe cranage zones to mitigate against any contact with the overhead lines. Plans for the proposed Cranage arrangements are included in the appendices of this document. All works on the ESB supply infrastructure will be carried out in accordance with relevant ESB guidelines.

Virgin Media maps indicate that there are existing Virgin Media services on Station Road to the north of the site. The exact extent and location of any future connections will be agreed with Virgin Media during the design stage of the project. All works on the Virgin Media supply infrastructure will be carried out in accordance with Virgin Media relevant guidelines. All Virgin Media infrastructure will be below ground with the exception of a Fibre Cabinet if required by Virgin Media.

There is a risk to all services during the construction phase of the project. Appropriate mitigation measures such as bunding of fuel and chemical stores to prevent spillages entering the drainage network, scanning for all services during excavation to prevent strike of services and providing silt control measures to prevent run off from entering the drainage network must be implemented during the construction stage.

During the operational stage, appropriate storage of surface water with flow control devices will limit the discharge of surface water from site, reducing the risk of downstream flooding. In addition, there will be an increased demand on other services due to the development which can be accommodated by the service provider.

Due to the proposed mitigation measures on both construction and operational phase, the impact on the utilities is considered not significant.

2.20 Cultural Heritage (Architectural and Archaeology Heritage) (Chapter 19)

The chapter assesses the effects of the proposed development on the cultural heritage resource, including archaeological and architectural heritage. The recorded and potential cultural heritage resource within a study area encompassing the lands within the proposed development site and surrounding lands extending for 1km in all directions, was reviewed during the desktop study in order to compile a comprehensive cultural heritage baseline context. This revealed that there are no recorded archaeological sites within the proposed development site which is located c.800m outside the east end of the zone of notification around the historic settlement cluster in the centre of Dunboyne village. There are 28 recorded archaeological sites within the 1km study area and, of these, 15 were identified and archaeologically excavated during development projects in recent decades. There are no Protected Structures, or any associated curtilage features, located within the proposed development site and it is c.1.13km outside the east end of the Dunboyne Architectural Conservation

Area. The archaeological sites and architectural heritage structures within the surrounding 1km area are identified and mapped within the chapter and relevant published inventory entries and excavation summaries are presented in Appendices 19.1 and 19.2.

A review of historic mapping, as well as modern aerial and LiDAR imagery, revealed no evidence for the presence of unrecorded archaeological sites within the site and no surface traces of any potential archaeological sites or structures of architectural heritage interest were identified during a field inspection. The only features of cultural heritage interest identified within the proposed development site during the desktop study and field inspection were two field boundaries which form sections of the townland boundaries between Castlefarm, Rusk, Loughsallagh and Clonee. These boundaries are undesignated features found throughout the country and comprise receptors of local (low) cultural heritage value.

The potential for the presence of unrecorded, sub-surface archaeological remains within the proposed development site was noted and a non-intrusive geophysical survey of all green field areas, under licence by the National Monuments Service, was carried to inform the assessment. This survey revealed sub-surface remains of an enclosure feature of unknown date, as well as potential associated features, within the proposed development site. The results of the survey are summarised within the chapter and a full copy of the geophysical survey report is presented in Appendix 19.4.

The construction and operational stages of the proposed development would have no predicted effect on any archaeological sites listed in the Sites and Monuments Record or the Record of Monuments and Places or on any recorded architectural heritage structures. Ground excavation works during the construction phase would have the potential to result in permanent, direct, moderate to significant, negative effects on the sub-surface features identified during the geophysical survey and this would require mitigation. The construction phase would also result in a permanent, direct, slight, negative effect on the sections of the townland boundaries extending within the proposed development site. No potential significant cumulative impacts on the cultural heritage resource were noted during an appraisal of the proposed development in combination other developments in the area.

A programme of archaeological test trenching of the features identified during the geophysical survey would be carried out in advance of the construction phase under licence by the National Monuments Service (NMS). This would also include test trenching of the sections of townland boundaries within the proposed development site. All sub-surface archaeological features identified during these investigations would be cordoned off, recorded *in situ* and described in a report submitted to the NMS. Any required additional mitigation measures, which may include total/partial preservation *in situ* by avoidance or preservation by record by archaeological excavation, would be formulated and enacted in consultation with the NMS. Preservation *in situ* would allow for a negligible magnitude of impact resulting in a potential imperceptible significance of residual effect on the unrecorded archaeological resource. Preservation by record would result in a high magnitude of effect, albeit ameliorated by the creation of a full and detailed archaeological record, the results of which shall be publicly disseminated. This would result in a potential slight to moderate range of significance of effect in the context of residual effects on the unrecorded archaeological resource.

2.21 Risk Management (Chapter 20)

This assessment describes the proposed development in respect of its potential vulnerability to major accidents/ disasters. It also considers the potential for the development to give rise to major accidents/ disasters.

The scope and methodology of this assessment is based on the understanding that the proposed development will be designed, built and operated in line with best international current practice. As such, major accidents resulting from the proposed development would be very unlikely.

A risk analysis-based methodology that covers the identification, likelihood and consequence of major accidents and / or disasters has been used for this assessment. There are no Seveso sites in the vicinity of the site.

No potential scenarios during the construction phase were identified as requiring further assessment.

2.22 Summary of Mitigation Measures (Chapter 21)

This Chapter provides a summary of all the mitigation and monitoring measures proposed throughout the EIAR document for ease of reference for the consent authority and all other interested parties.

2.23 Summary of Residual Impacts & Cumulative Impacts (Chapter 22)

This Chapter provides a summary of all the residual impacts identified throughout the EIAR document for ease of reference for the consent authority and all other interested parties.

2.24 Summary of Interactions (Chapter 23)

This Chapter identifies the principle interactions between the potential impacts of the environmental factors identified in Chapters 5-19 inclusive, and as well as cumulative impacts arising based on best scientific knowledge.

All potential interactions have been addressed as required throughout the EIAR. During each stage of the assessment contributors have liaised with each other (where relevant) to ensure that all such potential interactions have been addressed.

3 DESCRIPTION OF PROPOSED DEVELOPMENT

3.1 Introduction

This Chapter of the EIAR provides a Description of the Proposed Development which will be assessed as part of the EIA process.

The Description of Development provides details of this project which requires planning consent. It includes a description of the location of the project and its physical and environmental characteristics. The description of development as set out in this Chapter is also set out in the following chapters prepared by consultants specialising in the environmental topics subject of the Chapters.

In line with the EIA Directive a description of the application site, design, size and scale of development are also discussed within this Chapter. Consideration is also given to all relevant phases of development from construction through to operation. This chapter provides a broader summary description of the Proposed Development that is subject of this EIAR. The environmental impacts of the Proposed Development are then examined for each of the prescribed environmental topics discussed in turn under Chapters 5 – 19. A summary of the proposed mitigation measures are set out in Chapter 21: Summary of Mitigation Measures. The residual impacts of the Proposed Development are summarised under Chapter 22: Summary of Residual Impacts and Cumulative Impacts.

This chapter has been prepared by Stephen Little, EIAR Manager, with assistance from Naoise O'Connor, EIAR Co-ordinator at Stephen Little & Associates. Stephen has over 30 years' professional experience of town planning in Ireland, is a Corporate Member of both the Irish Planning Institute and the Royal Town Planning Institute and holds a Diploma in EIA Management (UCD). Naoise has 3 years' professional experience in the planning field, has a MRUP – Masters in Regional and Urban Planning.

3.2 Site Description & Context

The subject site of this intended planning application, as outlined in red in Figure 1 below, lies approximately 1km east of the centre of Dunboyne and is situated immediately south of the Dunboyne Rail Station on Station Road (also known as the L2228), Dunboyne and lies within the Metropolitan Area of the Greater Dublin Area as defined by the Eastern and Midlands Regional Spatial and Economic Strategy. The subject site measures approximately 16.92Ha and can be generally described as greenfield and agricultural in nature. The application site comprises of three distinct plots. The first of these comprises the site on Station Road where the residential development is proposed (including the distributor road), with the other two parcels being where upgrade works are proposed to the existing 2no. roundabouts on along R147 (Old Navan Road). All of the lands encapsulated within the red line are zoned 'A2' for residential development, save for where the distributor road crosses the Castle Stream (including part of its alignment leading to that crossing), where the zoning is F1 – Open Space and for the upgrade works to existing 2no. roundabouts on along R147 (Old Navan Road), where the zoning is RA- Rural Area.

There are lines of existing ESB cables crossing the site; one to the north and one to the south of the lands zoned for residential development. The line to the north are suspended on pylons, one of which is positioned on the site. These are identified on the planning drawings accompanying this planning application. This pylon and ESB cables are being retained in the layout. In the southern field is a line of ESB cables suspended in the air using more traditional timber poles.

All of the application lands are located in the townlands of Castlefarm, Rusk, Clonee and Loughsallagh in Dunboyne, Co. Meath. We note that the main parcel of land subject to this application comprising the residential development and ancillary roads and open spaces are located in the Townlands of Castlefarm, Rusk and Clonee, Dunboyne, County Meath, while alterations to 2no. existing roundabouts on the R147 (Old Navan Road) are located in lands in the townlands of Loughsallagh and Clonee, Dunboyne, County Meath.

The site of the residential development is located east of Dunboyne and bounded generally to the east and south by agriculturally zoned lands, to the west by the Iarnród Éireann rail line, and to the north by residential development permitted under Meath County Council (MCC) Reg. Ref. RA180561. The development permitted under Reg. Ref. RA180561, known as Castle Farm Meadows and Castle Farm Paddocks, is accessed from Station Road by a length of distributor road which will also provide future access to the proposed development in this case.

A length of distributor road runs northwards from Castle Stream to meet the existing length of distributor road connecting with Station Road built under Reg. Ref. RA180561 at a residential development called Castle Farm Meadows/Paddocks. The length of distributor road passes through existing agricultural fields. The fields to the west are zoned 'A2' to accommodate future residential development. Between the Castle Farm Meadows/Paddocks development and the railway line to the west lies the Dunboyne Herbal Clinic and a private residence/farm situated on their own grounds; both of which have direct access to Station Road.

The site of the residential development is positioned south of the Castle Stream and to the east side of the existing rail line and is further separated from the existing housing neighbourhood of Beechdale by a significant landscape buffer in the form of public open space. The separation distance between existing houses at Beechdale and the planned dwellings in this case is between c.94m and c.105m when measured off the Site Layout – General Arrangement (Drg. 494-WS-02-01) prepared by PLUS Architecture and included in this application.

The residential enclave at Larchfield off Station Road farther north is further separated from Beechdale by the Castle Stream and is also separated from the residential development proposed in this case by the railway line. The nearest house at Larchfield to the proposed dwellings in this case is c.135m when measured off the Site Layout – General Arrangement (Drg. 494-WS-02-01) prepared by PLUS Architecture and included in this application.

The recently constructed Castle Farm Paddocks and Caste Farm Meadows development on Station Road are in excess of 185m from the closest dwellings within the scheme itself. This is evidenced when measured off the Site Layout – General Arrangement (Drg. 494-WS-02-01) prepared by PLUS Architecture and included in this application, where a distance of approximately 185.5m is shown.

There are a cluster of dwellings situated in close proximity to the existing roundabout where Station Road/L2228 meets the R147 (Old Navan Road) that are to be upgraded as part of this development proposed. These dwellings are accessed directly off Station Road/L2228 or the R147 (Old Navan Road) respectively. At the second, southern-most roundabout on the R147 (Navan Road), the Ard Cluain Apartment scheme and Dunboyne Tennis Club are situated on one side, with open landscape currently on the other sides of this roundabout.

Figure 3.1: Approximate site location indicated in red, refer to enclosed Site Location Map prepared by Plus Architecture for definitive red line.

3.3 General Description of Proposed Development

Permission is sought for a period of 10 Years for a proposed development on a site of approximately 16.92Ha consisting of 716no. residential units in a mix of houses, duplex and apartment buildings ranging in height from 2 to 7 storeys overall; comprising of 155no. 2 storey houses; 517no. apartments accommodated in 8no. buildings ranging in height from 4 to 7 storeys; 44no. duplex units accommodated in 2no. 3 storey terraces; 1no. childcare facility (c.602sqm) located at ground floor level of Block B1; public open space; communal and private open space; public lighting; car parking, including basement car parking under some of the apartments; secure bicycle parking; and all associated and ancillary site development and infrastructural works, hard and soft landscaping and boundary treatment works including; provide a 200mm diameter watermain in existing section of southern distributor road adjacent to recently constructed Castle Farm development; provision of c. 470m of new distributor road; upgrade of junction of southern distributor road and L2228 (Station Road) to provide a signalised junction with pedestrian crossings, including ancillary adjustments to road markings on both roads; provision of foul drainage pumping station; provision of a compensatory storage area adjacent to Castle Stream; ESB Sub-Stations; and alterations to 2 no. roundabouts on the R147 (Old Navan Road).

A more detailed description of development proposed in this case is contained at Section 3.8 of this Chapter.

3.4 Cumulative Development

This EIAR also considers the development proposed in the context of the cumulative, or secondary, impacts arising. We refer the Planning Authority to Section 3.9 of this Chapter for information on cumulative development.

3.5 Statutory Planning Context

The subject lands are subject to national, regional, sub-regional, county and local planning policy. The following outlines high level planning policy of relevance to the future development of the subject lands. Whilst the EPA's Guidelines suggest that assessment of planning policy should not form part of an EIAR, it is considered that the planning context itself is an important aspect to understanding the development being proposed and that it is appropriate to refer to same in that context. This section will not address the detailed policies and objectives contained in the various plans which are relevant to the proposed LRD at Oakfield Dunboyne, as these are addressed in a separately in the Planning Application Report, prepared by Stephen Little & Associates, Chartered Town Planners & Development Consultants which accompanies the Planning Application.

3.5.1 National Planning Framework – Ireland 2040

The NPF marks a shift away from allowing urban sprawl, to more brownfield and infill urban development, focussed on integrated investment in and use of quality public transport focussed development and other essential services, to deliver a denser and more sustainably compact urban form.

This means encouraging more people, jobs and activity generally within our existing urban areas. In particular, it requires well-designed, high quality development that can encourage more people, and generate more jobs and activity within existing cities, towns and villages.

This requires that development meets appropriate design standards to achieve targeted levels of growth. It also requires active management of land and sites in urban areas.

The NPF seeks to achieve compact growth, aiming growth within the existing boundaries of our towns and cities. It also sets out a number of National Policy Objectives that will assist in ensuring the delivery of the Framework. Of particular note in the context of the development now being proposed are the following, which the Planning Authority is invited to take into account in its assessment:

National Policy Objective 4 seeks to *'Ensure the creation of attractive, liveable, well designed, high quality urban places that are home to diverse and integrated communities that enjoy a high quality of life and well-being'.*

National Policy Objective 9 which recognises that there is potential in each Regional Assembly Area for significant growth in some settlements (i.e. 30% or more above 2016 population levels), subject to criteria including the provision of adequate infrastructure and amenities to support such growth, and concurrent employment provision

National Policy Objective 11 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, towns and villages, subject to development meeting appropriate planning standards and achieving targeted growth.'*

National Policy Objective 13 states *'In urban areas, planning and related standards, including in particular building height and car parking will be based on performance criteria that seek to achieve well-designed high-quality outcomes in order to achieve targeted growth. These standards will be subject to a range of tolerance that enables alternative solutions to be proposed to achieve stated outcomes, provided public safety is not compromised and the environment is suitably protected'.*

National Policy Objective 33 states *'Prioritise the provision of new homes at locations that can support sustainable development and at an appropriate scale of provision relative to location'.*

The proposed development is strategically located on greenfield lands within a short walking distance of existing high frequency, high capacity public transport in the form of commuter rail services at Dunboyne Central Train Station. Irish Rail currently have a planning application with An Bord Pleanala for the upgrading and improvement of the commuter rail service here, including the electrification of this line upgrading it to a DART level of service. The site is serviceable and well connected to the road network. The site is a short distance from the centre of Dunboyne, a town

which has seen rapid growth in recent years owing to its location within the Dublin Metropolitan Area. The subject site is a prime location for residential development at a sustainable high density.

The proposed scheme features a variety of dwelling types (apartments, duplexes and houses) designed to a high standard, and with easy access to a wide range of existing, permitted and now proposed amenities of which future residents can avail. It is submitted to Planning Authority that the proposed development is compliant with the policies of the National Planning Framework.

3.5.2 Eastern and Midlands Regional Spatial & Economic Strategy

The Regional Spatial and Economic Strategy (RSES) for the Eastern and Midlands Regional Assembly (EMRA) came into effect on 28 June 2019. The RSES provides regional level strategic planning policy for the eastern and midland region in line with the NPF. The Region includes Dublin and its metropolitan area. The RSES contains the following elements: -

- Spatial Strategy – to manage future growth and ensure the creation of healthy and attractive places to live, work, study, visit and invest in.
- Economic Strategy – that builds on the region's strengths to sustain a strong economy and support the creation of quality jobs that ensure a good living standard for all.
- Metropolitan Plan – to ensure a supply of strategic development areas for the sustainable growth and continued success and competitiveness of the Dublin Metropolitan Area.
- Investment Framework – to prioritise the delivery of key enabling infrastructure and services by government and state agencies.
- Climate Action Strategy – to accelerate climate action, ensure a clean and healthy environment and to promote sustainable transport and strategic green infrastructure.

Figure 3.2: Dublin Metropolitan Area Strategic Plan

Dunboyne is identified as being within the Metropolitan Area of Dublin. The lands at Dunboyne are located on a strategic development area and corridor identified in the Dublin Metropolitan Area Strategic Plan (MASP) as the 'North-West Corridor' as can be seen in Figure 7 above.

The Vision Statement for the Dublin MASP, also includes

> **This high-level vision is underpinned by a spatial framework that supports the overall Settlement Strategy in Chapter 4 People and Place and sets out an integrated land use and transportation strategy for the sequential development of the metropolitan area, focussed on:**
>
> - Consolidation of Dublin City and suburbs
> - Key Towns of Swords, Maynooth and Bray
> - Planned development of strategic development areas in Donabate, Dunboyne, Leixlip and Greystones

The subject lands for part of the strategic development area at Dunboyne identified above.

Dunboyne is located within the Dublin City and Metropolitan Area, as identified in the Regional Spatial and Economic Strategy for Eastern and Midlands Region. The MASP has identified strategic development areas in Dunboyne along the north-western corridor of the Metropolitan Area that will have capacity to deliver significant residential and employment growth. The build out of these lands will increase the critical mass of population in the Metropolitan Area, creating more compact and sustainable patterns of growth and encouraging a modal shift away from the private car.

Dunboyne is identified in the RSES as a 'Self Sustaining Growth Town', a town with a moderate level of jobs and services, with capacity for continued commensurate growth to become more self-sustaining.

The proposed development is strategically located on lands immediately to the east of Dunboyne, in close proximity to high frequency urban rail transport and have been identified as a suitable location for residential development. The proposed scheme at this location shall deliver significant additional housing in a range of house types in a consolidated, accessible urban neighbourhood. The proposed housing development will be supported by a childcare facility and significant public open space provision.

The location of these lands in close proximity to public transport represents an efficient use of zoned lands and expenditure in to the public transport system.

3.5.3 Meath County Development Plan 2021 – 2027

The Meath County Development Plan 2021 – 2027 (the Development Plan) came into effect on 3 November 2021 and is the statutory land-use plan governing the subject lands at this time. There is no Local Area Plan for Dunboyne at present.

This Statement of Consistency is understood to be intended to provide Planning Authority with adequate comfort that the provisions of the Statutory Development Plan have been taken in to account in devising the draft proposals. Equally, it is understood that it is not intended to provide Planning Authority with a detailed assessment of the wide ranging detailed design standards relating to residential development.

In completing this exercise, we have compiled a List of Objectives, quoted the text in italics and provided the *Applicant's Response* to this beneath each Objective in turn.

Core Strategy

Dunboyne is identified within the core strategy as a Self-Sustaining Growth Town, as consistent with the Regional Spatial and Economic Strategy- Eastern and Midland Assembly.

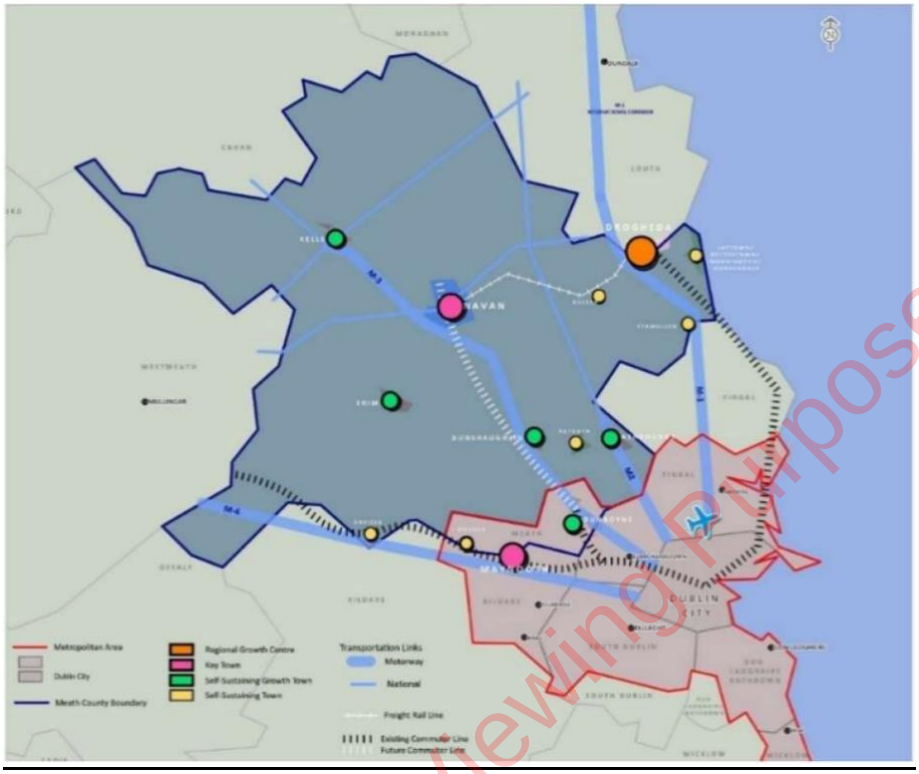


Figure 3.3: Extract from Map 2.3 of the County Development Plan

Table 2.12 'Core Strategy Table' identifies that there is a requirement for 2,002 additional homes in Dunboyne over the lifetime of the Development Plan until 2027.

Settlement	Population 2016	Projected population increase to 2027	Projected population 2027	Approximate households completed 2016-2019	Extant units not yet built	Household allocation 2020-2027[16]	Potential units to be delivered on infill/ brownfield lands[17]	Quantum of land zoned for residential use (ha)	Quantum of land zoned for existing residential use (ha)	Quantum of land zoned for mix of uses (ha)
Self-Sustaining Growth Town										
Dunboyne	7,272	3,300	10,572	48	119	2,002	1,180	72.89	116.97	26.65

Figure 3.4: Extract from Table 2.12 of the County Development Plan

The proposal includes the development of 716no. residential units. The proposal will amount to approximately 36% of the units allocated for Dunboyne.

The table below highlights the approximate number of large housing developments within Dunboyne that have been applied for and granted so far within the lifespan of the current Development Plan.

With regard to other Largescale Residential Developments and Strategic Housing Development, as of May 2023, there have been none granted in Dunboyne within the lifespan of the Current Development Plan.

Other permission granted in the Dunboyne area for developments over 5no. residential units have also been considered; these amount to approximately 34no. residential units.

Location	Meath County Council Reg. Ref.	An Bord Pleanala Reg. Ref.	Total No. Dwellings Proposed
Station Road, Dunboyne, Co. Meath	22675	N/A	21
Dunboyne Castle Hotel & Spa, Dunboyne, Co. Meath	212141	N/A	13
Total			**34**

Table 3.1: Development permitted during the lifespan of the current Development Plan

When taken cumulatively with the approved residential developments, amount to approximately 1.6% of the units allocated for Dunboyne.

We note that this is a ten-year permission which will be rolled out during the lifespan of the current Development Plan 2021-2027 and in to the first few years of the subsequent Development Plan. Therefore, the scheme proposed can be considered to be is consistent with the Core Strategy and associated household allocation of the County Development Plan/ a phased approach will be implemented to ensure that the development is consistent with the household allocation provisions of the current County Development Plan.

The proposed development supports the appropriate growth of Meath County by ensuring that the development takes place on residentially zoned land within the settlement of Dunboyne, which is designated as a Self-Sustaining Growth Town as outlined in the County Development Plan.

CS OBJ 1

To secure the implementation of the Core Strategy and Settlement Strategy, in so far as practicable, by directing growth towards designated settlements, subject to the availability of infrastructure and services.

CS OBJ 3

To ensure the implementation of the population and housing growth household allocation set out in the Core Strategy and Settlement Strategy, in so far as practicable. Meath County Council will monitor the number of units that are permitted and under construction/built as part of the implementation of this objective.

CS OBJ 4

To achieve more compact growth by promoting the development of infill and brownfield/regeneration site and the redevelopment of underutilised land within and close to the existing built-up footprint of existing settlement in preference to edge of centre locations

CS OBJ 5

To deliver at least 30% of all new homes in urban areas within the existing built-up footprint of settlements.

CS OBJ 12

To ensure that all settlements, in as far as practicable, develop in a self-sufficient manner with population growth occurring in tandem with the provision of physical and social infrastructure.

CS OBJ 16

To support the creation of 'live work' communities, in which employment and residential accommodation are located in close proximity to each other and strategic multi-modal transport corridors, and to reduce long distance commuter trends and congestion.

The proposed development shall achieve compact, high density and sustainable growth on an underutilised site of zoned lands east of Dunboyne located approximately only 400m from Dunboyne Rail Station.

It is considered that the proposed development aligns with the Core Strategy Objectives of the County Development Plan.

Land Use Zoning Objectives

The application site is predominantly zoned 'A2' (New Residential) the objectives of which aim to: -

Objective A2: *"To provide for new residential communities with ancillary community facilities, neighbourhood facilities as considered appropriate."*

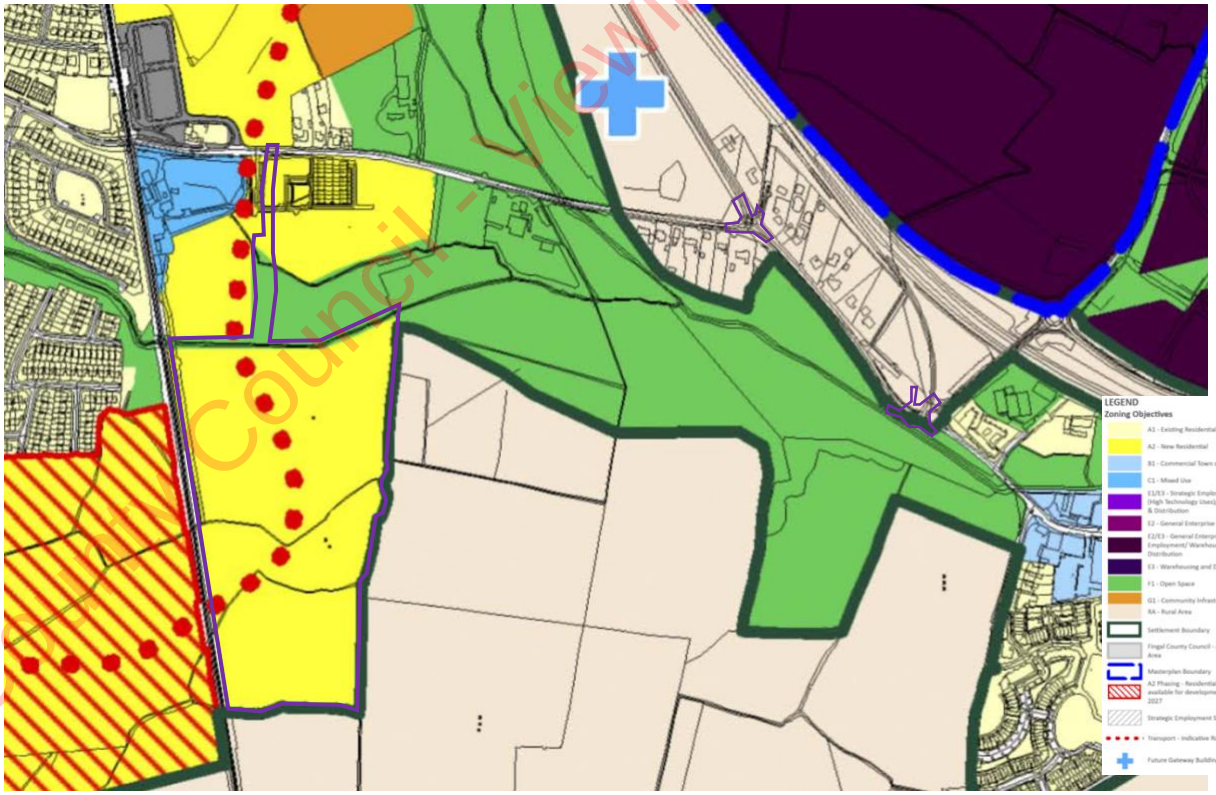


Figure 3.5*:* Extract from Meath County Development Plan 2021-2027 Land Zoning Map for Dunboyne/Clonee with indicative site purple line. (Overlay by SLA). Please refer to Site Location Plan for definitive application red line.

Section 11.14.5 of the Development Plan lists a range of 'permitted uses' and uses that are 'open for consideration' on lands zoned 'A2', see below list.

Permitted Uses	Open for Consideration
Residential / Sheltered Housing, B & B / Guest House, Bring Banks, Community Facility / Centre, **Childcare Facility**, Convenience Outlet, Children Play / Adventure Centre, Education (Primary or Second Level), Halting Site / Group Housing, Home Based Economic Activities, Leisure / Recreation / Sports Facilities, Retirement Home / Residential Institution / Retirement Village, Utilities	Betting Office, Caravan Park, Cultural Facility, Education (Third Level), Enterprise Centre, Health Centre, Healthcare Practitioner, Hotel / Motel / Hostel, Offices

The following uses proposed are permitted in principle on lands zoned 'A2': -

- Residential
- Childcare Facilities

The uses being proposed on these A2 zoned lands (i.e. the new residential units) are consistent with the zoning objective for these lands contained within the Statutory Development Plan.

The proposals have been devised having regard to the provisions of the Development Plan and are therefore consistent with the above objective.

A portion of the overall site, where there is proposed upgrading works to 2no. roundabouts is zoned 'RA' Rural Area the objective of which aims to: -

"To protect and promote in a balanced way, the development of agriculture, forestry and sustainable rural-related enterprise, community facilities, biodiversity, the rural landscape, and the built and cultural heritage."

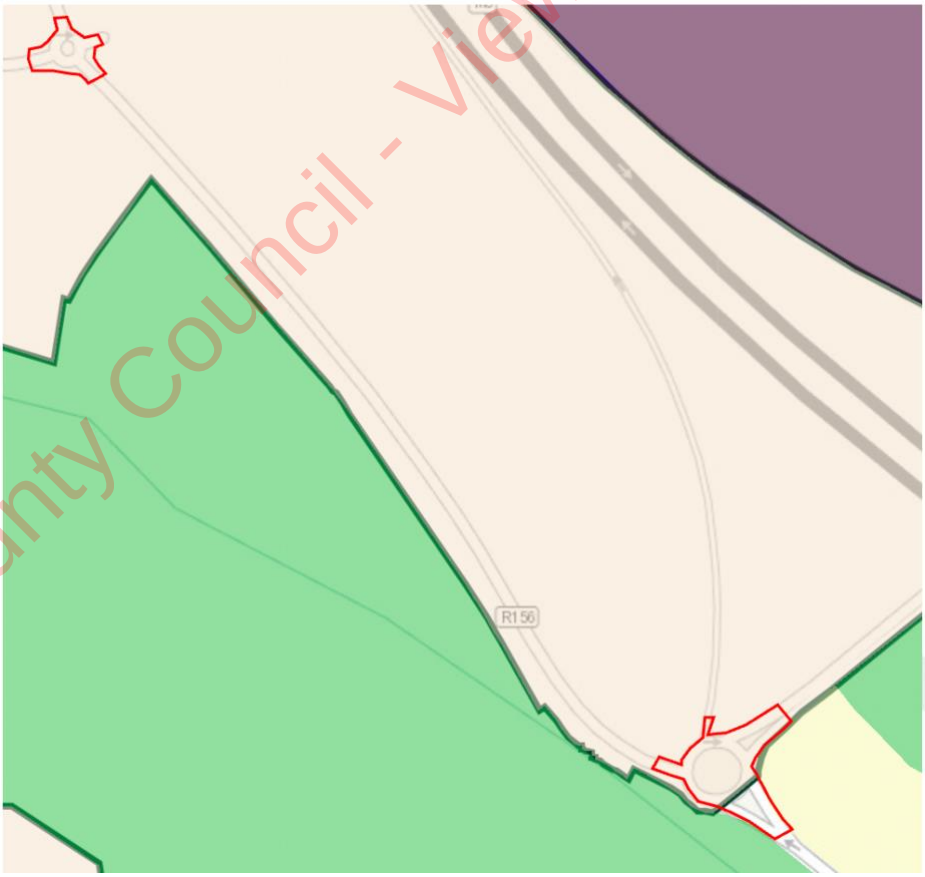


Figure 3.6: Extract from Meath County Development Plan 2021-2027 Land Zoning Map with indicative site red line. (Overlay by SLA). Please refer to Site Location Plan for definitive red line.

We note that road infrastructure does not fall within 'permitted uses' and uses that are 'open for consideration' on lands zoned 'RA'. However the roundabouts are an established use on site and

we are proposing improvements to these 2no. roundabouts. It is noted in the Development Plan under section 11.12.2 that any proposals for the improvement of established uses will be considered on their individual merits.

Specific Objectives

There is one Specific Objective relating to the lands zoned 'A2'.

Road Objective - There is an objective for a new distributor road running north south through the lands as indicated by red dots on Figure 3.5 above.

By reference to the Land Use Zoning Map for Dunboyne/Clonee it is evident that the distributor road objective where it crosses the Castle Stream is located on lands with a Zoning Objective F1 – Open Space. That provides an east west linear connection between the F1 – Open Space lands west of the rail corridor and the lands to the east of the planned distributor road. In addition, the proposed Distributor Road alignment connecting between the development to the north of the subject site at Castlefarm Meadows on Station Road to the Castle Stream bridge also encroaches marginally onto lands with zoning objective F1- Open Space (part of these lands also lie within Flood Zone B and is addressed elsewhere in this Report). The objective of the F1-Open Space lands is as follows: -

> **Objective F1:** *"To provide for and improve open space areas for active and passive recreation amenities."*

We note that the Chapter 11 of the Development Plan provides the following *Guidance* in respect of the F1 land use zoning:-

> *The Planning Authority will consider development proposals for utility development and transportation infrastructure on F1 Open Space zoned land on a case by case basis subject to the works being ancillary to and necessary for the appropriate development of adjacent lands. In all instances the integrity of the open space land as an amenity area shall not be significantly reduced.*

Furthermore, we note under the Open for Consideration category of land uses under the F1 land use zone that "*vehicular/cyclist/pedestrian access to zoned lands where appropriate*" are included.

Highlighted with a series of red dots in Figure 3.5 above, the indicative layout of the 'Dunboyne Distributor Road' runs in a general north-south direction through the northern portion of the site before it turns westwards across the rail line. This road is a specific Objective of the Development Plan are provides a link to zoned lands. As noted above, the alignment of this road will require the crossing of the Castle Stream in order to access the zoned A2 lands to the south and there is a linear strip of F1-Open Space zoned lands along the Castle Stream. As such, we consider that the land use zoning of the Development Plan provides the Planning Authority with the ability to permit this road in principle, even though it cross over the F1-Open Space lands in accordance with the provisions of the Development Plan.

Proposals include the provision of a future length of the Dunboyne Distributor Road which, until such a time when the Planning Authority require the land for this future road construction, such lands shall be used solely for agricultural purposes.

3.6 Characteristics of the Proposed Development

The Planning Application is accompanied by detailed drawings and a detailed Architectural Design Statement, prepared PLUS Architects, which provides a rationale for the design of the proposed scheme and the dwelling types proposed.

The proposed development is on a site of approximately 16.92Ha overall and consists of 716no. dwellings in a mixture of terraced, semi-detached and detached houses, duplexes and apartments as follows:

- 517no. apartment units are accommodated in 8no. buildings of 4-7 storeys in height comprising: 10no. 1-bed apartments, 202no. 2-bed apartments and 24no. 3-bed apartments

accommodated in 4no. 4-6 storey apartment blocks (Blocks A1, A2, A3 and A4); 55no. 1-bed apartments, 80no. 2-bed apartments and 12no. 3-bed apartments accommodated in 2no. 6-7 storey apartment blocks (Blocks B1 and B2); 36no. 1-bed apartments, 78no. 2-bed apartments and 20no. 3-bed apartments accommodated in 2no. 4-5 storey apartment blocks (Blocks C1 and C2). Resident's amenities are also provided within the apartment blocks, including a gym.

- 44no. duplex units accommodated in 2no. 3 storey terraces consisting of 22no. 1 bed dwellings, 18no. 2 bed dwellings and 4no. 3 bed dwellings.
- 155no. 2-storey houses consisting of 8no. 2-bedroom houses, 69no. 3-bedroom houses, 74no. 4-bedroom houses and 4no. 5-bedroom houses.

The proposed development also includes: -

- 1no. childcare facility (c. 602sqm) located at ground floor level of Apartment Block B1 and an associated outdoor play space (c. 114.67 sqm)

All ancillary and associated site development and landscape works, including: -

- site boundary treatments, including 1.8m-2.0m high boundary along western boundary with rail line
- Communal amenity open space (c. 13,643sqm)
- Public open space (c. 28,930sqm)
- Provision of 887no. car parking spaces (355no. in a basement), including 12no. creche car parking spaces.
- Provision of secure bicycle parking spaces, including creche bicycle parking spaces, including ancillary storage facilities.
- 3no. ESB substations
- Provision of foul drainage pumping station
- Provision of c. 470m of new distributor road, including a bridge crossing the Castle Stream.
- Provision of a 200mm diameter watermain in existing section of southern distributor road adjacent to recently constructed Castle Farm development (Castle Farm Meadows and Castle Farm Paddocks).
- Alterations to the recently constructed junction of southern distributor road permitted under Meath County Council Reg. Ref. RA180561 adjacent to the Castle Farm development and L2228 (Station Road) to provide a signalised junction with pedestrian crossings, including ancillary adjustments to road markings on both roads.
- Bin storage facilities.
- Provision of a compensatory flood storage area adjacent to Castle Stream

Vehicular, cyclist and pedestrian access to serve the development will be provided from L2228 (Station Road/Clonee Road) via existing access road permitted under Meath County Council Reg. Ref. RA180561, all in the Townlands of Castlefarm, Rusk and Clonee, Dunboyne, County Meath.

Alterations are also proposed to 2 no. roundabouts on the R147 (Old Navan Road) including enlarging the roundabout at the junction of the R147 (Old Navan Road) and L2228 (Station Road) and, widening of approach roads of the roundabout (including adjustments to footpaths and revised road markings) at the junction of the R147 and R156 (including northbound slip road to M3); both with ancillary site development and landscape works and being in the townlands of Clonee and Loughsallagh, Dunboyne, Co. Meath.

3.6.1 Layout & Design

The Proposed Development provides a high quality, architecturally designed scheme within a landscaped setting, at a greenfield that is extremely well connected to public transport and local facilities that supports this density residential development. The Proposed Development has had regard to National, Regional and Local Planning Policy, as well as Ministerial Guidelines such as the Apartment Guidelines and the Building Height Guidelines.

An Architectural Design Statement has been prepared by PLUS Architects to accompany this application. This sets out the architectural design approach to place making at this site and how this has been informed by: -

- The site context and existing development.
- The planning precedent set by the extant permission.
- Land use zoning.

The Architectural Design Statement describes the proposed site layout and building character within the scheme which enhance its legibility and coherence, and the connections made through the site to enhance physical and visual permeability.

A detailed Housing Quality Assessment has been prepared by PLUS Architects to accompany this planning application, demonstrating the full compliance of the proposed apartment units with the relevant residential amenity standards.

3.6.2 Materials Strategy

We refer the Planning Authority to the accompanying elevational drawings, prepared by PLUS Architects for details of materials and finishes of the Proposed Development. A palate of materials and colours has been chosen to provide a robust, quality finish to the scheme while referencing the existing developments in the area.

3.6.3 Residential Development

Within the 716no. residential units being proposed in this case, there are some 13no. varieties of dwelling types being proposed. Please refer to the Housing Quality Assessment, prepared by PLUS Architecture which provides details all house types proposed in this development.

3.6.4 Density

The availability of strategically located employment and residential lands in Dunboyne, is identified in the Dublin Metropolitan Area Strategic Plan of the Regional Spatial & Economic Strategy for the Eastern and Midlands Region, in addition to the area benefiting from some of the best transport links in the county presents superb opportunities to facilitate significant and sustainable growth in Dunboyne.

As such, density standards usually applied throughout the County can, subject to appropriate and acceptable design, be increased. This is addressed in Section 11.5.3 of the Meath County Development Plan in which it is stated that sustainable communities should be promoted through the creation of compact, high quality developments with higher densities promoted within walking distance of town centres and public transport infrastructure.

The following objectives of the Plan are therefore applicable:

> ***DM POL 5:*** *To promote sustainable development, a range of densities appropriate to the scale of settlement, site location, availability of public transport and community facilities including open space will be encouraged.*
>
> ***DM OBJ 14:*** *The following densities shall be encouraged when considering planning applications for residential development:*

- *Residential Development **Beside Rail Stations**: **50uph or above***
- *Regional Growth Centres/Key Towns: (Navan/Drogheda) – 35-45uph*
- *Self-Sustaining Growth Towns: (**Dunboyne**, Ashbourne, Trim, Kells): **greater than 35uph***
- *Self-Sustaining Towns: 25 – 35uph*
- *Smaller Towns and Villages: 25uph – 35uph*
- *Outer Locations: 15uph – 25uph*

DM OBJ 14 of the plan is of particular importance in regards to the subject site. The site is located in Dunboyne, which as highlighted above is a 'Self-Sustaining Growth Town' and therefore a density of 35uph is encouraged. However, as the northern most part of the site to be developed for new housing is approximately 300m from the rail station at Dunboyne Central (well within a 1km distance), a density of 50uph or above is therefore encouraged. Additionally, Dunboyne as part of the Dublin Metropolitan Area is regularly serviced by various bus routes, is located a short distance from the M3 Motorway and is a short commute from neighbouring high-density urban developments such as Clonee.

The net developable area of the subject site measures 12.61Ha when excluding the Distributor Road, the roundabouts along the R147, the 10m landscape buffer areas provided to the field drainage ditches and the 10m Riparian Corridors to the watercourses. It is considered that this is consistent with the methodology set out in Appendix A of the Sustainable Residential Development in Urban Areas 2009 for the calculation of net density.

The proposed development of 716no. residential units across a site of net 12.61Ha achieves a net density of c. 56.8no. units per hectare. If the overall site area were to be included, this would result in a gross density amounting to 42.6 units per hectare.

In the context of residential density generally, it would appear that SPPR 4 of the Urban Development and Building Height Guidelines (2018) is also applicable to this particular case. SPPR 4 states as follows: -

SPPR 4

It is a specific planning policy requirement that in planning the future development of greenfield or edge of city/town locations for housing purposes, planning authorities must secure:

1. *the minimum densities for such locations set out in the Guidelines issued by the Minister under Section 28 of the Planning and Development Act 2000 (as amended), titled "Sustainable Residential Development in Urban Areas (2007)" or any amending or replacement Guidelines;*
2. *a greater mix of building heights and typologies in planning for the future development of suburban locations; and*
3. *avoid mono-type building typologies (e.g. two storey or own-door houses only), particularly, but not exclusively so in any one development of 100 units or more.*

Figure 5: Extract from the Building Height Guidelines.

The development being proposed in this case is in excess of the minimum location proximate to a rail station of 50 units per hectare, provides a reasonable mix is building heights between 2 and 6 storeys and also includes two buildings that are at 7 storey's in height and provides a mix of building typologies across housing, duplexes and apartments. We refer the Planning Authority to Section 8.3.5 of this report which assesses the proposed development in respect of the Urban Development and Building Height Guidelines (2018).

Overall, on the basis of the scale, layout and density of the proposals and considering the development within the context of both Dunboyne and the Dublin Metropolitan Area the proposed density of 56.8no. units per hectare is considered appropriate and sustainable in this context.

3.6.5 Unit Mix

The proposed unit mix for the development is as follows:

- 1-bedroom units: 123no. units (17.18%)
- 2-bedroom units: 386no. units (53.91%)
- 3-bedroom units: 129no. units (18.02%)
- 4-bedroom units: 74no. units (10.34%)
- 5-bedroom units: 4no. units (0.56%)

Overall, the housing typologies proposed, and the associated mix of unit sizes is consistent with the Development Plan's objective to encourage a wide variety of housing types, sizes and tenures which will support the establishment of sustainable residential community. We refer the Planning Authority to section 9.1.7.8 of the Planning Application Report for further discussion on Unit Mix.

3.6.6 Part V – Social & Affordable Housing

Subsequent to dialogue between MCC Housing and the Applicant, the Applicant has prepared a Part V proposal.

We enclose herewith a Part V Proposal, prepared by Stephen Little & Associates Chartered Town Planners & Development Consultants on behalf of the Applicant, together with a Part V Drawing which is included as part of the Architectural Design Statement, prepared by PLUS Architects. Drawing. No. 494 WS 01 03 prepared by Plus Architecture is entitled "Proposed Site Layout – Part V" and identifies the 78no. dwellings being offered as meeting the Part V requirement in this case. The location of those dwellings is highlighted on this drawing.

Taking into consideration recent amendments made to Part V provision and noting the northern portion of the site was purchased between 1 September 2015 and 31 July 2021, the Applicant is required to provide 10% Part V units. However, as the southern lands were purchased by the Applicant after 31 July 2021, it is understood that 20% of the units developed in the southern lands shall be subject to Part V.

3.6.7 Water Service

In the first instance, we refer the Planning Authority to the Engineering Assessment Report and drawings, prepared by Waterman Moylan Consulting Engineers for further detail.

Wastewater

The proposed wastewater layout for the subject site is shown on Waterman Moylan drawing No 21-061-P201-P202-P203 'Proposed Drainage Layout'.

The site has been divided into two foul drainage catchments as follows: -

Catchment 1: The foul drainage has been designed such that the development be served with a series of 150mm and 225mm diameter sewer networks. This network will ultimately outfall via gravity into the proposed diverted sewer along the northern boundary.

Catchment 2: The foul drainage has been designed to serve the development with a series of 150mm and 225mm diameter sewer network. This catchment is unable to outfall into the proposed diverted sewer by means of gravity alone, even with the proposed redistribution of approximately 10,000m^3 of material from elsewhere on site in this area which results in the ground level being raised. Catchment 2 will outfall, via gravity, into a pumping station located within the north-western side of Catchment 2. The station will pump the foul by means of a rising main, which will then discharge into Catchment 1 and ultimately outfall into the proposed diverted sewer.

It is proposed that the foul pumping station will be constructed in line with the Irish Water 'Code of Practice for Wastewater Infrastructure' (2020). The detailed design of this pumping station will be subject to future discussions and correspondence with Irish Water.

There is an existing 525mm diameter combined sewer traversing the site from west to east along the northern boundary. As part of the proposed works, it is proposed to divert the existing sewer to a more preferred location, we refer to drawing number 21-061 - P201 "Proposed Drainage Layout - Sheet 1 of 3", for further detail.

Surface Water Drainage

Surface water will outfall to existing watercourse/ditches which bound the site. The proposed surface water drainage layout for the subject lands is shown on Waterman Moylan drawing Nos. 21-061-P201, 21-061 P202 and 21-061 P203.

It is proposed to divert elements of the existing field drainage ditches in the southern extent of the site. This has been examined and modelled in considerable detail by JBA Consulting and the Planning Authority are referred to the accompanying Report from JBA for details of this. These ditch diversions are clearly identified on the enclosed drawings prepared by Waterman Moylan. Specifically, the Planning Authority are directed to Drawing. No. P199 prepared by Waterman Moylan for this detail.

It is proposed that surface water from the proposed development will drain via gravity through an underground pipe network. Various SuDS devices have been implemented to ensure runoff is treated to the standards outlined in the GDSDS and which also has regard to "*Water-based Solutions to the Management of Rainwater and Surface Water Runoff in Urban Areas: Water Sensitive Urban Design Best Practice Interim Guidance Document*" prepared by the Department of Housing, Local Government and Heritage.

Due to the topography of the site and the layout of the proposed development, surface water drainage is laid out in 5 No. Catchments. The proposed catchment drainage layout for the subject lands is also shown on Waterman Moylan drawing No. 21-0161-P207- Proposed Drainage Catchment Layout.

Water Supply

In order to service the proposed development site, it is proposed to tie into the existing watermain located within Station Road/Clonee Road (L2228).

In order to facilitate this connection Irish Water have identified that a watermain upgrade is required to the existing infrastructure. It is proposed to upsize the existing 200mm diameter watermain to a 400mm diameter watermain over a length of 1.1km and which will be required to cater for the wider zoned lands and not just this development. This work will be carried out directly by Irish Water as part of the Connection Agreement Process under their exempted development rights as set out in Class 58 of Schedule 2 of Part 1 – Exempted Development-General of the Planning & Development Regulations 2001, as amended.

A pre-connection enquiry was submitted to Irish Water, Reg. Ref. CDS2200299. Irish Water confirmed that a connection is feasible, however, the above-mentioned upgrade will be required in order to facilitate water supply to the subject site. It is noted that the client will enter into a connection agreement with Irish Water in this regard.

The proposed water supply network for the subject lands consists of a series of 100mm diameter to 200mm diameter watermain.

The proposed watermain network is shown on Waterman Moylan Drawing Nos. 21-061-P301, 21-061-P302 and 21-061 P303 Proposed Watermain Layout Sheets 1 to 3.

Flood Risk Assessment

We note that a small portion of the proposed distributor road alignment is positioned in Flood Zone B and that compensatory storage (68m³) is provided in the pre-development Flood Zone C area. We refer the Planning Authority to the enclosed Technical Report (Site Specific Flood Risk Assessment), prepared by JBA Consulting which incorporates a Justification Test in line with the Flood Risk Management Guidelines.

This report concludes that: -

JBA Consulting has undertaken a Site Specific Flood Risk Assessment for the proposed residential development in Oakfield Dunboyne, Co. Meath.

There are instances of flooding in the Dunboyne area, however no incidences have been reported since the Tolka Flood Alleviation Scheme was constructed in 2003. The Castle Stream, its tributary and a local drainage network flow through the main site. The River Tolka, flows from west to east, c. 0.5k northeast of the main site and to the west of the two roundabouts included within the red line boundary. According to OPW Fluvial Flood Map the 1% AEP flood event (Flood Zone A) and the 0.1% AEP flood event (Flood Zone B) do not inundate the main site, but there is a small overlap with the distributor road and Flood Zone B to the north of the main body of the site. The two roundabouts are identified as being within Flood Zone C of the CFRAM mapping and so the flood risk to the roundabouts has been screened out.

The detailed hydrological and hydraulic analysis has been undertaken to verify the CFRAM mapping within the main site boundary and add-in additional drainage ditches not previously modelled. The modelling confirms that the footprint of the northern entrance road (the distributor road) is partially located in Flood Zone B. There are drainage ditches within the site which remain in-bank throughout. The channels contain both Flood Zone A/B and are diverted and culverted only to facilitate the development and road access. Compensatory storage has been designed for the site which compensates for the loss of Flood Zone B as a result of the proposed northern road entrance and ensures existing water levels and extents are managed appropriately in the area.

Risk to the site is managed by setting floor levels to the 1% AEP climate change water level, plus a freeboard allowance of at least 500mm, this the case for both MFRS and HEFS scenarios. Further, the finished floor level provides a minimum of 150mm above surrounding ground levels to provide protection against pluvial flooding. All residential buildings have also been located in Flood Zone C, further minimising the risk of inundation. The post-development modelling also confirms there is no increase in flood risk to the site or surrounding lands as a result of the proposed development.

The stormwater system will be designed to manage surface water runoff from the site. It was based on recommendations in the Greater Dublin Strategic Drainage Study (GDSDS) and in the CIRIA SuDS Manual. The design incorporates the use of various SuDS techniques. Further detail is supplied under separate cover by Waterman Moylan.

Residual risks have been identified as potential impacts of culvert blockage and potential failure of the stormwater system, both have been shown to have been assessed and mitigated.

The proposed culverts and proposed bridge have been designed in accordance with Section 50 (of the Arterial Drainage Act) requirements.

As a result of the mitigation details discussed above, it is concluded that the development proposal is in compliance with the core principles of the Planning System and Flood Risk Management Guidelines and has been subject to a commensurate assessment of risk including the application of the Justification Test.

Exempted Development

In order to accommodate this development and other developments in and around the Dunboyne area, Irish Water will be required to upgrade c. 1,100m of existing 200mm uPVC watermain so as to provide a 400mm ID watermain in its place.

Figure 3.7: Irish Water infrastructure adjacent to application site, extract from enclosed Confirmation of Feasibility

This is to be undertaken by Irish Water under their exempted development provisions set out in the Planning & Development Regulations 2001, as amended, and these works do not form part of this planning application as a result. The approximate location of this watermain to be upgraded is identified by Irish Water in their Confirmation of Feasibility dated 08 June 2023.

3.6.8 Landscape Proposal

The landscape proposals in this case have been designed by Parkhood Landscape Architects having regard for the existing landscape and nature of the area as well as the comments made by Meath County Council at previous pre-planning meetings.

The landscape proposals comprise of high quality public and communal open spaces that cater for the residents with a range of social activities, exercise, interactions and play proposed. Native tree and shrub planting also provide an aesthetically pleasing environment and sense of place.

Long continuous planted areas between the pedestrian public realm and the road provide a natural buffer. The proposed tree lined avenue provides a green link from the main site entrance through the development connecting parks and open spaces along the cycle and pedestrian routes.

Significant public open space is proposed throughout the site amounting to 2.8ha or c. 25.6% of the site area being developed for residential development. For clarity, the site of the alterations to the two roundabouts in the R147 (Old Navan Road)(c. 0.495Ha), the lands being reserved for the future extension of the southern distributor road (c. 0.83Ha) and the lands north of Castle Stream where the works to the southern distributor road are proposed (c. 0.64Ha) are excluded from the area used for calculation purposes. The rationale for taking this approach is that a) the roundabout lands are not zoned for residential development, b) the road reservation lands are accommodating a development of a road/bridge by others in the future and c) the lands north of Castle Stream beside the new distributor road proposed are themselves zoned for residential development and will be required to provide public open space as part of those future lands in due course; these lands are also in the ownership of a third party.

The largest area of public open space is located centrally beneath the ESB pylons. Meadows, shrubs, trees and swale attenuation planting are also proposed to assist with the biodiversity and pollinator friendly environment. There is a direct connection from the main boulevard into the open space at this location allowing for ease in access from the adjacent residential dwellings north and south of the site.

Proposed public open spaces are also allocated to the peripheral areas of the site where ecological enhancement of the existing tree and hedgerow boundaries can be augmented with pollinator friendly species and wildflower planting to provide a green corridor for residents to circulate.

Informal gathering areas, amenity areas and natural play spaces for children are interspersed along these areas of open space.

If the entirety of the area within the red line of the application is used, the public open space proposed still amounts to approximately 17% of that site area.

A significant number of communal open spaces are also proposed over and above the public open space areas. Communal open spaces are designed to be more intimate and to encourage social interactions. Communal open spaces are typically proposed within courtyard spaces and areas adjacent to the proposed apartment blocks and together amount to 13,643sqm.

The landscaping scheme proposed has been designed to optimise passive surveillance across the development.

We refer the Planning Authority to the enclosed landscape drawings and Landscape Strategy Report prepared by Parkhood Landscape Architects for greater detail on the proposals.

3.6.9 Access & Transportation

We refer Planning Authority to the following set of Reports prepared by Waterman Moylan Consulting Engineers which provides a more detailed discussion on various relevant transportation matters:-

1. Traffic and Transport Assessment
2. Engineering Assessment Report
3. DMURS Statement of Consistency
4. Report on Public Transport Capacity
5. Travel Plan
6. Preliminary Construction & Environmental Management Plan

Access

The entire development shall be served by direct access from the existing external road network. The under construction (almost complete) Merville Homes Ltd. development (Reg. Ref. RA180561) immediately north of the subject site provides access to the subject site southwards from the Station Road/Clonee Road (L2228) via a distributor road which is proposed to be extended as part of this application to become the main access for the scheme. This development is known as Castle Farm Paddocks and Castle Farm Meadows.

A signalised junction is proposed at the entrance of the site along the L2228, for details, please refer to Drawing No. 21-061 P101 'Proposed Road Layout & Levels Sheet 1 of 3', prepared by Waterman Moylan Consulting Engineers.

Along with complete internal road network provision, full cycle and pedestrian facilities are proposed also.

A number of roads, or paths cross over existing watercourses within the site. It is acknowledged that formal Section 50 applications will be required to be made to the OPW in due course to facilitate these crossings; once planning permission has been secured in line with standard practice. The designs have been progressed to date for these crossings with inputs from JBA Consulting in the knowledge that such subsequent consents will be needed.

Future Distributor Road & Bridge

The planning application includes an 470m length of distributor road linking to that part of the distributor road already built as part of the Castle Farm Meadows/Castle Farm Paddocks development which ultimately connects with Station Road.

This proposed road forms part of the overall Dunboyne Distributor Road and relates specifically to what is referred to as the Southern Distributor Road in that overall project; an objective of the Meath County Development Plan 2021-2027. It is intended as part of that Development Plan objective that in the future that distributor road would be extended southwards and then eastwards over the railway line. The design for this future extension to the distributor road and bridge has been included in this application as evidence that it provides a viable workable solution, however permission for that extension is not being sought at this time as it is not required to cater for this development.

The design of this road and bridge has been the subject of discussion with the Planning Authority, including Roads Department and also Irish Rail to ensure that their respective requirements are factored in to the design. In the case of Irish Rail, the road design, including the bridge that will ultimately span the rail line to Dunboyne has taken in to account the planned electrification of this rail line as now proposed in the current planning application for the DART+West project (ABP Ref. 314232-22), including taking in to account the columns required to hold the overhead power lines along the rail line.

Adequate working space during the construction phase of this future length of road and bridge have also been provided. We refer the Planning Authority to Drawing. No. P100 prepared by Waterman Moylan, Consulting Engineers which highlights the extent of the distributor road being proposed as part of this proposed planning application and those lands identified for the future road across the lands in the Applicant's control. The Traffic and Transportation Report prepared by Waterman Moylan, Consulting Engineers explains in a simple graphic form how the length of distributor road being proposed in this case connects with the already permitted/existing distributor road to the north and the future road and bridge to the south and west. It is envisaged that the lands required for this future road in the control of the Applicant will be made available to Meath County Council in due course and we confirm the Applicant's willingness to enter in to an Agreement under Section 47 of the Planning & Development Act 2000, as amended, with the Council in that regard upon receipt of a viable and implementable planning permission. The lands to be made available to the Council are those marked 'Future Road' on Drawing. No. P100 prepared by Waterman Moylan, Consulting Engineers. We refer the Planning Authority to Drawing Nos. P102, P103, P160 and P152, prepared by Waterman Moylan Consulting which provide cross sections, longitudinal sections and levels of the future distributor road.

In the interim period that the 'Future Road' lands are not required by the Planning Authority for said road, the lands will remain in the ownership of the Applicant, is to be fenced off from the remainder of the development (see planning drawings for detail) and will be used by the Applicant for farming/agriculture, or related purposes. It is envisaged that the detail of this could be formalised in any Section 47 Agreement in due course.

The potential for the proposed development to impact on a future environment that includes the continuation of the future distributor road has been carefully considered, by the Applicant and the Planning Authority. The distributor road has been designed and incorporated to the proposed development to ensure that it is not prejudicial to, the future distributor road project including the bridge that is to be constructed by Meath County Council. Whilst the delivery of this road extension and bridge will not be a matter for the Applicant in this case and any environmental impact arising from same is for others to assess in due course, this EIAR has considered the possible environmental effects of the construction of that extension on the proposed residential development in this case assuming it is constructed and operational.

For clarity and avoidance of doubt, within the lands marked 'Future Road' on Drawing. No. P100 prepared by Waterman Moylan, there are site development works proposed in this area as part of the development proposed in this case, including works to an existing field drainage ditch. Details of this can be further found on Drawing Nos. P202 and P203 prepared by Waterman Moylan.

Car Parking

Car parking provision shall be provided in a number of forms on site. Housing units shall predominantly be served by on-curtilage parking spaces, whereas the apartment blocks served by

basement level parking. A number of parallel parking spaces shall be provided alongside the main distributor road of the scheme. Parking is also provided for the childcare facility.

The proposed parking provision for the site has been informed by both the Meath County Development Plan (2021-2027) and the 'Apartment Guidelines' (2022).

We refer the Planning Authority to the Design Statement prepared by Plus Architecture where this aspect of dealt with in more detail.

Bicycle Parking

A total of 1288no. cycle parking spaces are proposed which are all located at ground floor level which are dispersed around the apartment blocks for ease of access. These spaces are intended for long-term use of residents. 293no. of which are for short-term use for visitors and creche users.

There are three types of bicycle parking for the apartments. First are within the ground floor areas of all of the proposed apartment blocks. Bike sheds are located in Block C. There are also sheltered bike stands which run along the western boundary of the site.

Duplex residents have a choice to park their bikes in the garage for the upper units and in the proposed garden of the lower units for security, or on Sheffield stands located along the street adjacent to the duplex units.

For the housing residents, bicycle parking is provided within their private curtilage. Secure garden gateways ensure the safety & privacy of these parking spaces.

The proposed parking provision for the site has been informed by both the Meath County Development Plan (2021-2027) and the 'Apartment Guidelines' (2022).

We refer the Planning Authority to the Design Statement prepared by Plus Architecture where further details on the provision of bike parking is set out.

3.6.10 Childcare

When considering the size of the proposed development and having regard to the Planning Guidelines for Childcare Facilities (2001), it was deemed necessary to include a childcare facility/crèche in these proposals. A childcare facility (c. 602q.m.) has been provided within the ground floor unit of Apartment Block B1 which will accommodate approximately 150no. children.

The capacity of the childcare facility has been arrived at through the consideration of the 'Apartment Guidelines', section 4.7 in particular, which again references the Planning Guidelines for Childcare Facilities (2001). Section 4.7 states:

> *"[The Planning Guidelines for Childcare Facilities]…recommend the provision of one child-care facility (equivalent to a minimum of 20 child places) for every 75 dwelling units, the threshold for provision of any such facilities in apartment schemes 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. 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.*

Having regard for the above, and noting that there are 123no. 1-bed units proposed this leaves 593no. units of 2 beds or more. The Guidelines also provide a degree of flexibility to how 2 bedroom dwellings are to be considered, but do not do so in a prescriptive manner. Arising from this, it is considered reasonable to allow for 50% of 2-bedroom units to be discounted from the calculation and that this can be considered to be consistent with the Childcare Guidelines as can be seen above. 50% represents a mid-point of what the Guidelines indicate could be considered and thereby is considered appropriate. This results in 296 units requiring childcare facilities.

When applying the 20no. spaces per 75no. unit threshold as above this would leave a requirement for a childcare facility that can cater for a minimum of c. 107no. children.

In this context it is found that the creche having a floor area of 602sqm has adequate capacity to cater for the likely demand and also has scope to cater for any additional demand for spaces that may arise in the immediate vicinity in the future also.

A Social Infrastructure Capacity Audit, including an assessment of existing childcare facilities in the area has been prepared by Stephen little & Associates and accompanies this LRD Planning Application.

3.6.11 Taking in Charge

We refer the Planning Authority to enclosed Drawing No. 494_WS_01_04 'Taking in Charge Plan', prepared by Plus Architecture which provides details of areas to be taken in charge by Meath County Council. It is proposed that all roads and public open spaces will be taken in charge by the Planning Authority.

3.6.12 Refuse Strategy

We refer the Planning Authority to the enclosed Operational Waste Management Plan, prepared by AWN Consulting included as Appendix 17.1 of this EIAR which outlines details of waste management at operational stage of the development. We also refer the Planning Authority to Chapter 17 (Waste) prepared by AWN Consulting for further details of the refuse strategy for the proposed development.

3.7 Construction Management

We refer the Planning Authority to the enclosed Preliminary Construction Environmental Management Plan, which sets out typical arrangements and measures which may be undertaken during the construction phase of the project in order to mitigate and minimise disruption / disturbance to the area around the site. The Preliminary Construction Environmental Management Plan will be treated as a live document and communicated to all relevant personnel on site should the scheme be permitted.

3.8 Project Life Cycle

The purpose of this section is to provide a description of the Proposed Development and consider all relevant aspects of the project life cycle both during construction and post construction. These include the following: -

- Construction Phase (Land Use Requirements, Construction Activity & Significant Effects).
- Operation Phase (Processes, Activities, Materials Used).
- Secondary and Off-Site Developments.

3.8.1 Construction Phase

It is proposed to deliver the development across 5no. phases as follows: -

Phase Number	Main Works Proposed per Phase
Phase 1	• Site set up and enabling works. • Foul sewer diversion c.330m • Construction of c. 470m of Distributor Road • 14no. houses and 70no. Block B1 Apartments • Childcare facility • 7,643sqm of Public Open Space

	• 1,456sqm of Communal Open Space • Local streets and communications infrastructure
Phase 2	**Phase 2A** • 20no. dwelling units in 10no. duplex buildings (Part V) • 38no. houses • Open space and attenuation tank • Public Open Space • Local streets and communications infrastructure
	Phase 2B • 118no. Block A1 and A2 apartments. • 2,960sqm of Public Open Space • 3,986sqm of Communal Open Space • Roundabout works on R147 • Signalising of junction at Station Road (L2228) • Commensurate communications infrastructure
Phase 3	**Phase 3A** • 24no. dwelling units in 12no. duplex buildings (Part V) • 32no. houses • Local streets and communications infrastructure
	Phase 3B • 118no. Block A3 and Block A4 Apartments • 77no. Block B2 Apartments • 35no. Apartments (Block B2) (Part V) • 7,531sqm of Public Open Space • 5,378sqm of Communal Open Space • Commensurate communications infrastructure
Phase 4	• 134no. Block C1 and C2 Apartments • 4,909sqm of Public Open Space • 2,823sqm of Communal Open Space • Commensurate communications infrastructure
Phase 5	• 71no. houses • 5,887sqm of Public Open Space • Local streets and communications infrastructure

Table 3.5: Proposed Construction Phasing Plan

It is envisaged at this time that the development will be constructed and occupied in a rolling manner across these phases over the duration of the permission. In this regard, an indicative construction programme is set out below to assist the Planning Authority's understanding of this. It is envisaged that occupations would occur in line with this phasing arrangement but would of course be subject to market demands expressed at the time, which could cause this to change over the life of this permission.

The Table above shows Phase 2 and Phase 3 split in to sub-phases. This is merely to distinguish as between the Apartments located west of the southern distributor road and the housing and duplexes located to the east.

Project:	Oakfield, Dunboyne	PHASING PROGRAMME				
Revision:	FINAL					
Date:	28/06/2023					
Ref	**Task**	**Start**	**Finish**	**Duration**	**Units Completed**	**Cumulative units**
1	Grant of planning permission - **10 year permission**		2023	**Milestone**		
2	Phase 1 - Enabling works + mitigation measures, creche, houses, and B1 apartments	2023	2025	2 years	84	84
3	Phase 2 - Duplex units, houses, A1 + A2 Apartments Incl roundabout works + Signalising at Station Rd	2025	2027	2 years	176	260
4	Phase 3 - Duplex units, A3 and A4 and B2 apartments	2027	2029	2 years	251	511
5	Phase 4 - Blocks C1 and C2 apartments.	2029	2031	2 years	134	645
6	Phase 5 - Houses	2031	2033	2 years	71	716

Figure 3.8: Proposed Construction Phasing Plan

We refer the Planning Authority to Section 5 of the enclosed Architectural Design Statement, prepared by Plus Architecture for further detail relating to Phasing.

3.8.1.1 Construction Activities

There are a number of construction activities involved in a project such as this. The activities (independent of phasing) can be divided into five general categories: -

- **Excavation:** This includes site clearing and earthworks – soil / rock removal – required to prepare the site for the foundations and residential floorspace above.
- **Structure:** Structure includes the foundations and the physical frame of the residential units.
- **Enclosures:** The enclosures for the buildings will be formed, block work, brick, timber, and glass, with slate roofs and flat roofs, all with the required levels of insulation and waterproof membranes.
- **Services:** The requisite services will be provided including drainage and lightning.
- **Landscaping:** The landscaping works include some hard landscaping, roads, footpaths, cycle-paths, bed and tree planting, and significant open spaces. In addition, there are a number of existing trees to be protected on site and incorporated into the new scheme.

3.8.1.2 Construction Access

Construction access to the site will be through the existing access off Station Road. Due regard will be paid to minimising any impacts by construction vehicles on the existing developments in the area. Should an issue arise in respect of construction traffic, then the position will be reviewed by the Project Team and changes made.

3.8.1.3 Air Quality – Dust & Dirt

The appointed Contractor shall put in place a regime for monitoring dust levels in the vicinity of the Site during the Construction Phase. The level of monitoring and adoptions of mitigation measures will vary throughout the Construction Phase depending on the type of activities being undertaken and the prevailing weather conditions at the time

The potential impacts associated with air quality during the Construction Phase are addressed in Chapter 10: Climate (Air Quality).

3.8.1.4 Noise & Vibration

It is not envisaged that any significant prolonged noise producing activities will be carried out onsite. During daytime periods, the dominant source of noise in the area of the Station Road site is traffic on the L2228 and the adjoining roads, R157 and M3 motorway, as well the as the train services running along the rail line to the west of the site. The night time noise levels are also dominated by traffic on the nearby roads, L2228, R157 and M3 motorway, together with the train services until around midnight that run along the rail line to the west of the site.

The potential impacts associated with noise and vibration during the Construction Phase, are addressed in Chapter 14: Air (Noise & Vibration).

3.8.1.5 Waste

A Construction & Environmental Management Plan, an Operational Waste Management Plan and Construction and Demolition Waste Management Plan have been prepared and are included with the LRD Planning Application. In addition, Chapter 17: Material Assets (Waste) of this EIAR includes details regarding the anticipated amounts of waste generated from the project, the subsequent potential impacts and the mitigation measure proposed to ameliorate any anticipated negative impacts.

In summary, all waste generated during the construction and operational periods is proposed to be appropriately disposed of in accordance with the Waste Management Plans.

3.8.1.6 Health & Safety Issues

The development will comply with all Health & Safety Regulations during the construction of the project. Where possible potential risks will be omitted from the design so that the impact on the construction phase will be reduced.

3.8.2 Operational Phase

The Proposed Development is a residential development consisting of apartments, houses and duplex's ranging in height from 2 to 7 storeys and amenity facilities.

The primary direct significant environmental effects will arise during the Construction Phase. As a result, the Operational Phase of the Proposed Development is therefore relatively benign and not likely to give rise to any significant additional impacts in terms of activities, materials or natural resources used or effects, residues or emissions which are likely to have a significant impact on human beings, flora and fauna, soils, water, air and climate.

The primary likely significant environmental impacts of the Operational Phase as a result of the Proposed Development are fully addressed in the relevant specialist chapters of this EIAR. These impacts relate to Population & Human Health, Landscape & Visual, Climate (Noise & Vibration), Climate (Air Quality) and Climate (climate change) associated with the traffic generated.

The Proposed Development also has the potential for cumulative, secondary and indirect impacts (i.e. traffic) and can be difficult to quantify due to complex inter-relationships.

However, all interactions and cumulative impacts are unlikely to be significant, have been addressed in Chapters 22 and 23 of this EIAR.

3.9 Related Development and Cumulative Impacts

Each Chapter of the EIAR includes a cumulative impact assessment of the Proposed Development with other planned projects in the immediate area.

For the purposes of this EIAR, we have examined proposals within 0.5km of the development being proposed. In that context, the Castle Farm Meadows development on Station Road is considered under the Receiving Environment. The cumulative assessment considered as part of this EIAR are as follows:

- **Exempted Development** - In order to accommodate this development and other developments in and around the Dunboyne area, Irish Water will be required to upgrade c. 1,100m of existing 200mm uPVC watermain so as to provide a 400mm ID watermain in its place. This is to be undertaken by Irish Water under their exempted development provisions and these works do not form part of this planning application as a result.
- **Future Development** - The planning application includes an 470m length of distributor road linking to that part of the distributor road already built as part of the Castle Farm Meadows development which ultimately connects with Station Road. This proposed road forms part of the overall Dunboyne Distributor Road; an objective of the Meath County Development Plan 2021-2027. It is intended as part of that Development Plan objective that in the future that distributor road would be extended southwards and then eastwards over the railway line. The design for this future extension to the distributor road and bridge has been included in this application as evidence that it provides a viable workable solution, however permission for that extension is not being sought at this time as it is not required to cater for this development.
- **Residential Development Meath County Council Reg. Reg. 22675** - On 24 May 2022, Darcon Properties Ltd. applied for permission for 8 no. two storey semi-detached houses with habitable attic accommodation, 2 no. two storey end-terrace houses with habitable attic accommodation, 2 no. two storey mid terrace houses, a three storey apartment building accommodating 9 no. apartments and all ancillary and associated site development works. Further information was sent to Meath County Council on the 17 April 2023. This application was granted on the 24th May 2023.
- **Dart + West**– A railway order was submitted to An Bord Pleanála for a Railway Order for DART+ West Project on 29th July 2022. This project has completed its public consultation and is now currently undergoing detailed design and beginning the procurement process.
- **Meath County Council Reg. Ref. 212395 –** On the 24th Feburary 2022 permission was granted for the demolition of an existing single story cottage including partially demolished ancillary structures
- **Meath County Council Reg. Ref. RA170175 –** Permission was granted on the 18th April 2017 for construction of a 98.18 sq.m Water Pumping Station with access to the nearby R147 including associated site works to replace the existing Loughsallagh Water Pumping Station as part of improvements to the water supply network
- **Meath County Council Reg. Ref. RA150605 –** in 2015 permission was granted for a data centre campus on Lands at Portan, Clonee, County Meath.

The relevance of the above list of cumulative projects may differ as between the environmental topics contained in this Environmental Impact Assessment Report when considering cumulative impact.

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

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

4 EXAMINATION OF ALTERNATIVES

4.1 Introduction

This Chapter of the EIAR sets out the reasonable alternatives that have been considered for the Proposed Development and provides an indication of the main reasons for the final scheme choice, taking into account the effects on the environment in the context of the characteristics of the site (receiving environment). Article 5(1)(d) of the EIA Directive requires Environmental Impact Assessment Reports (EIAR) to include the following: -

> *"a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment".*

Paragraph 2 of Annex IV elaborates the requirement, as follows: -

> *"A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects."*

Pursuant to Section 3.4.1 of the Environmental Protection Agency (EPA) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022), the consideration of alternatives also needs to be cognisant of the fact that: -

> *"…in some instances some of the alternatives described below will not be applicable – e.g. there may be no relevant 'alternative location'…"*

In accordance with EPA Guidelines (EPA, 2022), different types of alternative may be considered at several key phases during the process. As environmental issues emerge during the preparation of the EIAR, alternative designs may need to be considered early on in the process or alternative mitigation options may need to be considered towards the end of the process.

The EPA Guidelines (EPA, 2022) states: -

> *"The objective is for the developer to present a representative range of the practicable alternatives considered. The alternatives should be described with 'an indication of the main reasons for selecting the chosen option'. It is generally sufficient to provide a broad description of each main alternative and the key issues associated with each, showing how environmental considerations were taken into account in deciding on the selected option. A detailed assessment (or 'mini-EIA') of each alternative is not required."*

Thus, the reasonable alternatives studied by the project design team and in the context of the associated Regulations, the alternatives of the Proposed Development in this EIAR Chapter as follows: -

- Alternative Locations.
- 'Do Nothing' Alternative.
- Alternative Processes.
- Alternative Mitigation Measures.
- Alternative Layouts & Designs.

This chapter has been prepared by Stephen Little, EIAR Manager, with assistance from Naoise O'Connor, EIAR Co-ordinators at Stephen Little & Associates. Stephen has over 30 years' professional experience of town planning in Ireland, is a Corporate Member of both the Irish Planning Institute and the Royal Town Planning Institute and holds a Diploma in EIA Management (UCD). Naoise has 2 years' professional experience in the planning field, has a MRUP – Masters in Regional and Urban Planning and is a Graduate Member of the Irish Planning Institute.

4.2 Development Rationale

The Proposed Development seeks to provide a large scale residential development and a childcare facility in line with the 'A2' – New Residential land use zoning objective. The nature of the development is actively promoted at this location by Meath County Council through the Meath County Council Development Plan 2021-2027 ("the Development Plan") and having regard to other strategic plans and guidance.

4.3 Main Alternatives Studied

The main alternatives considered during the development of this project comprise alternative design solutions and layouts for a predominantly residential development at the subject site.

4.3.1 Alternative Locations

Under the Development Plan, the site is subject to the zoning objective 'A2 – New Residential' which seeks:-

> *"To provide for new residential communities with ancillary community facilities, neighbourhood facilities as considered appropriate."*

The Development Plan was prepared by Meath County Council to provide a framework for future development of this new residential community at the subject lands.

Under section 11.14.6 of the Development Plan under Zoning Category 'A2', it is noted that lands zoned A2 are the primary zones for new residential development and these lands may also include other uses that will support the establishment of residential communities.

As such it is considered that the site is entirely suitable for the nature of development as proposed in this planning application. It is not considered necessary to consider an alternative site location for the proposed development as a result.

In addition, these zoned 'A2' lands are the ones in the ownership of the Applicant and not any other in Dunboyne.

4.3.2 'Do-Nothing' Alternative

In the event of a 'do-nothing' scenario, the site would remain 'as-is' with the undeveloped nature of the site or its former agricultural use retained.

A do-nothing approach would be contrary to the Council's objectives to promote of residential land use at this site, in accordance with national, regional and local planning policy and guidance, including the obligations under the Core Strategy of the adopted statutory Development Plan. It would potentially result in a failure of the housing needs of the County being appropriately met and the site being identified as 'vacant, or idle land'. An opportunity to achieve efficient and compact development which benefits from existing public transport connectivity would also be undermined. A 'do-nothing' approach would be considered inappropriate and unsustainable from a planning and housing perspective.

From an environmental perspective, beyond impact on human health from a failure to deliver sustainable residential development to meet housing and community development needs and further sustainable based on alternatives to travel by private car, a 'do nothing' approach is otherwise likely to result in a neutral impact on the environment in respect of material assets, land, water, air, climate, cultural heritage, biodiversity and landscape.

4.3.3 Alternative Processes

Alternative processes for the proposed housing, supporting facilities, amenities and infrastructure, at Construction and Operational Phase of the development, are discussed below: -

- **Construction Phase:** The proposed construction works comprise relatively standard building construction processes. As such there are no specific alternative construction processes identified in this EIAR.
- **Operational Phase:** No new, unusual or technically challenging operational techniques are required, as such no alternative operational processes have therefore been considered at this point.

4.3.4 Alternative Mitigation Measures

The mitigation measures as outlined in the various chapters of this EIAR are considered appropriate to the location, nature and extent of the project and its potential impacts. Due to this no alternative mitigation measures have been considered.

4.3.5 Alternative Layouts & Designs

This section provides an overview of how the proposed development has evolved to date by way of consideration of alternative designs and how the final scheme within the planning application made to Meath County Council has been reached.

Various design and layout options were considered as the proposals progressed and key considerations and amendments to the design were incorporated. A number of minor amendments have been made throughout the design and consultation process including:

- The alignment of the distributor road;
- Re-alignment and diversion of the watercourse;
- Treatment of lands required for future extension to distributor road;
- Removal of dog park proposals;
- Introduction of traffic signals on Station Road (L2228).

The above list of amendments caused no significant or fundamental change to the overall design and layout of the site and therefore do not require a detailed environmental assessment. However, having regard to the environmental issues pertaining to the lands one main alternative to the layout is discussed below in section 4.3.5.1.

This EIAR provides reasonable evidence that the proposed development can be accommodated at this location without predicted risk of significant adverse impact on the environment, subject to implementation of the identified mitigation measures at construction and operational stages.

No specific further alternatives in respect of the nature, design and layout of the proposed development have been identified in the recommended EIAR mitigation measures.

4.3.5.1 Main Alternative Considered – 1st Section 247 meeting

A section 247 meeting was held with Meath County Council on the 5 April 2022. This initial meeting helped inform the Design Team's concept proposals for the subject site and in turn the final proposal.

The proposed layout shown at the Section 247 meeting can be seen Figure 4.1 below. The proposal consisted of apartment blocks to the west and lower Density housing development to the east. 540no. total units were proposed on site of 11.7 Ha, comprising 146no. houses and 394no. apartments. This plan did not include any layout plans for the southern lands.

Figure 4.1: Site Layout Plan at Section 247 meeting held on the 5 April 2022 with area of change highlighted in blue (SLA overlay)

The proposed housing layout to the South of Figure 4.1 (highlighted with a blue circle) was not considered to satisfactorily address the sensitive edge of the tree lines riparian corridor. The overall development shown also failed to achieve the encouraged density of 50 units per hectare. The key issues from an environmental perspective of this alternative design are summarised as follows: -

- The proposed gardens and buildings close to and crossing the 10m Riparian Corridor;
- Encroachment on a root protection area
- Issues with lighting overspill from houses and gardens on bats within the existing trees being retained.

As such having considered the design further the proposal was changed to place apartment buildings in to this area of the site as these can achieve the densities required to achieve the levels required, but on a much smaller footprint, such that the impacts on the trees, riparian corridor and bats are mitigated (See Figure 4.2 below for current site layout).

4.3.5.2 Final Proposed Development

The development as now proposed is considered to have arrived at an optimal solution in respect of making efficient use of zoned, serviceable lands and achieving the recommended residential density across the site whilst also addressing the potential impacts on the environment relating to residential, visual, natural and environmental amenities and infrastructure. The proposed development has also taken on board all comments and recommendations of the LRD Opinion issued by MCC.

The Proposed Development subject of this planning application will generally comprise of 716 no. units in total comprising a mix of 155no. houses, 44no. duplexes and 517no. apartments. On a site of net 12.61Ha achieving a density of 56.8no. units per hectare.

Please refer to Chapter 3: Description of Proposed Development of this EIAR for a further detailed description of the Proposed Development. The final design presents the most effective utilisation of this significant site, fulfils MCC objectives and ensures the optimum provision of much-needed housing while delivering residentially led, mixed use development of the highest quality.

To summarise it is considered that the final layout: -

- Advances the strategic and statutory objectives applicable to these lands and the wider area.
- Optimises development space within the overall site, in an efficient and sustainable manner.
- Enables extensive economic development through both employment created at Construction and Operational Phases, and also under development of a childcare facility on site.
- Avoids the necessity to utilise in a non-sustainable manner other greenfield lands.
- Affords excellent play opportunities and open space provision for the Proposed Development and to members of the public.
- Encourages the use of public transport and provides pedestrian and cycle links throughout to minimise car usage within the scheme.
- Avoids significant environmental impacts.

The final iteration of the Proposed Development is not considered to give rise to any significant adverse environmental impacts. Mitigation measures to be implemented at construction and operation stages of the project are summarised in Chapter 21: Summary of Mitigation Measures of the EIAR.

Environmental Effects of the Final Proposed Development compared to Preliminary Layout			
Environmental Factor	**Headings Under which the Environmental Factors were Assessed**	**Topic**	**Comparative Effect of Preferred Option**
Population & Human Health		Construction Phase Operational Phase	Neutral, imperceptible and permanent No perceived additional adverse effects during Construction / Operational Phase.
Biodiversity		Construction Phase Operational Phase	Neutral, imperceptible and permanent No perceived additional adverse effects during Construction / Operational Phase. Overall, the impacts are reduced in the Final Proposed Development during the Operational Phase.
Land, Soil & Geology		Construction Phase Operational Phase	Neutral, imperceptible and permanent No perceived additional adverse effects during Construction / Operational Phase.
Water	Surface Water	Construction Phase Operational Phase	Neutral, imperceptible and permanent No perceived additional adverse effects during Construction / Operational Phase.
	Waste Water	Construction Phase Operational Phase	Neutral, imperceptible and permanent No perceived additional adverse effects during Construction / Operational Phase.
	Water Supply	Construction Phase Operational Phase	Neutral, imperceptible and permanent No perceived additional adverse effects during Construction / Operational Phase.
	Flood Risk	Construction Phase Operational Phase	Neutral, imperceptible and permanent No perceived additional adverse effects during Construction / Operational Phase.

Wind		Construction Phase Operational Phase	Neutral, imperceptible and permanent No perceived additional adverse effects during Construction / Operational Phase.
Climate	Air Quality	Construction Phase Operational Phase	Neutral, imperceptible and permanent No perceived additional adverse effects during Construction / Operational Phase.
Climate	Climate Change	Construction Phase Operational Phase	Neutral, imperceptible and permanent No perceived additional adverse effects during Construction / Operational Phase.
Climate	Sunlight	Construction Phase Operational Phase	Neutral, imperceptible and permanent No perceived additional adverse effects during Construction / Operational Phase.
	Daylight	Construction Phase Operational Phase	Neutral, imperceptible and permanent No perceived additional adverse effects during Construction / Operational Phase.
Air	Noise & Vibration	Construction Phase Operational Phase	Neutral, imperceptible and permanent No perceived additional adverse effects during Construction / Operational Phase.
Material Assets	Traffic & Transport	Construction Phase Operational Phase	Neutral, imperceptible and permanent No perceived additional adverse effects during Construction / Operational Phase.
	Waste	Construction Phase Operational Phase	Neutral, imperceptible and permanent No perceived additional adverse effects during Construction / Operational Phase.
	Utilities	Construction Phase Operational Phase	Neutral, imperceptible and permanent No perceived additional adverse effects during Construction / Operational Phase.
Landscape and Visual	Visual Impact	Construction Phase Operational Phase	Neutral, imperceptible and permanent No perceived additional adverse effects during Construction / Operational Phase.
Cultural Heritage	Archaeological & Architectural	Construction Phase Operational Phase	Neutral, imperceptible and permanent No perceived additional adverse effects during construction/operational phase.

5 POPULATION & HUMAN HEALTH

5.1 Introduction

This chapter has been prepared to assess the likely significant impacts on Population and Human Health in respect of the Proposed Development (as defined in Chapter 3 of this EIA Report).

This Chapter was prepared by Natalie Machado:

Natalie Machado is an Environmental Consultant with AWN Consulting. Natalie holds an MBA in Project Management & Environmental Sustainability by the Pontifical Catholic University of Rio Grande do Sul (PUCRS) and a BSc in Biological Sciences by the Federal University of Rio Grande do Sul (UFRGS). Natalie has experience in project and teams' management, environmental impact assessment, freshwater ecotoxicology, scientific research and academic sector, effluent testing, international environmental consultancy, corporate and environmental sustainability.

The EU (2017) *Guidance on the preparation of the Environmental Impact Assessment Report* outlines that human health is a very broad factor that is be highly project dependent. This guidance states:

> *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.*

Human health should be considered in the context of environmental pathways which may affect health such as air quality, noise, water and soil quality. All can contribute to negative effects on human health by facilitating the transport of contaminants or pollutants. An evaluation of the effects of these pathways on health, by considering the accepted standards of safety in dose, exposure or risk of air quality and noise levels for example, is considered appropriate, as these standards have been arrived at via scientific and medical research.

The EPA (2015) Advice Notes explains that the scope of population and human health is project dependant but should consider significant impacts likely to affect aspects such as: convenience (expanded range of transport options); displaced settlement patterns (residential); employment opportunities; land use patterns; access for tourism, amenity, health impacts and/or nuisance due to noise, dust or water pollution; and health and safety. The EPA Guidelines (2022), notes that the transposing legislation does not require assessment of land-use planning, demographic issues or detailed socioeconomic analysis (EPA, 2022). Furthermore, the EPA Advice Notes (2015) states that issues such as employment, commercial competition, zoning, property prices, agri-business and other social and economic issues are dealt with by more specific instruments (such as the Planning Acts).

Furthermore, in accordance with the EPA (EPA, 2022), the assessment of impacts on population and human health should refer to the assessments of those factors under which human health effects might occur, as addressed elsewhere in the EIAR. The likely significant impacts on with Human Health and Population in regards to issues such as soils, geology and hydrogeology, water, air quality, noise and vibration, traffic and landscape are addressed in detail within the following EIA chapters:

- Chapter 7 - Land, Soils and Geology
- Chapter 8 - Water
- Chapter 11 - Air Quality
- Chapter 14 - Air (Noise and Vibration)
- Chapter 15 - Landscape and Visual Impact Assessment
- Chapter 16 - Material Assets (Transportation)

Where these topics are dealt with in further detail elsewhere in this EIA Report, the relevant chapters have been cross referenced in this Chapter to provide the Planning Authority with a context for their determination.

5.2 Assessment Methodology

The World Health Organization (WHO) Constitution defines health as 'a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity' (WHO 1948). This assessment, therefore, includes consideration of potential impacts of the Proposed Development on physical, mental and social aspects of health in the context of environmental pathways such as air quality, noise, water, soil quality and visual impact. All can contribute to effects on human health, for example by facilitating the transport of contaminants or effecting the views available to persons due to the construction of the Proposed Development. An evaluation of the effects of these pathways on health, by considering the accepted standards of safety in dose, exposure or risk of air quality and noise levels for example, is considered appropriate, as these standards have been arrived at via scientific and medical research.

The EPA (2015) Advice Notes explains that the scope of population and human health is project dependant but should consider significant impacts likely to affect aspects such as: convenience (expanded range of transport options); displaced settlement patterns (residential); employment opportunities; land use patterns; access for tourism, amenity, health impacts and/or nuisance due to noise, dust or water pollution; and health and safety. The EPA Guidelines (2022), notes that the transposing legislation does not require assessment of land-use planning, demographic issues or detailed socioeconomic analysis (EPA, 2022). Furthermore, the EPA Advice Notes (2015) states that issues such as employment, commercial competition, zoning, property prices, agri-business and other social and economic issues are dealt with by more specific instruments (such as the Planning Acts).

Furthermore, in accordance with the EPA (EPA, 2022), the assessment of impacts on population and human health should refer to the assessments of those factors under which human health effects might occur, as addressed elsewhere in the EIAR.

The relevant chapters have been cross referenced in this Chapter to provide the Planning Authority with a context for their determination.

The assessment of other health and safety issues that are carried out under other EU Directives are also relevant. These may include reports prepared under the Industrial Emissions, Waste Framework, Landfill, Strategic Environmental Assessment, Seveso III, Water Framework Directive, Floods or Nuclear Safety Directives. In keeping with the requirement of the amended Directive, an EIAR considers the results of such assessments without duplicating them.

5.2.1 Relevant Legislation and Guidance

This chapter has been prepared in accordance with:

- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports. Environment Protection Agency (EPA, 2022)
- Health Impact Assessment Guidance. Institute of Public Health (IPH), (IPH, 2021).
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report European Commission (EU, 2017)
- Advice Notes for Preparing Environmental Impact Statements Draft Environment Protection Agency (EPA, 2015).

This chapter follows these guidelines and will examine the health effects relevant to the proposed development as they relate to the relevant study area.

The description of the sensitivity, magnitude and significance, outlined within this assessment are based on the Health Impact Assessment Guidance (IPH, 2021) criteria, while the probability and duration of effects are based on the definitions set out within Section 3.7 of the 'Guidelines on information to be contained in Environmental Impact Assessment Reports' (EPA, 2022).

5.2.2 Data Sources of information

The following sources of information have been used in this assessment:

- 2011 Census carried out by the Central Statistics Office (CSO) 10 April 2011. Made available from https://www.cso.ie/en/
- 2016 Census carried out by the Central Statistics Office (CSO) 24 April 2016. Made available from https://www.cso.ie/en/
- Population and Actual and Percentage Change 2016 to 2022. Made available from https://data.cso.ie/
- Pobal HP Deprivation Index based on 2011 Census Data (CSO) Made available from https://www.pobal.ie/
- Pobal HP Deprivation Index based on 2016 Census Data (CSO) Made available from https://www.pobal.ie/
- Google maps available from https://www.google.com/maps
- OpenStreetMap and contributors available from https://www.openstreetmap.org
- GeoHive contributors and available from https://www.geohive.ie/

5.2.3 Study Area

There is no specific guidance available on an appropriate study area to focus the assessment of existing land use and/or permitted projects. The research area has been established using expert judgement and based on the accessibility of data and taking into consideration the potential for impact from the proposed development.

It is acknowledged that projects like the one proposed can have an impact on activity in a larger area that only the site itself. Generally, the closer to the works, the greater the potential for impacts. The most significant environmental impacts are likely to be confined within 50-150 m of the proposed development. Some effects from the Proposed Development, including air quality and traffic, might have a larger area of effect, and these are addressed in further detail in the corresponding expert assessments that set out the chapters within this EIAR.

The project being considered, is not expected to have Regional, National or International, or Transboundary impacts on Human Health. Therefore, the Study area has been restricted to the neighbouring community (site-specific population), and wider community (local population). A general study area of 1 km from the site location is included for population statistics, while the wider area of 2.5 km from the site location has been used to inform the baseline description of the area.

In the desk-based assessment of Population Health Sensitivity the use of Electoral Divisions (ED) statistics from CSO have been utilised. Electoral Divisions are the smallest legally defined administrative areas in the state; developed with the intention of producing areas roughly equivalent in both population and "rateable value" (CSO).

The selection ED within the study area has included ED the that are either entirely contained within or partially within 1 km of the proposed development site. In the case of the proposed development, the site is located within Dunboyne (ED 11009), Republic of Ireland, County Meath.

The EDs Blanchardstown-Tyrrelstown (ED 4015) and Blanchardstown-Blakestown (ED 4009), Republic of Ireland, County Dublin, are located more than 1km from the subject site, so these ED were not considered for this Population Health Sensitivity assessment.

5.2.4 Population Impact Assessment Categories

5.2.4.1 Assessment Sensitivity of Population

The assessment of significance of an impact is a professional appraisal based on the sensitivity of the receptor and the magnitude of effect. Within any area, the sensitivity of individuals in a population will vary. The Health Impact Assessment Guidance (IPH, 2021) sets out conceptual model of the different components of sensitivity (Figure 5.1). It uses criteria (segments) and indicative classifications (levels) to explore, and explain, a finding of sensitivity. The conclusion may be summarised as a high, medium, low or negligible sensitivity to change.

The existing sensitivity of the receiving environment (in terms of population and human health) has been appraised for the study area with a desk-based assessment of routine demographic and health indicators, rather than the use of surveys or collection of primary data. This includes analysis of existing data (based on the availably of information) from the Central Statistics Office (CSO) and Pobal to build up a profile of the baseline population information within the study area. Topographical maps and Google maps have also been used to inform the baseline description of the area to inform the proximity of the Site to areas of economic activity, employment, community infrastructure, emergency services, tourism and recreation amenities.

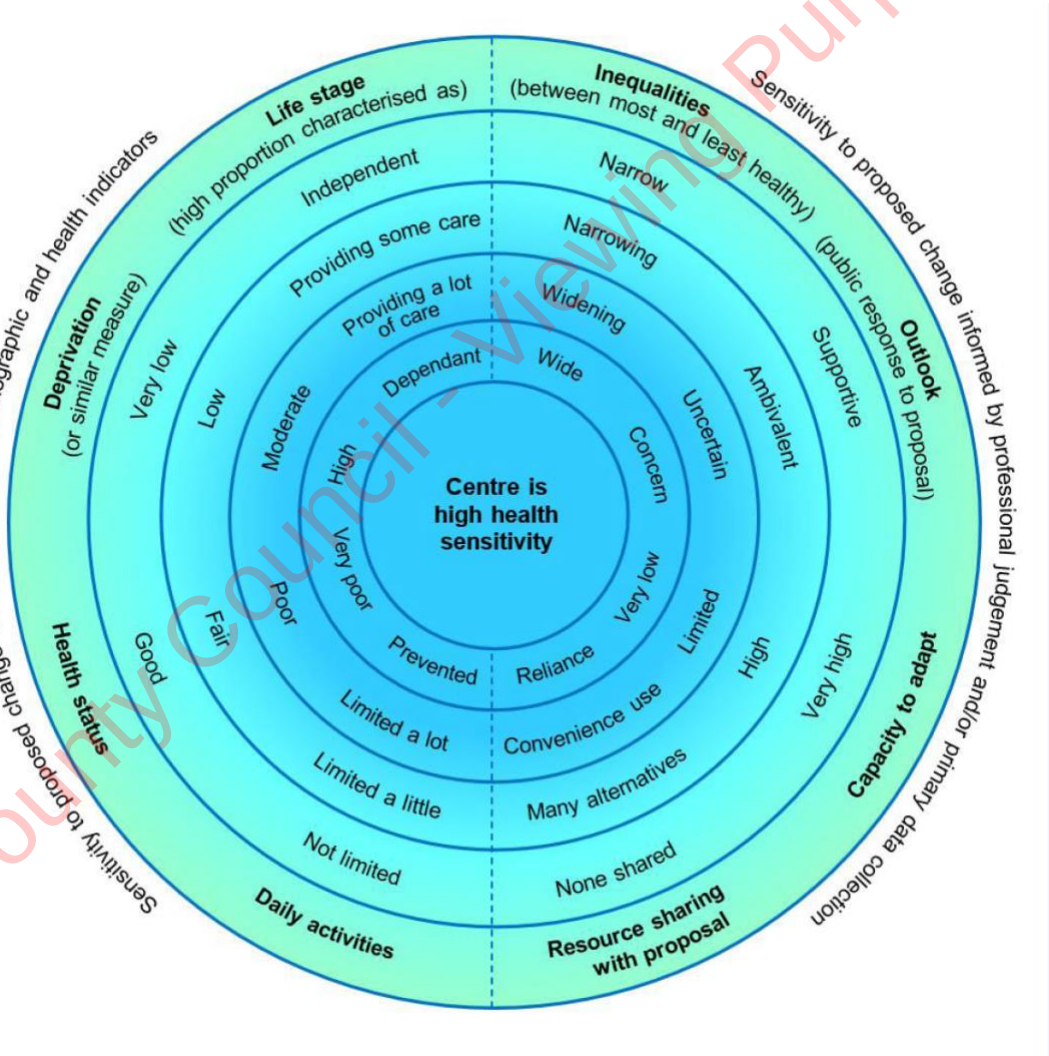


Figure 5.1: Health sensitivity: conceptual model (Source: Health Impact Assessment Guidance (IPH, 2021))

5.2.4.2 Magnitude of Impact

Magnitude considers the characteristics of the change which would affect the receptor as a result of the proposal. The Health Impact Assessment Guidance (IPH, 2021) sets out a conceptual model of the

different components of sensitivity (Figure 5.2). Again, this model provides different components of *magnitude*. It uses criteria (segments) and indicative classifications (levels) to explore, and explain, a finding of *magnitude*. The conclusion may be summarised as a high, medium, low or negligible magnitude of change.

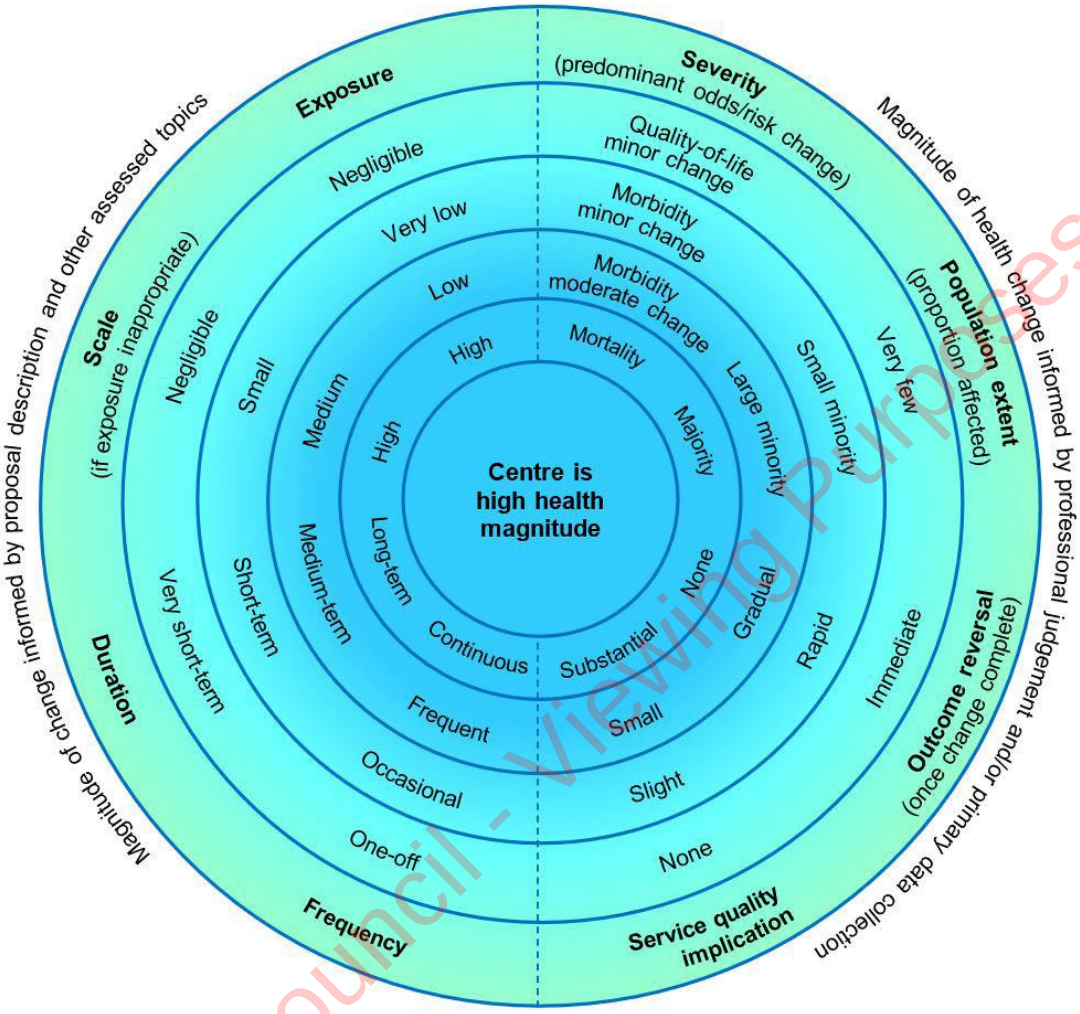


Figure 5.2: Health magnitude: conceptual model (Source: Health Impact Assessment Guidance (IPH, 2021))

5.2.4.3 Significance of Effects

Significance relies on informed, expert judgement about what is important, desirable or acceptable with regards to changes triggered by the proposal in question. The assessment of the significance of effects in this assessment is a professional appraisal and has been based on the relationship between the magnitude of the effects and the sensitivity of the receptor.

The Health Impact Assessment Guidance (IPH, 2021) sets out a conceptual model of the different components of significance. It uses criteria (segments) and indicative classifications (levels) to explore, and explain, a finding that a health effect is significant or not significant.

The Health Impact Assessment Guidance (IPH, 2021) model brings together different types of evidence, e.g. scientific literature, public health priorities, regulatory standards and health policy. The model thus not only take into account a range of evidence sources, but also a diversity of professional perspectives, e.g. academics, public health practitioners, regulators and policy makers.

The model below, includes the factors of magnitude of impact and the sensitivity of receptors as determined in Section 5.2.1 and Section 5.2.2 above. This EIA assessment typically relies on regulatory

thresholds, where there would be formal monitoring by regulators, to set out the acceptability or desirability of change to population health.

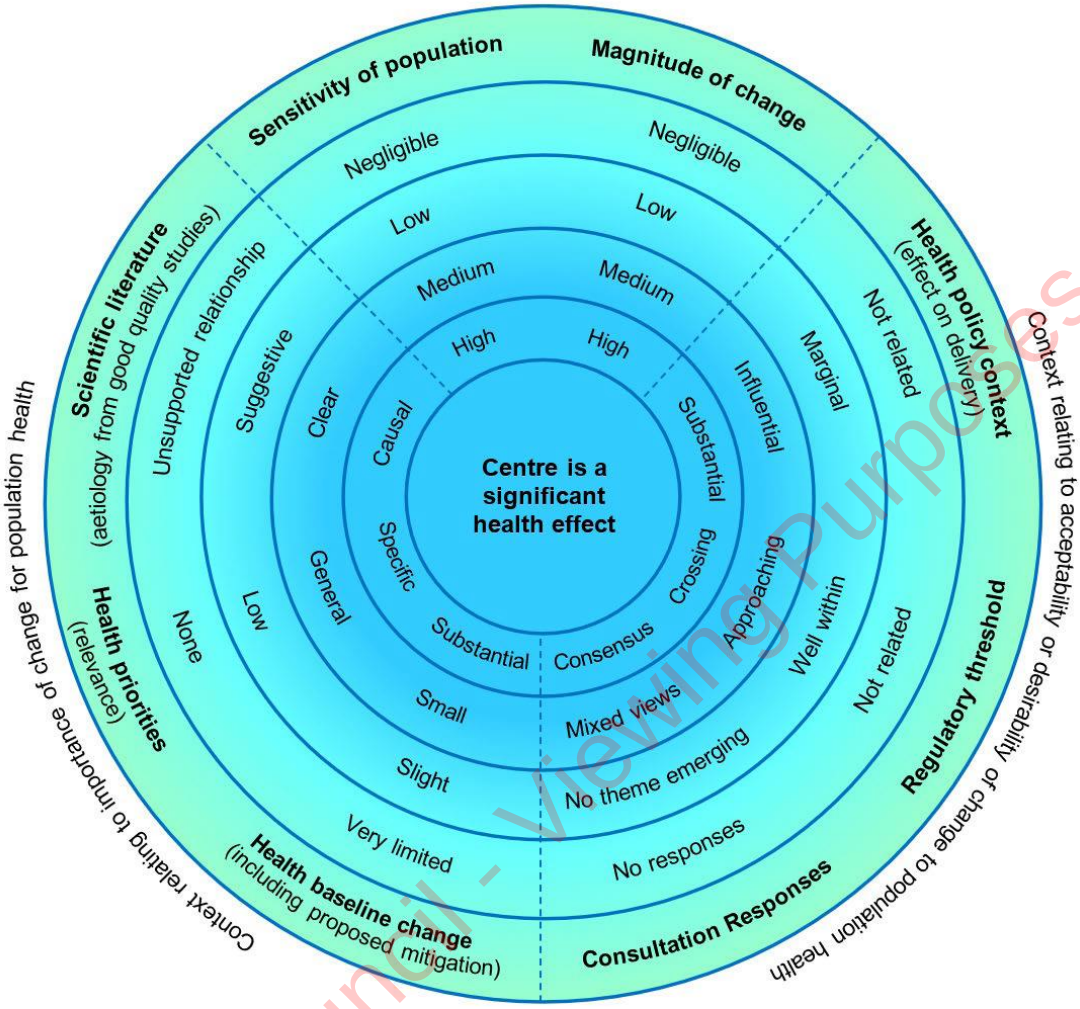


Figure 5.3: Health significance: conceptual model

5.3 Receiving Environment

5.3.1 Population Health Sensitivity within the Study Area

The purpose of the population health sensitivity assessment is to identify the likely sensitivity of the local population and its capacity to absorb change. It is considered that for the purpose of this assessment that available data on: Population; Deprivation; Life Stage; and Health Status within the Study Area provides sufficient information to establish the population sensitivity and to provide the Planning Authority with a context for this assessment.

Population

The most recent census of population was carried out by the CSO on the 3 April 2022. However full results of this census are yet to be published. Preliminary results regarding population growth have been published and are utilised in section 5.3.1.1 of this study. For the purposes of the remainder of this study the results of the census of population carried out by the CSO on the 24 April 2016 will be used, and the previous census on the 10 April 2011. The census compiles data for the whole state as well as smaller individual areas including counties, cities, towns, and electoral divisions. Taking into consideration the location of the Proposed Development, the census information on population, age profile, employment, and social class, has been analysed in relation to the development site.

Table 5.1 denotes the population change at for the state, and electoral districts for the census years 2016 and 2022. The latest census data shows that the population surrounding the development site in the North City ED decreased in size by 15.5% between the years 2016 and 2022 compared with a growth of 7.6% nationally. However, the average rate of population growth across the study area as a whole was an increase in 7.6%, in line with the national growth.

Area	Population for Census Year		% Change 2016-2022
	2016	2022	
State - Republic of Ireland	**4,761,865**	**5,123,536**	**7.6**
Dunboyne ED	10,094	**10,639**	+5.4

Table 5.1: Population change at National, County and Electoral Division level from 2016 – 2022 (Source: www.cso.ie)

5.3.1.1 Deprivation

The Health Impact Assessment Guidance (IPH, 2021) outlines that impact assessments should consider if the population is already stressed by limited resources or high burdens as well as if groups are affected that have reduced access to financial, social and political resources. Deprivation differences between areas are indicative of social gradients, which are central to the consideration of health inequalities.

Deprivation statistics for Ireland are available from the Pobal HP Deprivation Index that shows the overall affluence and deprivation. This Index draws on data from the national Census and combines three dimensions of relative affluence and deprivation: Demographic Profile, Social Class Composition and Labour Market Situation that are measured by ten key socio-economic indicators from the Census of Population.

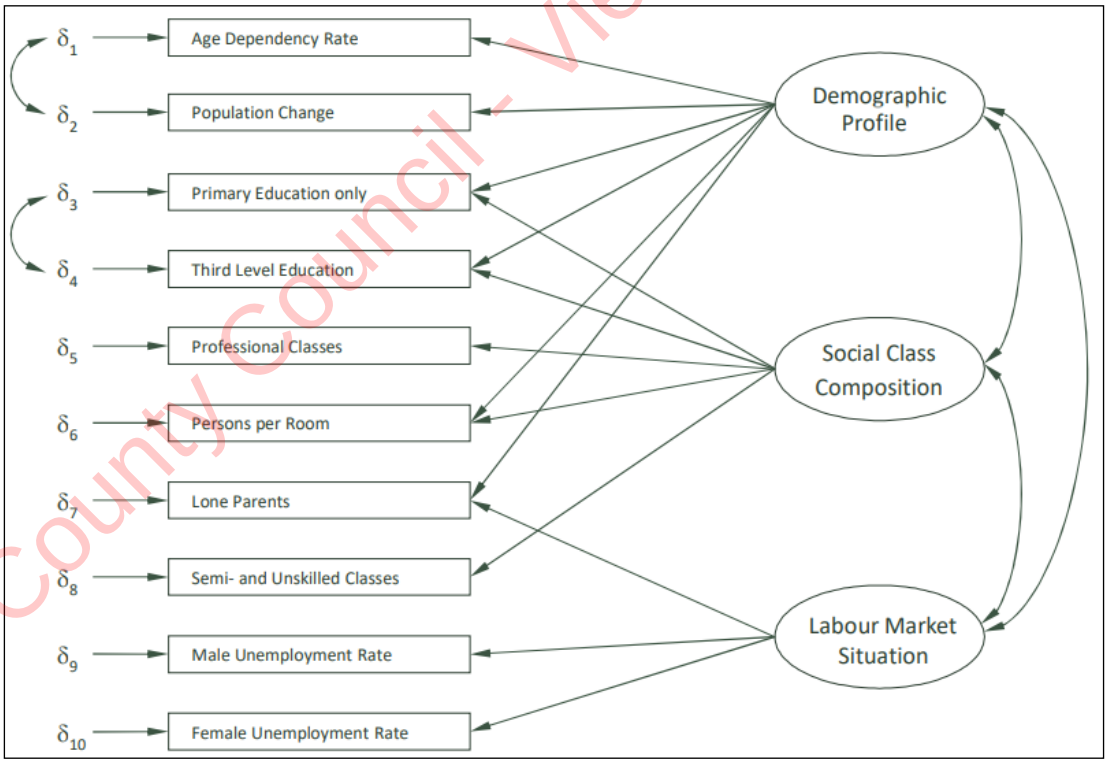


Figure 5.4: Basic Model of the Pobal HP Deprivation Index

The Pobal HP Deprivation Index Relative Index Score allows for the provision of descriptive labels with the scores, which are grouped by standard deviation as seen in Table 5.2 below.

In order to make a uniform assessment using the conceptual model as set out in Figure 5.1 above a relative Population Sensitivity the Deprivation Score of 'Very disadvantaged', or 'Extremely

disadvantaged' would represent a high sensitivity. Conversely, a 'Extremely affluent' or 'Very affluent' would represent a very low sensitivity.

Deprivation Score	Pobal HP Description	Sensitivity of Population
> 30	Extremely affluent	Very Low
20 to 30	Very affluent	Very Low
10 to 20	Affluent	Low
0 to 10	Marginally above average	Low
0 to -10	Marginally below average	Moderate
-10 to -20	Disadvantaged	Moderate
-20 to -30	Very disadvantaged	High
< -30	Extremely disadvantaged	High

Table 5.2: Pobal HP Index Relevant Index Score labels (Source: Pobal HP Deprivation Index)

The data in Table 5.3 show the Pobal HP Deprivation Index Relevant Index Scores for the Study Area based on the 2016 Census. These figures show for the year 2016 Dunboyne ED as 'Marginally Above Average' as compared with the ROI is that is as ''Marginally Below Average'. This indicates a Low Population Sensitivity (Deprivation) within the study area.

Area	Deprivation Score	Pobal HP Description
State - Republic of Ireland	-4.2	Marginally Below Average
Dunboyne	8.54	Marginally Above Average

Table 5.3: Deprivation Score within the Study Area (Pobal HP Deprivation Index, 2016 Cencus)

5.3.1.2 Life Stage (Age Dependency)

The Health Impact Assessment Guidance (IPH, 2021) outlines that life-course analysis is often used in public health and reflects differing health sensitivities and needs at different ages. Typically, children and older people are particularly sensitive to change, including due to being dependants. Dependents are defined for statistical purposes as people outside the normal working age of 15-64. Dependency ratios are used to give a useful indication of the age structure of a population with young (0-14) and old (65+) shown as a percentage of the population of working age (15-64).

A low dependency ratio indicates that there is a larger proportion of working population age (15–64) years as compared to young (0-14) and old (65+). Conversely, a high dependency ratio indicates that there is a larger proportion of young (0-14) and old (65+) as compared to working population age. High dependency ratio can also indicate if some groups are more likely to be at home during the day (for example, due to childcare, or retired persons) and would therefore be more likely to be impacted by a development within the area.

Age dependency ratio are available through the Pobal Online Geo-Profiling tools (https://maps.pobal.ie/) which are based on the national Census.

The age dependency ratio for the study area is shown in Table 5.4 below. From these dependency ratios we can tell that the study area is less dependent when compared with ROI. Indicating a largely 'independent' population within the Study Area as compared ROI which can be defined as per the conceptual model as 'providing some care' to 'providing a lot of care'.

Area	Age Dependency Ratio for Census Year	
	2011	2016
State - Republic of Ireland	49.30	52.70
Dunboyne ED	32.69	32.73

Table 5.4: Age Dependency Ratio within the Study Area (Pobal Geo-Profiling, 2016 Census)

5.3.1.3 Health Status (General Health)

The CSO as part of the census records an overall self-reported measure of population health within Ireland. Areas with a poor health status are typically considered to be of a higher sensitivity and more susceptible to change in environmental conditions.

Table 5.5 below shows the Self-reported measure of population health within the Study Area compared to ROI. This shows the area predominately self reports their health as 'Very Good' in-line with national trends.

Area	% population describing their general health					
	Not Stated	Very Bad	Bad	Fair	Good	Very Good
State - Republic of Ireland	3.33%	0.29%	1.32%	8.04%	27.65	59.38%
Dunboyne ED	2.00%	0.26%	0.58%	4.97%	24.92%	67.27%

Table 5.5: Self-reported measure of population health (CSO, 2016 Census)

5.3.1.4 Ability to perform daily activities

People's ability to perform day-to-day activities is relevant to population sensitivity, particularly where there are changes in access to services or community amenities. Persons with disabilities can also be more susceptible to the changes in environmental conditions. The CSO as part of the census records an overall self-reported measure of persons with disabilities within Ireland.

Table 5.6 details the number of persons with a disability compared to the population as a whole. The data shows that the study area has a lower % of Persons with a disability than the national average; indicating that for persons within the area there is a relatively limited restrictions on daily activity.

Area	Persons with a disability	Population	% Persons with a disability
State - Republic of Ireland	643,131	4,761,865	14%
Dunboyne ED	952	10,094	9%

Table 5.6: Persons with a disability (CSO, 2016 Census)

5.3.1.5 Summary of Population Health Sensitivity

The sensitivity of the surrounding area has been considered based on the details of the published data available from CSO and Pobal. The study area has seen a population growth between the 2016 and 2022 census. The Pobal HP Deprivation Index shows the area be Marginally Above Average indicating a Low Population Sensitivity (Deprivation) within the study area.

There is a low age dependency ratio, therefore a large proportion of the population is within working age, thus considered as largely independent and judged to be not sensitive to change. The information presented above for the study area shows, a high proportion [67.27%] describes their health status as 'Very Good' and low proportion as 'bad' or 'very bad'. The data shows that the study area has a lower % of Persons with a disability than the national average; indicating that for persons within the area there is a relatively limited restrictions on daily activity.

The population within the study area is therefore not particularly sensitive to change, with a ranking of low sensitivity.

5.3.2 Location and Character of the Local Environment

The purpose of describing the location and character of the local environment provides useful information on the current local community and usage within the study area provide the Planning Authority with a context for this assessment. This includes community and social infrastructure that

covers a range of services and facilities that meet local and strategic needs and contribute towards a good quality of life. In this context it includes local business, residential areas, education, health facilities, emergency services, and places of worship, and green infrastructure.

Furthermore, the baseline identifies tourism and landscape amenity within the study Area which provides an indication on current intrinsic values placed on the area for local, national and international users that may be impacted by the Proposed Development.

The local environment also includes areas of natural resources that relate to populations and human health that may be impacted by the proposed development, this includes economic resources, recreational and bathing waters, and drinking water resources.

While a general study area of ED's within 1 km from the site location is included for population statistics, the wider area of 2.5 km from the site location has been used to inform the baseline description of the area.

5.3.2.1 Community and Social Infrastructure within the Study Area

Residential and Employment areas

The site extends to over 16.92 ha. on adjacent lands located to the south east of Dunboyne townland, Co Meath. The site is surrounded to the south, north west and east by Greenfields, by some dwellings to north and to the west, and bounded to the west by a train line which connects Dunboyne station to Dublin via the M3 Parkway Service. The site is c. 1.27km distance from the village of Dunboyne and c. 1.1km from Clonee.

According to the adopted Meath County Development Plan 2021-2027, for Dunboyne, Clonee and Pace, the subject lands are classified as A2 zones, destined for new residential areas, as such the proposed development is in alignment with the county development plan.

Notable facilities within Dunboyne, in the vicinity of the site, include but are not limited to; Dunboyne Herbal Clinic (healthcare), Dunboyne Healthcare Unit (healthcare), Ellen Chiropodist (healthcare), Dunboyne Dental Care (dental care), Josie's Botanicals (pharmaceuticals) St. Peter's GAA Dunboyne (club), Dunboyne Athletic Club (sports centre), Dunboyne Junior Badminton Club (sports centre), Dunboyne Castle (hotel), Dublin Dunboyne Castle Guest (hotel), Nally's SuperValu Dunboyne (supermarket), Lidl, ALDI, Grove Environmental Solutions Ltd (environmental), Tom Hand Cars (car dealer), Fleetplan Hire Ltd (truck rental), Sidewalk Catering, EMR Integrated Solutions(EMR Integrated Solutions), ENSTO Renley (Industrial equipment supplier), Petrochem Dunboyne (Pipe supplier), Aquachem(Water treatment supplier), Scott Bader (global composites manufacturer), Village Vets (veterinary), Floor Form Ireland (flooring contractors), Murcom (consruction), Village Vets Dunboyne (veterinarian) and a series of educational centres that will be further detailed below in the *Education, Childcare, Schools* section.

Within 2km North of the site is the Bracetown business Park, relevant to the local economy and the location of companies such as Securitas Security Services Ireland (security services), Ashdown Controls (technology, integrated systems), Drummonds (farm shop), MBM Chartered Accountants (accountability company), Runways Information Services LTD (storage facilty), PerformanSC Supply Chain (business management consultancy), Whelehan Group (distribution service), Clayton Plant Protection Ltd (Agrochemicals), Irish Pensions & Finance (finance), Bohan Solicitors (law firm), MBC Project - Oknoplast Dublin (window supplier) and Minnis Development Ltd (building firm).

To the east and north east of the site the following sites are located; AgraKepak (Corporate office, meat industry), Kepak Group Head Office (Corporate office, meat industry), EZ Living Furniture - Dublin Collection Depot (Furniture store), Dominic Fleming Electrical (electrical supply store), the IBM campus (technology), and the large Facebook Clonee Data storage facility c. 2km to 2.6km from the site. There is a large area of land, an extension of the Damastown Industrial Park in Co. Meath, zoned 'E2/E3 General Enterprise and Employment / E3 Warehousing and Distribution' under the Meath County Development Plan 2021-2027. This stretches from the Facebook data centre campus to The Hub Logistics Park.

The closest shopping centre of note is the Blanchardstown Centre c. 5.2 km south-east of the site. Dublin Airport is located c. 15 km East-North-East of the site.

There are some notable concentrations of residential settlements that occur to the west and northwest of the site across the train rails. There are also rural developments to the north, south and east from the development, predominantly in a one-off development pattern typical of their rural setting.

The nearest noise sensitive location comprise dwelling houses situated to the west of the site, across the train rails at a distance c. 100m from the site.

Education, Childcare, Schools

There are a number of primary and secondary schools in the vicinity of the proposed development including:

- Geri's Montessori (preschool) – c. 600m West
- Little Scholars Creche – c. 1.3km Northwest
- Little explorers Creche – c. 1.16km East-South-East
- Fonthill Lodge Clonee (Childcare) – c. 1.6km East
- Missus Tatty's Nursery – c. 2.5km South-East
- Links Childcare Clonee – c. 2.5km South-East
- Cocoon Childcare – c. 2.26km South-East
- Tiny Tots Montessori – c. 2km North-West
- Kidology Childcare – c. 1,8km North-North-west
- Mother Hubbard's Creche – c. 2.3km
- Little Treasures Playgroup (Creche and Montessori) – c. 2.1km South-East
- Small World Playschool and Afterschool – 2.35km South-East
- Dunboyne Senior Primary School – c. 990m North-West
- Dunboyne Junior Primary School - c. 1km North-West
- Dunboyne College of Further Education (DCFE) – c. 1.8km North-North-West
- Gaelscoil Thulach na nÓg (school) – c. 870m West-North-West
- St. Peters College – c. 840m North-West
- St. Peters National school – c. 1.3 km North-West
- Mary Mother of Hope Junior National School – 2.6km East-South-East
- Mary Mother of Hope Senior National School – c. 2.6km East-South-East
- Blanchardstown West Educate Together National School – c. 2.6km East-South-East
- Coláiste Pobail Setanta College – c. 2.4km South-East
- Scoil Ghrainne (school) – c. 2.3km South-East
- Small Steps Montessori (preschool) - c. 2.3km South-East
- Early Learners Montessori School (preschool) c. 2.35km South-East
- St. Benedict's National School - c. 2.5km South-East
- Castaheany Educate Together National School - c. 2.4km South-East

- Hansfield Educate Together National School - c. 2.5km South- South-East
- Hansfield ETSS School - c. 2.6km South- South-East

Healthcare Services

According to the HSE, the Healthcare Services within the study area provided with a GP are Dunboyne Surgery c. 1.1 km North-West, and Dunboyne Family Practitioners c. 1.4km North-West.

There are no hospitals within the study area, the nearest is Connolly Hospital Blanchardstown located c. 6.7 km to the South-East of the site.

Emergency Services

The Dunboyne Garda Station is located c. 1.4km North-West from the site and the Blanchardstown Fire Station located in Blanchardstown c. 5.3 km South-East of the site.

Places of Worship

There are two places of worship in the vicinity of the development:

- Chapel of Ease, Littlepace Church, located in Clonee c. 2.4 km East-South-East
- St. Peter and Paul's Roman Catholic Church c. 1.2 km North-West

Green Infrastructure, Landscape and Amenity, within the Study Area

The nearest noteworthy feature for recreational use is Dunboyne Park c. 1.3 km North-West which provides car parking, playground and skate park facilities, and c. 2.6km East-South-East from the site the Littlepace park which includes the Hunter's Run GAA Pitch.

In terms of landscape amenity, residential infrastructure is the dominant element at the west of the site while the south, north, east and the proposed site itself are predominantly greenfields. Considering the portion of the proposed development will be an extension of the existing dominant landscape amenity at the west of the site, the visual amenity is limited. This area can be considered of low sensitivity to the proposed development, and in alignment with the adopted Meath County Development Plan 2021-2027, for Dunboyne, Clonee and Pace, which destines the region for new residential developments. There are no listed or scenic views, no landscape or amenity designations or protected trees pertaining to the site, and no protected structures or National Monuments on the site.

Tourism within the Study Area

Tourism is returning to strong growth and continues to play a hugely influential role in Ireland's economic success.

The development site is located within Meath County which holds the Boyne Valley. Situated in the east of Ireland and only 20 minutes outside Dublin city, the Boyne Valley is known as Ireland's ancient capital and its most sacred and mythical landscape. According to the County Meath Council website (available on https://www.meath.ie/discover/discover-the-boyne-valley) the valley is home to a range of heritage sites including the UNESCO World Heritage Site at Brú na Bóinne (Newgrange and Knowth) as well as Ireland's largest Anglo-Norman castle at Trim. The County Meath website outlines tourism in the county as:

> *"From brave knights, castles and round towers to tales of emigrants, monks and ancient civilisations, Meath is brimming with stories, culture, attractions, festivals and fun."*

The development site is located in a greenfield area and is not located near any areas of significance or local tourism. Tourism is not a major industry in the immediate environs of the site.

5.3.2.2 Natural Resources within the Study Area

Geological Heritage, and Economic Resources

A review of Geological Survey Ireland online maps has shown that there is a non-metallic mineral locality in Bracetown c. 2km north from the Study area, the key mineral extracted is gravel. There are no extractive industries, active quarries, or areas of geological heritage within the Study Area.

Recreational Waters and Bathing Waterbodies

A review of Environmental Sensitivity Mapping online maps that includes the Register of Protected Areas (RPA) under the Water Framework Directive (WFD) has shown that there are no protected Recreational Waters or Bathing Waterbodies within the Study Area.

Drinking Water Resources

A review of Environmental Sensitivity Mapping and Geological Survey of Ireland online maps that includes the Water Abstraction locations, and Groundwater Source Protection Areas has been undertaken. This shows a Groundwater Source Protection Area c. 2.5km from the subject site, SI-Inner Protection Area, scientific Score: 3.00. There are a number of Water Abstraction locations shallow <10 m within the study area for Public supply (Co Co).

5.3.3 Risk of Major Accident Hazards or Disasters

The potential for a project to cause risks to human health, cultural heritage or the environment due to its vulnerability to external accidents or disasters is considered where such risks are significant, e.g. the potential effects of floods on sites with sensitive facilities. Where such risks are significant then the specific assessment of those risks in the form of a Seveso Assessment (where relevant) or Flood Risk Assessment may be required.

Landslides, Seismic Activity and Volcanic Activity

There is a negligible risk of landslides occurring at the site and in the immediate vicinity due to the topography and soil profile of the site and surrounding areas. There is no history of seismic activity in the vicinity of the site. There are no active volcanoes in Ireland so there is no risk of volcanic activity. Further detail is provided in Chapter 7 (Land, Soils, Geology and Hydrogeology).

The proposed development site is not vulnerable to landslides, seismic activity or volcanic activity. Therefore, there is no significant potential for the proposed development to cause risks to human health due to its vulnerability to landslides, seismic activity or volcanic activity.

Proximity to Seveso or Industrial Emissions Sites

The potential for major accidents to occur at the facility has also been considered with reference to establishments registered with the Health and Safety Authority in accordance with the Control of Major Accident Hazards (COMAH) Regulations that implements the implements the Seveso III Directive.

There are no significant risks in relation to the proposed development and Major Accident Hazards.

The site is not a Seveso facility and is not within the consultation distance of any Seveso facility.

Risk of Flooding

The potential risk of flooding on the site was also assessed. As stated in Section 8.3.5 of Chapter 8 (Water), JBA Consulting has undertaken a Site-Specific Flood Risk Assessment for the proposed residential development in 2023. According to the Site Specific Flood Risk Assessment, the OPW Fluvial Flood Map the 1% AEP flood event (1 in 100 year) and the 0.1% AEP flood event (1 in 1000 year) do not inundate the site. The detailed hydrological and hydraulic analysis indicates that the northern entrance road is partially located in Flood Zone B. The development design has set floor levels to the 1% AEP climate change water level, plus a freeboard allowance of at least 300mm. Further, the finished floor level provides a minimum of 150mm above surrounding ground levels to provide protection against pluvial flooding. All residential buildings have also been located in Flood Zone C, further minimising the risk of inundation. This has been confirmed with the most recent OPW flooding maps (available on www.floodinfo.ie).

5.4 Characteristics of the Proposed Development

5.4.1 Proposed Development

Permission is sought for a period of 10 Years for a proposed development on a site of approximately 16.92 Ha consisting of 716no. residential units in a mix of houses, duplex and apartment buildings ranging in height from 2 to 7 storeys overall; comprising of 155no. 2 storey houses; 517no. apartments accommodated in 8no. buildings ranging in height from 4 to 7 storeys; 44no. duplex units accommodated in 2no. 3 storey terraces; 1no. childcare facility (c.602sqm) located at ground floor level of Block B1; public open space; communal and private open space; public lighting; car parking, including basement car parking under some of the apartments; secure bicycle parking; and all associated and ancillary site development and infrastructural works, hard and soft landscaping and boundary treatment works, provision of c. 470m of new distributor road; provide a 200mm diameter watermain in existing section of southern distributor road adjacent to recently constructed Castle Farm development; upgrade of junction of southern distributor road and L2228 (Station Road) to provide a signalised junction with pedestrian crossings, including ancillary adjustments to road markings on both roads; provision of foul drainage pumping station; provision of a compensatory storage area adjacent to Castle Stream; ESB Sub-Stations; and improvement works to 2 no. roundabouts on the R147 (Old Navan Road).

5.5 Potential Impact of the Proposed Development

The main potential impacts on population and human health from the proposed development are potential for spills/leaks, air emissions, noise, visual, and traffic impacts. The baseline environment, pollution pathways, relevant mitigation measures and residual impacts have been assessed in greater detail within the corresponding specialist chapters; Chapter 7 - Land, Soils and Geology, Chapter 8 – Water, Chapter 11 - Air Quality, Chapter 14 - Air (Noise and Vibration), Chapter 15 - Landscape and Visual Impact Assessment, Chapter 16 - Material Assets (Transportation).

A summary of the main potential impacts as they are relevant to human health criteria during construction, commissioning, operation and decommissioning of the proposed development is presented herein.

5.5.1 Proposed Development

5.5.1.1 Construction Stage

Potential Impacts on Businesses and Residences

The main potential impacts on local businesses and residences associated with the Proposed Development will be in relation to nuisances; air quality, noise, visual impact and traffic. The potential impacts and mitigation measures to address them are dealt with within the corresponding chapters of this EIA Report as follows:

- Chapter 11 - Air Quality
- Chapter 14 - Air (Noise and Vibration)
- Chapter 15 - Landscape and Visual Impact Assessment
- Chapter 16 - Material Assets (Transportation)

Construction will have an indirect positive effect on support industries such as builder suppliers, construction material manufacture, maintenance contracts, equipment supply, landscaping and other local services. There will also be a need to bring in specialist workers on a regular basis that may increase the above estimated working population at times. Specialists are only likely to stay for shorter periods depending on the nature of the work. The construction phase, therefore, is considered to have the potential to have an ***imperceptible, temporary*** *and* ***positive*** impact on the economy and employment of the local and wider area.

Potential Impacts on Landscape Amenity and Tourism

There will be no impact on the local parks or the larger amenity areas. It is not anticipated the proposed development will have any impact on local tourism or shopping amenities. The proposed development able will not create any wastewater discharge which could have a potential impact on local amenities or the local population. The foul drainage has been designed such that the development be served with a series of 150mm, 225mm and 300mm diameter sewer networks in line with Irish Water Code of Practice for Wastewater .

Visual impacts and amenity impacts perceived by individual persons are highly subjective and difficult to characterise however, it is considered that the overall impact on the community will be ***Moderate Adverse to Negligible, significant*** to ***not significant*** and ***temporary*** during the construction phase. Ref. to Chapter 15 (Landscape and Visual Impact Assessment).

Potential Impact from Land and Water Emissions on Human Health

With reference to Chapter 7 (Land, Soils and Geology), during construction of the proposed development, there is a risk of accidental pollution incidences from the following sources:

- Suspended solids (muddy water with increase turbidity) – arising from excavation and ground disturbance;
- Cement/concrete (increase turbidity and pH) – arising from construction materials;
- Hydrocarbons (ecotoxic) – accidental spillages from construction plant or onsite storage;
- Wastewater (nutrient and microbial rich) – arising from accidental discharge from on-site toilets and washrooms.

Accidental spillages which are not mitigated may result in localised contamination of soils and groundwater underlying the site, should contaminants migrate through the subsoil's and impact the underlying groundwater.

With reference to Chapter 7 (Soils, Geology and Hydrogeology) the GSI Well Card Index does not show any wells drilled or springs at the site while multiple wells are located within the immediate vicinity which are mainly associated to the junction of the Dunboyne Stream and the River Tolka. None of the wells is the surrounding area listed are categorised as domestic use, and it is unlikely that any wells are used for potable supply. The site is not located near any public groundwater supplies or group schemes. There are no groundwater source protection zones in the immediate vicinity of the site. The zone in closest proximity is approximately 1.6 km to the northwest (Dunboyne PWS) and the proposed site is outside of the zone of contribution of this supply.

Even with the lack of receptors i.e., no groundwater wells in the vicinity of the site or direct pathway to surface water, the proposed development construction phase could impact Population and Human

Health due to excavation material transported from the site with no appropriate mitigation measures or in the event of an accidental pollution incidence.

In respect of the proposed development construction phase, considering the environmental factor of Soils, Geology and Hydrogeology, the predicted impact on Human Health would be ***short-term, slight,*** and ***negative***.

With reference to Chapter 8 (Water) during construction of the proposed development, there is a risk of accidental pollution incidences from the following sources:

- Increased Sediments Loading in Run-off, possibly containing increased silt levels or contaminated by construction activities
- Suspended solids (muddy water with increase turbidity) – arising from excavation and ground disturbance;
- Cement/concrete (increase turbidity and pH) – arising from construction materials;
- Hydrocarbons (ecotoxic) – accidental spillages from construction plant or onsite storage;
- Wastewater (nutrient and microbial rich) – arising from accidental discharge from on-site toilets and washrooms
- Spillage of fuels, oils, paints, etc, from machinery used on site and overall operations

The described risks could impact surface water if allowed to infiltrate to runoff to surface water systems and/or receiving watercourses. However, implementation of the mitigation measures detailed in Chapter 8 (Water) will ensure that this does not occur.

With reference to Chapter 8 (Water) the potential impact on the surface water and hydrology during construction adopting the recommended mitigation measures is considered to have a ***short-term-imperceptible*** impact with a ***negative*** impact on quality.

Potential Impact from Air Quality on Human Health

The key elements of construction of the proposed development with potential impacts on populations and human health from air quality and climate impacts are:

- Potential for Dust Soiling Effects on People and Property from general site preparation, vehicles and construction activities;
- Potential Human Health Impacts from dust (PM10 and PM2.5.) emissions from general site preparation, vehicles and construction activities;
- Engine emissions from construction vehicles, traffic and machinery.
- A change in traffic flows on road links nearby the proposed development.

In line with the UK Institute of Air Quality Management (IAQM) guidance document '*Guidance on the Assessment of Dust from Demolition and Construction'* (2014) as referenced in Chapter 11 (Section 11.3.3) the worst-case sensitivity of the area to dust soiling is considered ***high*** based on the IAQM criteria outlined in Table 11.7. Based on the IAQM criteria outlined in Table 11.8, the worst-case sensitivity of the area to human health is considered to be ***low***.

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. In terms of receptor sensitivity to dust soiling, there are no residential properties with 50m of the proposed works area, however there are sensitive receptors in proximity to junction upgrade areas. In addition, there is a newly constructed development (The Meadows, Castletown development) with sensitive receptors (about 12 properties) which are within

10 m. In addition, some residential properties are also currently under construction within the 50 m band (Block G and Block F of The Paddocks, Castletown) and have the potential to be occupied prior to the construction of the Proposed Development. A review of Dublin Airport met data has been examined to identify the prevailing wind direction and average wind speeds over a five-year period (section 11.3.1). For data collated during five representative years (2018 – 2022), the predominant wind direction is westerly to south-westerly with a mean wind speed of 5.3 m/s over the 30-year period of 1990 - 2010.

Table 11.15 of Chapter 11 shows a Summary of Dust Impact Risk used to Define Site-Specific Mitigation. This defines the Potential Impact from Dust Soiling to have a medium risk and on Human Health to have a Low Risk. Therefore, In the absence of mitigation dust impacts are predicted to be ***short-term, localised, negative*** and ***slight***.

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 TII assessment criteria in Section 11.2.2.2.

It can therefore be determined that the construction stage traffic will have an ***imperceptible, neutral*** and ***short-term*** impact on air quality and Human Health.

Potential Impact from Noise and Vibration on Human Health

Exposure to excessive noise is becoming recognised as a large environmental health concern. According to the 2015 European Commission report 'Noise Impacts on Health', (European Commission, 2015), the most common effects of noise on the vulnerable include;

- Annoyance
- Sleep Disturbance
- Heart and circulation problems
- Quality of Life
- Cognitive Process
- Hearing

It is acknowledged that humans are particularly sensitive to vibration stimuli and that any perception of vibration may lead to concern. In the case of road traffic, vibration is perceptible at around 0.5mm/s and may become disturbing or annoying at higher magnitudes. Noise and vibration impacts associated with the development have been fully considered within Chapter 14 of the EIA Report.

As detailed in Chapter 14 - Air (Noise and Vibration), noise emissions associated with the different stages of the construction phase and construction traffic at the nearest sensitive locations of the proposed development are expected to be ***negative, imperceptible*** to ***significant, short-term*** to ***medium-term***. In terms of human response, the vibration magnitudes have potential for a ***Negative, Moderate,*** and ***Brief*** effect for building occupants within 10m of road surface breaking activities.

Potential Impact from Traffic and Transportation on Human Health

The World Health Organisation Report 'Health Effects and Risks of Transport Systems: The Hearts Project' (World Health Organisation, 2006) states that road traffic is a major cause of adverse health effects - ranking with smoking and diet as one of the most important determinants of health in Europe. The report states;

> *"Traffic-related air pollution, noise, crashes and social effects combine to generate a wide range of negative health consequences, including increased mortality, cardiovascular, respiratory and stress-related diseases, cancer and physical injury. These affect not only transport users but also the population at large, with particular impact on vulnerable groups such as children and elderly people, cyclists and pedestrians"*

In the Department of Communications, Climate Action & Environment document *Cleaning Our Air – Public Consultation to Inform the Development of a National Clean Air Strategy* vehicle emissions are included as a key source of health impacts in Ireland (DOCCA&E, 2017).

Regarding the proposed development, there is potential for construction traffic to impact from a noise, vibration and dust perspective in relation to the surrounding road network due to the use of heavy vehicles and vehicles travelling along gravel roads and from general earthwork activities. There is also potential for traffic congestion, due to increased heavy good vehicles on the road network which may also perform turning movements on areas that impact on traffic. The potential for inappropriate parking, particularly along the Southern Distributor Road (SDR) whilst waiting for access to the site, may also impact local road users. There is potential of conflict between construction traffic and pedestrian/cyclists using the existing facilities on L2228 Station Road and the Southern Distributor Road. There is also potential for conflicts with pedestrian and cyclists during the extension works of the Southern Distributor Road and the improvements works to the road and junction network.

The number of construction vehicle movements is low compared to the number of vehicular trips expected to be generated by the proposed development during the operational phase. Once most of construction trips will occur outside the traditional peak hours, and it is not considered that this level of construction traffic would result in any major operational problems. No road or junction assessment for the construction phase was undertaken.

Potential Impacts from Major Accident Hazards and/or Natural Disasters on Population and Human Health

The proposed development has the potential for an impact on the health and safety of workers employed during the construction phase. The activities of the applicant's contractors during the construction phase will be carried out in accordance with the Safety, Health and Welfare at Work (Construction) Regulations 2013 (S.I. No. 291 of 2013) to minimise the likelihood of any impacts on workers' health and safety.

As outlined in Section 5.3.4 there is a negligible risk of external natural disasters; including landslides, seismic activity, volcanic activity and sea level rise. There is a negligible risk of major accidents to occur at the facility due to the lack of proximity to Seveso/Control of Major Accident Hazards (COMAH) Regulations sites.

As stated in Chapter 8 (Water) the northern entrance road is partially located in Flood Zone B. The development design has set floor levels to the 1% AEP climate change water level, plus a freeboard allowance of at least 300mm. Further, the finished floor level provides a minimum of 150mm above surrounding ground levels to provide protection against pluvial flooding. All residential buildings have also been located in Flood Zone C, further minimising the risk of inundation.

The potential effect is therefore ***imperceptible***, and unlikely, respect of Major Accident Hazards or Natural Disasters on Population and Human Health during the Construction Phase of the Proposed Development.

5.5.1.2 Operational Stage

Potential Impacts on Businesses and Residences

The main potential impacts on local businesses and residences associated with the Proposed Development will be in relation to nuisances; air quality, noise, visual impact and traffic. The potential impacts and mitigation measures to address them are dealt with within the corresponding chapters of this EIA Report as follows:

- Chapter 11 – Air Quality
- Chapter 14 – Air (Noise and Vibration)
- Chapter 15 – Landscape and Visual Impact
- Chapter 16 - Material Assets (Transportation)

The proposed development includes 716 no. dwellings. The addition of new residents to the area will improve the vibrancy and vitality of the area and will help to support existing community and social infrastructure, in addition to further supporting nearby neighbourhood centre and commercial businesses. As set out within the section 5.3 (Receiving Environment) if this chapter, there is a considerable range of existing community and social infrastructure within a 2.5 km radius from the subject site, which the proposed development will be able to avail of.

The proposed development includes a childcare facility of 602sqm) located at ground floor level of Apartment Block B1. Having regard to the nature of the scheme, of homes consisting of 1 bedroom up to 5 bedrooms proposed, the demographic profile of expected end users, the proximity of the site to a number of existing and the proposed childcare facility within the subject proposal, it is considered the proposed childcare facility along with existing and proposed childcare facilities available are sufficient to cater for the estimated increased demand for childcare services arising from the proposed development.

The proposed development will also provide significant communal amenity open space (c. 8273.19sqm) for community use, and also provision of public open space (c. 30948sqm). Accordingly, the needs of the future residents within the proposed development regarding community and cultural uses are considered to be adequately met and the provision will also support existing facilities in the area.

Once operational, the proposed development will give rise to much needed additional residential accommodation. Residents will spend a portion of their income locally which would not happen without the proposed development. The proposed development also provides for a new childcare. As such, the proposed development will provide long term job opportunities for people living in the area to operate the facility.

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

Potential Impacts on Amenity and Tourism

The proposed development once operational will have no adverse impact on local tourism or shopping amenities. The proposed development will not create any wastewater discharge which could have a potential impact on local amenities or the local population. There will be no impact on the local parks or the larger amenity areas. The development will be fully serviced with separate foul and stormwater sewers which will have adequate capacity for the facility and discharge limits as required by Irish Water licencing requirements. Discharge from the site to the public foul sewer will be sewage and grey water only due to the nature of the proposed development.

Landscape impacts associated with the proposed development throughout the Application Site, Station Road, SE Dunboyne, Dunboyne Town and South East Lowlands will be ***negligible*** to ***significant, slight adverse*** to ***slight-positive*** and ***long term.***

Potential Impact from Land and Water Emissions on Human Health

With reference to Chapter 7 (Soils, Geology and Hydrogeology), there will be an increase in hardstand as a result of the development of the facilities. Incorporation of hard stand area on previous greenfield area and the use of SUDs techniques (refer to Chapter 8) will have a minor effect on local recharge to ground; however, the impact on the overall groundwater regime will be insignificant considering the proportion of the site area in relation to the total aquifer.

In the absence of mitigation, the effect on the geological and hydrogeological environment is likely to be ***long-term, slight*** and ***negative***. The effect is considered to be 'slight' due to there will not be intervention on the geological and hydrological regime on a local or regional scale.

With reference to Chapter 8 (Water) the surface water drainage will discharge into an existing ditch network which ultimately outfalls into the Dunboyne Stream. The surface water network has been designed to provide sufficient capacity to contain and convey all surface water runoff associated with the 1 in 100 year event to the attenuation basins without any overland flooding including an additional allowance of 20% in rainfall intensities due to climate change. Storm Water Management Plan will be implemented using of various SuDS techniques to treat and minimise surface water runoff from the site. Discharge flow will be restricted to the greenfield equivalent runoff for the catchment area. Run-off systems and drainage infrastructure will be prepared to contain and intercept any accidental fuel leakage that might occur, and it is concluded that the increased hardstanding on site will have an insignificant impact on the overall hydrological regime.

Considering the implementation of mitigation measures, the potential impact during operation on Population and Human Health in respect of the environmental factor of Hydrology is ***long-term-imperceptible-neutral***. Following the TII criteria (refer to Appendix 8.1) for rating the magnitude and significance of impacts on the geological and hydrogeological related attributes, the magnitude of impact is considered ***negligible***.

Potential Impact from Air Emissions on Human Health

As outlined in Chapter 11 - 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 the protection of human 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 Chapter 11, Table 11.1). The standards for human health have designed to avoid harmful effects to health.

The potential impact of the proposed development has been assessed by modelling emissions from the traffic generated as a result of the development.

Dispersion modelling of traffic emissions at sensitive receptors in proximity to impacted road links during the operational phase indicate pollutant emissions will significantly below the ambient air quality standards. The impact to air quality as a result of increased traffic volumes during the operational phase of the proposed development will be ***long-term, localised, neutral*** and ***non-significant.***

Potential Impact from Noise and Vibration Emissions on Human Health

Exposure to excessive noise is becoming recognised as a large environmental health concern. According to the 2015 European Commission report 'Noise Impacts on Health', (European Commission, 2015), the most common effects of noise on the vulnerable include;

- Annoyance
- Sleep Disturbance
- Heart and circulation problems
- Quality of Life
- Cognitive Process
- Hearing

It is acknowledged that humans are particularly sensitive to vibration stimuli and that any perception of vibration may lead to concern. In the case of road traffic, vibration is perceptible at around 0.5mm/s and may become disturbing or annoying at higher magnitudes. Noise and vibration impacts associated with the development have been fully considered within Chapter 14 of the EIA Report.

Once operational, there are no major noise sources associated with the proposed development which is residential in nature. The range of operational activities are in line with those in the surrounding environment at nearby residential areas (e.g. local vehicle movements, amenity and play areas etc.).

None of these activities are associated with any significant noise impacts to the surrounding noise environment.

Potential Impact from Traffic and Transportation on Human Health

The World Health Organisation Report 'Health Effects and Risks of Transport Systems: The Hearts Project' (World Health Organisation, 2006) states that road traffic is a major cause of adverse health effects - ranking with smoking and diet as one of the most important determinants of health in Europe. The report states;

> *"Traffic-related air pollution, noise, crashes and social effects combine to generate a wide range of negative health consequences, including increased mortality, cardiovascular, respiratory and stress-related diseases, cancer and physical injury. These affect not only transport users but also the population at large, with particular impact on vulnerable groups such as children and elderly people, cyclists and pedestrians"*

In the Department of Communications, Climate Action & Environment document *Cleaning Our Air – Public Consultation to Inform the Development of a National Clean Air Strategy* vehicle emissions are included as a key source of health impacts in Ireland (DOCCA&E, 2017).

An assessment of the additional traffic movements associated with the proposed development during the construction and operational phases is presented in Chapter 16 Material Assets (Transportation).

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.

Potential Impacts from Major Accident Hazards and/or Natural Disasters on Population and Human Health

The proposed development has been designed with consideration given to the health and safety risks of people living and working in the vicinity. The facility has been designed by skilled personnel in accordance with internationally recognised standards, design codes, legislation, good practice and experience.

As outlined in Section 5.3.4 there is a negligible risk of external natural disasters; including landslides, seismic activity, volcanic activity and sea level rise. There is a negligible risk of major accidents to occur at the facility due to the lack of proximity to Seveso/Control of Major Accident Hazards (COMAH) Regulations sites.

As stated in Chapter 8 (Water) the northern entrance road is partially located in Flood Zone B. The development design has set floor levels to the 1% AEP climate change water level, plus a freeboard allowance of at least 300mm. Further, the finished floor level provides a minimum of 150mm above surrounding ground levels to provide protection against pluvial flooding. All residential buildings have also been located in Flood Zone C, further minimising the risk of inundation.

The potential effect is therefore ***imperceptible***, and unlikely, respect of Major Accident Hazards or Natural Disasters on Population and Human Health Operational Phase of the Proposed Development.

5.5.1.3 Do-Nothing Impact

If the proposed development is not built there will be a *neutral* effect on the land as it will remain the same. However, the area is within the adopted Meath County Development Plan 2021-2027, for Dunboyne, Clonee and Pace, the subject lands are classified as A2 zones, destined for new residential areas, so it can be presumed that some form of development would process.

5.6 Mitigation Measures (Ameliorative, Remedial or Reductive Measures)

5.6.1 Proposed Development

5.6.1.1 Construction Stage

The mitigation measures to address the potential impacts on population and human health from the proposed development have been assessed within the corresponding specialist chapters; Chapter 7 (Soils, Geology and Hydrogeology); Chapter 8 (Hydrology); Chapter 11 Air Quality and Climate, Chapter 14 (Noise and Vibration); Chapter 15 (Landscape and Visual); 16 Material Assets (Transportation).

Businesses and Residences

There are no potential likely significant impacts on Businesses and Residences therefore additional measures are not required. Any impact will be further mitigated by the use of binding hours of construction as well as the measures set out in Chapter 7 (Soils, Geology and Hydrogeology); Chapter 8 (Hydrology); Chapter 11 Air Quality, Chapter 14 (Noise and Vibration); Chapter 15 (Landscape and Visual); 16 Material Assets (Transportation).

Landscape Amenity and Tourism

With reference to Chapter 15 (Landscape and Visual), the proposed development will entail significant groundworks to facilitate construction of the residential properties. The subsoils and topsoil are to be retained on site and reused to ensure no requirement for moving material off site.

The hedgerows will be managed to remove dead, dying and dangerous branches and any colonising scrub or brier. For retained trees, the recommendations given in BS5837:2012 Guide for trees in relation to construction will be adopted to ensure site and tree safety.

The area to the south of the site towards the proposed bridge and crossing of the railway line will be graded out and retained as a grassed field with stock-proof boundary fencing. Access will be provided via a gate to the south of the proposed development. Once the grass has grown, this area will - for the period of time until bridge construction – be returned to a character that is visually comparable with the adjacent fields in the south Dunboyne area.

Land and Water Emissions

All mitigation measures outlined within the Chapter 7, and 8 will be implemented alongside a *Construction Environmental Management Plan (CEMP)*, as well as any additional measures required pursuant to planning conditions which may be imposed. The construction phase mitigation measures set out in the CEMP, these will be implemented by the construction Contractor to ensure that pollution and nuisances arising from site clearance and construction activities is prevented where possible and managed in accordance with best practice environmental protection.

Air Emissions

Mitigation measures proposed to minimise the potential effects on human health in terms of air quality during the construction phase are set out in Chapter 11, Section 11.6.1.1. These include measures for dust control at the site is to ensure that no significant nuisance occurs at nearby sensitive receptors. In order to ensure that no dust nuisance occurs a series of measures will be implemented, drawing on best practice guidance from Ireland, the UK and the USA.

Noise and Vibration Emissions

Mitigation measures proposed to minimise the potential effects on human health in terms of noise and vibration during the construction phase are set out in Chapter 14.

Provided that the mitigation measures detailed in Chapter 14 (Noise and Vibration) are put in place, such as limiting the number of high-noise activities at the closest boundary at the nearest NSLs, and best practice noise and vibration control measures will be employed by the contractor during the construction phase such as: Selection of quiet plant, noise control at source, screening, and liaison with the Public. The likelihood of a significant impact will be reduced sufficiently.

Traffic and Transportation

With reference to 16 Material Assets (Transportation) Section 16.6.2.1, a detailed Construction Environmental Management Plan (CEMP) will be prepared by the contractor. The plan will include measures to minimise the impacts associated with the construction phase upon the peak periods on the surrounding road network.

HGV trips are anticipated to arrive and depart the site at a uniform rate throughout the day, to avoid pressure on the morning and evening peak hour periods.

Care will be taken to ensure existing pedestrian and cycling routes are suitably maintained or appropriately diverted as necessary and contractors' vehicles will be facilitated to park within the development site area, in order to mitigate the impact of traffic movements on the surrounding road network. It is likely that construction will have a not significant effect on pedestrian and cycle infrastructure – causing noticeable changes in the character of the environment but without significant consequences.

Major Accident Hazards and/or Natural Disasters

The potential effect is imperceptible, and unlikely, in respect of Major Accident Hazards or Natural Disasters on Population and Human Health during the Construction Phase of the Proposed Development. Therefore, no specific mitigation measures are required.

5.6.1.2 Operational Stage

The mitigation measures to address the potential impacts on population and human health from the proposed development have been assessed within the corresponding specialist chapters; Chapter 7 (Soils, Geology and Hydrogeology); Chapter 8 (Hydrology); Chapter 11 Air Quality, Chapter 14 (Noise and Vibration); Chapter 15 (Landscape and Visual); 16 Material Assets (Transportation).

Businesses and Residences

There are no potential likely significant negative impacts on Businesses and Residences therefore additional measures are not required.

Amenity and Tourism

With reference to Chapter 15 (Landscape and Visual), the main mitigation measures will be: street trees in broad grass verges planted to create a strong green link through the development for motorists, cyclists and pedestrians, Public and Communal Open Space including extensive planting with a mix native and ornamental tree species, 10m wide buffer / riparian corridors free from new development alongside the watercourses and streams for biodiversity and habitats creation and enhancement, planting of semi-mature trees, green links, provision of playgrounds, Western boundary augmented with native planting, planting a mix of native tree species and shrub planting to create a natural and welcoming environment for residents, open spaces designed with consideration given to long-term management and Sustainable Urban Drainage Systems (SuDS) with the landscape designs working around required swales, compensation areas and retained watercourses or culverts.

Land and Water Emissions

The proposed development will provide an improvement to the local drainage catchment as it is proposed to introduce SUDs measures in compliance with the requirements of the Greater Dublin Strategic Drainage Study (GDSDS). A number of design measures (refer to Section 8.4.1.4 of Chapter 8) will be put in place to minimise the likelihood of any spills entering the water environment to include ditches, detention basins, attenuation tank and flow control devices. In the event of an accidental leakage of oil from the parking areas, this will be intercepted by the drainage infrastructure proposed and any releases to drainage will be mitigated through hydrocarbon interceptors.

Air Emissions

There is no mitigation required for the operational phase of the development as impacts to air quality are predicted to be neutral and imperceptible.

Noise and Vibration Emissions

Changes to traffic flows will not result in a perceptible increase in noise level in the surrounding environment. Therefore, no mitigation measures are necessary in this case.

The selection and location of plant items within the development buildings at the design stage will ensure that noise emissions from any mechanical and electrical building services plant do not exceed the relevant internal noise criteria for residential dwellings, therefore no further mitigation is required. Once operational noise emissions are controlled within the development site, there will be no perceptible noise impact at sensitive receivers off-site.

Traffic and Transportation

With reference to 16 Material Assets (Transportation) Section 16.6.2.2, In order to understand the traffic impact and to determine suitable mitigation measures, a `Traffic and Transport Assessment' (TTA) has been prepared by Waterman Moylan.

Regarding Junction 3, if in the future the junction doesn't be upgraded to a 4-armed signalised junction and remains as a 3-armed junction, it will require future signalisation to support the delivery of the proposed development in order to avoid delays. The results indicate that Junction 3, as a 3-armed signalised junction, would operate within capacity for the future 2041 DO SOMETHING scenario and while avoiding delays.

Regarding Junction 4, the traffic impact estimated that for the 2026 DO SOMETHING scenario would operate within capacity during both peak hours, however for the 2031 DO SOMETHING, with the inclusion of the overall proposed development, the results indicate that Junction 4 would operate above capacity during both peak hours becoming oversaturated any time in the future.

As a mitigation measure, in order to increase Junction 4 capacity to support the proposed development, an improved layout is proposed. The changes consist of the upgrade of the existing mini roundabout to a standard-sized roundabout with two circulating lanes and an ICD of 28 metres, and upgrades to the northern, western and southern approaches to comprise additional entry lanes and increased entry widths. The proposed upgraded Junction 4 has also been designed in a way to facilitate this pedestrian/cycling infrastructure. The analysis results indicate that the proposed upgraded roundabout would operate within capacity for the 2031 DO SOMETHING scenario during both peak hours and would continue to do so for the 2041 DO SOMEHING with no high delays or queue lengths expected.

Regarding Junction 5, for the 2031 DO NOTHING scenario, even without the proposed development trips in place, the results indicate that Junction 5 would operate without capacity in the PM peak hour. The 'Transportation Study at Dunboyne & Environs' (TSDE) have proposed interventions to help increase capacity along the R147 and near the M3 interchange west of Clonee, such as realignment of the junction between R147 and the R149 (the subject Junction 5), and upgrades to the Clonee West

Interchange, which include additional entry and exit slips to/from the M3 motorway. The assessment considers however that the if these interventions do not take place, in order to increase the operational capacity and support the development of the proposed residential scheme, upgrades to the north-western (R147) and north-eastern (R147), by increasing road widths, entry widths and flare lengths, may take place as part of this application.

As part of the proposed mitigation measures, a Travel Plan has been included in the subject application, describing on how to reduce car Journeys, and encouraging population to walk, cycle and use public transport rather than driving. The proposed development provides connectivity to existing facilities and public transport options and the proposed extension of the Southern Distributor Road (SDR) will also facilitate pedestrian and cyclists' progression, by connecting the proposed cycle lanes and footpaths to the existing facilities.

Major Accident Hazards and/or Natural Disasters

The potential effect is imperceptible, and unlikely, in respect of Major Accident Hazards or Natural Disasters on Population and Human Health during the Operational Phase of the Proposed Development. Therefore, no specific mitigation measures are required.

5.7 Residual Impact of the Proposed Development

5.7.1 Proposed Development

5.7.1.1 Construction Stage

Businesses and Residences

It is predicted that there will be a positive impact on local business activity during the construction phase with the increased presence of construction workers using local facilities. This job creation will result in a ***positive***, ***local*** to ***regional***, ***imperceptible***, ***short-term*** socioeconomic impact.

The presence of these site personnel in the area during the construction phase will create a slight additional demand in the area for services, particularly for food from local shops, restaurants and cafés. There will also be economic benefits for providers of construction materials and other supporting services, e.g., quarries. This is predicted to result in a ***positive, local*** to ***regional, indirect, not-significant, short-term*** socioeconomic impact.

The residual impacts on local businesses and residences in relation to air quality, noise, visual impact, and traffic has been summarised in the below sections.

Landscape Amenity and Tourism

With reference to Chapter 15 (Landscape and Visual), the significance of the residual construction stage impacts is considered to be ***Moderate Adverse to Negligible, significant*** to ***not significant*** and ***temporary.*** The Proposed Development will have no discernible effect on local tourism.

Land and Water Emissions

The implementation of mitigation measures outlined above will ensure that the residual impacts during the construction phase in respect of the environmental factor of Soils, Geology and Hydrogeology is ***short term-imperceptible-neutral*** and **negligible** in magnitude. In respect of the environmental factor of Hydrology is ***short-term-imperceptible-neutral***.

Air Emissions

As detailed in Chapter 11 Air Quality Section 11.7.1.3, 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, direct, short-term*** and ***imperceptible*** with respect to human health.

Noise and Vibration Emissions

As detailed in Chapter 14 (Noise and Vibration), during the construction phase of the project there is the potential for temporary to 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.

Following mitigation, the residual noise and vibration effects during the construction phase will be ***local, negative, slight*** to ***moderate*** and ***temporary*** to ***short-term***. The residual impact of construction vibration building occupants is determined to be of ***Negative, Imperceptible*** to ***slight*** and ***Short-Term*** effect.

Traffic and Transportation

Provided the mitigation measures and the management procedures outlined in the Construction Management Plan (CMP) are incorporated during the construction phase, the residual impact upon the local receiving environment is predicted to be ***medium-term*** in nature and ***slight negative*** in terms of effect – causing noticeable changes in the character of the environment without affecting its sensitivities.

With regards to pedestrian and cycle infrastructure, construction will have a not significant effect – causing noticeable changes in the character of the environment but without significant consequences.

Major Accident Hazards and/or Natural Disasters

There are no significant potential impacts on Human Health from Major Accident Hazards and/or Natural Disasters; therefore, there are no residual impacts.

5.7.1.2 Operational Stage

Businesses and Residences

The Proposed Development will provide modern, well-designed and sustainable housing units in the Dunboyne and area during the operational phase. The proposed development will provide a childcare facility to the wider community, as well as open spaces and communal amenity open space for community use, all of which will be of benefit to the health of the local population.

Positive impacts on population and human health will include health benefits associated with the provision of a significant number of modern, well-designed and sustainable housing units, a high-quality environment, public open space and improvements to the public realm which creates a highly permeable layout that encourages walking and cycling, amenity and recreational facilities, including use of public transport options and local retail and commercial offerings.

The proposed development will enhance the local area by providing a childcare facility that will strengthen the social and community infrastructure of the area and provide employment opportunities.

The proposed development does not represent a loss of land that would otherwise be used for an alternative purpose. The proposed development will be located in residential zoning lands and aligns with the Meath County Development Plan 2021-2027, for Dunboyne, Clonee and Pace.

As such, the Proposed Development will result in a ***positive, significant*** and ***long term*** impact.

The predicted impacts on local businesses and residences in relation to air quality, noise, visual impact, and traffic has been summarised below.

Amenity and Tourism

With reference to Chapter 15 (Landscape and Visual), while recognising there are localised significant landscape and visual impacts, the proposed development, while sizeable, can be accommodated and absorbed into this part of Dunboyne without causing significant detrimental or unacceptable landscape or visual effects. Also, the proposed development, associated parklands, open space and public realm landscapes and additional planting to far more significant vegetation cover on this site than it had a present, will include positive and significant elements that will contribute to the amenity, character and broader environment of this part of Dunboyne.

The residual impact of the proposed development is considered to result in a ***positive, slight,*** and ***long-term*** impact for operational phase. The Proposed Development will have no discernible effect on local tourism.

Land and Water Emissions

The implementation of mitigation measures outlined above will ensure that the residual impacts during the operational phase in respect of the environmental factor of Soils, Geology and Hydrogeology is ***long-term-imperceptible-neutral*** and ***negligible*** magnitude***.*** In respect of the environmental factor of Hydrology is ***long-term-imperceptible-neutral*** and ***negligible*** magnitude***.***

Air Emissions

As detailed in Chapter 11 Air Quality, air dispersion modelling was undertaken to assess the impact of the development with reference to EU ambient air quality standards which are based on the protection of human health. As demonstrated by the dispersion modelling results, the emissions of air pollutants during the operational phase are predicted to be significantly below the ambient air quality standards, which are based on the protection of human health. Therefore, residual impacts to human health related to air quality will be ***long-term, localised, neutral and non-significant***.

Noise and Vibration Emissions

Regarding traffic noise levels, the predicted impact is expected to be ***Negative, Not Significant*** to ***Slight*** and ***Long-term,*** in the context of the existing noise environment and of traffic noise level at the nearest NSLs to the distributor road linking.

Regarding mechanical and electrical plant noise, once operational noise emissions are controlled within the development site, noise emissions outside the site will be imperceptible. The residual noise effect is **Neutral**, ***Imperceptible*** and ***Long Term***.

The proposed development will not generate any perceptible levels of vibration during operation and therefore there will be no impact from vibrations on human health.

Traffic and Transportation

The analysis of the road network has shown that the existing and proposed upgraded junctions would operate within capacity for the 2041 DO SOMETHING scenario during both the AM and PM peak hours. The proposed upgraded junctions would also be able to cater for the additional traffic demand arising from the residential zoned lands in Dunboyne (2041 Sensitivity Analysis).

Whilst the estimated increase in traffic over the baseline conditions is considered moderate, the proposed upgraded junctions would have a ***positive*** impact in terms of quality, increasing the capacity

of the road network to accommodate the proposed and potential future developments, and would be ***medium/long-term*** in terms of duration.

The extension of the Southern Distributor Road and provision of adequate pedestrian and cyclist facilities as part of the proposed development, will results in a ***positive*** and ***permanent*** effect in terms of sustainable transport options.

Major Accident Hazards and/or Natural Disasters

There are no significant potential impacts on Human Health from Major Accident Hazards and/or Natural Disasters; therefore, there are no residual impacts.

5.7.2 Cumulative

The potential for cumulative impact of the proposed development with any/all relevant other planned or permitted developments are discussed in Sections 5.7.2.1, 5.7.2.2 and 5.7.2.3 below for construction and operational phases.

The likely cumulative impact of the proposed development in conjunction with these cumulative developments upon health in relation to noise, dust generation, construction traffic, visual impacts, etc., associated with the works; have been assessed in the respective EIA Report Chapters.

5.7.2.1 Construction Stage

In a worst-case scenario, multiple developments in the area could be developed concurrently or overlap in the construction phase and contribute to additional impacts in terms of traffic, dust, and noise.

The implementation of mitigation measures within each chapter and detailed in Section 5.5.1; as well as the compliance of adjacent development with their respective planning permissions, will ensure there will be minimal cumulative potential for change in soil quality or the natural groundwater regime during the construction phase of the proposed development. The cumulative impact is considered to be ***neutral*** and ***imperceptible***.

Regarding Water impacts, the implementation of the mitigation measures contained CEMP will result in minimal cumulative potential for change in surface water quality or the natural hydrological regime. The cumulative impact is considered to be ***neutral*** and ***imperceptible***.

There are no predicted cumulative impacts arising from the construction phase of the proposed development respective to Traffic.

Contractors for the Proposed Development will be contractually required to operate in compliance with a project-specific CEMP and Construction Traffic Management Plan which will include the mitigation measures outlined in this EIA Report. The construction phase for the overall development of the applicant owned lands would be restricted by the same binding limits for noise, dust, and emissions to water.

According to the IAQM guidance (2014) should the construction phase of the proposed development coincide with the construction phase of any other developments within 350m then there is the potential for cumulative construction dust related impacts to nearby sensitive receptors. However, provided the mitigation measures outlined in Section **Error! Reference source not found.** and Appendix 11.1, are implemented throughout the construction phase of the proposed development significant cumulative dust impacts are not predicted. The predicted residual cumulative air quality impacts during the construction phase are ***short-term, direct, negative, localised and imperceptible.***

The residual noise and vibration impact from the various projects with potential for cumulative impacts have been assessed. There are no residual significant cumulative impacts forecast. The residual effects are ***negative, slight*** to ***moderate*** and ***temporary to short-term***.

5.7.2.2 Operational Stage

Regarding chapter 7 (Soils), there are no other large projects proposed within this area of the aquifer so no cumulative impact on recharge to the aquifer. All developments are required to manage groundwater discharges. As such there will be no cumulative impact to groundwater quality and therefore there will be no cumulative impact on the Groundwater Body Status. The operation of the proposed development is concluded to have a ***long-term***, ***imperceptible*** significance with a ***neutral*** impact on soil and water quality.

All developments are required to manage groundwater discharges in accordance with S.I. 272 of 2009 and S.I. 77 of 2019. As such there will be no cumulative impact to groundwater quality and therefore there will be no cumulative impact on the Surface Waterbody Status. The cumulative impact is considered to be ***neutral*** and ***imperceptible***

The cumulative impact for air emissions is included within the operational stage impact for the proposed development. The impact is predicted to be ***long-term, negative*** and ***imperceptible*** with regards to air quality.

The residual noise and vibration impact associated with the operational phase of the proposed project and the projects assessed for cumulative impacts are ***negative, not significant*** and ***long-term***.

5.7.2.3 Worst Case Impact

In respect to Landscape, the assessment of effects is based on the worst-case scenario where the proposed development would be most visible.

In respect to Air Emissions, the assessment of effects is based on the worst-case scenarios.

In respect to Noise and Vibration, the assessments have all determined with the inclusion of potential worst case scenarios, no significant effects are likely to occur.

There was no specific modelling carried out for a worst-case impact scenario, however, it is very much likely that, should the construction of all zoned lands occur simultaneously, given its existing condition, there will be significant traffic displacement in the studied local road network.

5.8 Monitoring

5.8.1 Proposed Development

5.8.1.1 Construction Stage

During construction phase the following monitoring measures will be implemented:

- Daily visual inspection will be undertaken by the contractor at the silt trap/ settlement tank.
- 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 10 m from surface water receptors.
- Regular inspection of surface water run-off and any sediment control measures
- Regular auditing of construction / mitigation measures
- The Principal Contractor or equivalent must monitor the contractors' performance to ensure that the proposed mitigation measures are implemented, and that dust impacts and nuisance are minimised;
- For air quality, drop heights from conveyors, loading shovels, hoppers and other loading equipment will be minimised, if necessary fine water sprays should be employed.
- 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;

- Spot check noise monitoring may be required where the construction noise thresholds have the potential to be exceeded at NSLs.
- Regular monitoring will be undertaken to determine success of landscape operations and ensure they are behaving in the manner anticipated at design stage. If required, elements of the design can be adapted to accommodate changes required by actual field experience.
- Construction vehicles routes and parking.
- Internal and external road conditions.
- Construction activity hours of work.

5.8.1.2 Operational Stage

- Carparking capacity and associated occupancy.
- Cycle parking capacity and associated occupancy.
- Public transport serving the area, including location of closest bus stops, service frequency and routes, and commuting times from key destinations.
- Travel Plan (must be reviewed and updated in regular intervals)

5.9 Reinstatement

5.9.1 Proposed Development

5.9.1.1 Construction Stage

There will be no reinstatement with regard to Human Health required at the proposed development.

5.9.1.2 Operational Stage

There will be no reinstatement with regard to Human Health required at the proposed development.

5.10 Difficulties Encountered

No particular difficulties were encountered in preparing the population assessment.

There are uncertainties in relation to assessing impacts on individuals or communities due to the lack of individual health data and the difficulty in predicting effects, which can only be based on general guidance and assumptions.

Forecasting methods and methodology, if any, are set out within the specialist chapters that this assessment relies upon.

6 BIODIVERSITY

The Biodiversity assessment has been undertaken by Altemar Limited. It assesses the biodiversity value of the proposed development area and the potential impacts of the development on the ecology of the surrounding area and within the potential zone of influence (ZOI). Standard construction and operational phase control measures, in addition to monitoring measures are detailed, to minimise potential effects of the proposed development and to improve the biodiversity potential of the proposed development site post construction.

6.1 Introduction

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 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 Natura 2000 sites, Annex species or Annex habitats. It concludes that *'Out of an abundance of caution and in a strict application of the precautionary principle, it has been concluded that effects on the integrity of South Dublin Bay SAC, North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA are likely from the proposed works in the absence of mitigation measures, primarily as a result of the hydrological connection to the site via dust and contaminated surface water drainage to onsite drainage ditches and watercourses traversing through the subject site, which outfall to the River Tolka, which in turn outfalls to the marine environment at Dublin Bay. For this reason, an NIS was carried out to assess whether the proposed project, either alone or in combination with other plans or projects, in view of best scientific knowledge and in view of the sites' conservation objectives, will adversely affect the integrity of the European Site. All other Natura 2000 sites were screened out at initial screening.*

Following the implementation of the mitigation measures outlined, the construction and operation of the proposed development will not result in direct, indirect, or in-combination effects which would have the potential to adversely affect the integrity of the qualifying interests/special conservation interests of the European sites screened in for NIS with regard to the range, population densities or conservation status of the habitats and species for which these sites are designated (i.e. conservation objectives).'

6.1.1 Quality Assurance and Competence

Altemar Ltd. is an established environmental consultancy that is based in Greystones, Co. Wicklow that has been in operating 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 28 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 in addition to numerous housing developments.

6.1.2 Description of the Proposed Development

The proposed development on a site of approximately 16.92Ha consisting of 716no. residential units in a mix of houses, duplex and apartment buildings ranging in height from 2 to 7 storeys overall; comprising of 155no. 2 storey houses; 517no. apartments accommodated in 8no. buildings ranging in height from 4 to 7 storeys; 44no. duplex units accommodated in 2no. 3 storey terraces; 1no. childcare

facility (c.602sqm) located at ground floor level of Block B1; public open space; communal and private open space; public lighting; car parking, including basement car parking under some of the apartments; secure bicycle parking; and all associated and ancillary site development and infrastructural works, hard and soft landscaping and boundary treatment works, provision of c. 470m of new distributor road; provide a 200mm diameter watermain in existing section of southern distributor road adjacent to recently constructed Castle Farm development; upgrade of junction of southern distributor road and L2228 (Station Road) to provide a signalised junction with pedestrian crossings, including ancillary adjustments to road markings on both roads; provision of foul drainage pumping station; provision of a compensatory storage area adjacent to Castle Stream; ESB Sub-Stations; and improvement works to 2 no. roundabouts on the R147 (Old Navan Road).

6.2 Assessment Methodology

A pre-survey biodiversity data search was carried out in March 2021 and updated in June 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. Four site surveys of the site were undertaken within the appropriate seasonal timeframe for terrestrial fieldwork. Field surveys were carried out as outlined in Table 6.1. All surveys were carried out in the appropriate seasons.

Area	Surveyors	Survey Dates
Terrestrial Ecology	Bryan Deegan (MCIEEM)	03rd September 2021, 22nd April 2022 23rd April 2023
Bat Fauna	Bryan Deegan (MCIEEM)	3rd September 2021, 22nd April 2022, 01st June 2023
Mammal Assessment	Bryan Deegan (MCIEEM)	20th March 2021, 22nd April 2022, 23rd April 2023
Amphibian Survey	Bryan Deegan (MCIEEM)	20th March 2021, 22nd April 2022,23rd April 2023.
Brid Assessment	Bryan Deegan (MCIEEM)	20th March 2021, 03rd September 2021, 22nd April 2022, 23rd April 2023.

Table 6.1. Field Surveys

Desk studies were carried out to obtain relevant existing biodiversity information within the ZOI. The assessment also extends beyond the immediate development area to include those species and habitats that are likely to be impacted upon by the project. Given the scale of the proposed development, the nature of the construction works (which include in-stream and culverting works), and recognising that it is proposed to direct surface water drainage to onsite watercourses, drainage ditch and surface water network that outfall to the River Tolka and ultimately the marine environment at Dublin Bay, it is considered that out of an abundance of caution in line with precautionary principle (EC,2000)[1] the potential ZOI of the proposed works extends beyond the site outline to include the onsite watercourses, the River Tolka, and designated conservation sites located within Dublin Bay. The proposed layout, drainage strategy and landscape design were reviewed to inform this assessment. Further, Chapter 3 Description of Proposed Development (including Planning Policy Context), Chapter 7 Land, Soils and Geology, Chapter 8 Water, Chapter 9 Climate (Air Quality & Climate), Chapter 12 Air (Noise and Vibration), Chapter 13 Landscape and Visual Impact Assessment, Chapter 14 Material Assets (Transportation), Chapter 15 Material Assets (Waste), and Chapter 16 Material Assets (Utilities) of this submission were reviewed.

[1] Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC.

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

The designated conservation sites within 15km, and beyond 15km with the potential for a direct or indirect pathway, of the site were examined for potential impact. This assessment included sites of international importance; Natura 2000 sites (Special Areas of Conservation (SAC), Special Protection Areas (SPA)) and Ramsar sites and sites of National importance ((Natural Heritage Areas (NHA), proposed Natural Heritage Areas (pNHA). Up to date GIS data (2023 NPWS data shapefiles) were acquired and plotted against 1, 5, 10 and 15km buffers from the proposed development site. A data search of rare and threatened species within 10km of the proposed site (GIS shapefile) was provided by NPWS. Additional information on rare and threatened species was researched through the National Biodiversity Data Centre maps.

6.2.2 Terrestrial and Avian Ecology

A pre-survey data search was carried out. This included a literature review to identify and collate relevant published information and ecological studies previously conducted and comprised of information from the following sources; the National Parks and Wildlife Service, NPWS Rare and Protected Species Database, National Biodiversity Data Centre, EPA WMS watercourses data, in addition to aerial, 6 inch, satellite imagery. Following the desktop study, walk-over assessments of the site were carried out on the 20th March 2021, 03rd September 2021, 22nd April 2022, 23rd April 2023 and 01st June 2023. The presence of mammals is indicated principally by their signs, such as resting areas, feeding signs or droppings - though direct observations are also occasionally made. Habitat mapping was carried out according to Fossitt (2000) using AcrGIS 10.5 and displayed on Bing satellite imagery or street mapping. Any rare or protected species or habitats were noted. As part of the fieldwork an invasive species assessment was carried out. Birds noted on site were classed based on the Birds of Conservation Concern in Ireland classification of red, amber and green, which is based on an assessment of the conservation status of all regularly occurring birds on the island of Ireland.

6.2.3 Bat Fauna

Onsite trees and walls were inspected for bats and/or their signs using a powerful torch (141 Lumens) – Petzl MYO RXP. The site surveys were supplemented by a review of Bat Conservation Ireland's (BCIreland) National Bat Records Database. Bat detector and emergent surveys were carried out by Bryan Deegan on the 3rd September 2021, 22nd April 2022, and 01st June 2023.

6.2.4 Rating of Effects

The terminology for rating impacts is derived from the EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports (2022).

6.2.5 Difficulties Encountered

No difficulties were encountered in relation to the preparation of the Biodiversity report. The bat surveys were undertaken within the active bat period (April to September) and a detector survey was possible. Insects were observed in flight during the bat survey. Flora, amphibian, habitat and mammal assessments were carried out within the optimal survey period.

6.2.6 Consultation

Consultation was carried out with the project team in relation to the proposed project. Rare and protected species data was acquired from the National Parks and Wildlife Service (NPWS).

6.3 Receiving Environment

6.3.1 Zone of Influence

The potential ZOI of the project was deemed to be the site within the site outline with potential for downstream impacts to the marine environment via the proposed in-stream works and foul and surface water drainage strategy. This site outline is shown in figure 6-1.

6.3.2 Designated sites

As can be seen from Figures 6.2 (SAC's within 15km), 6.3 (SPA's within 15km), 6.4 (NHA and pNHA within 15km), 6.5 (Watercourses proximate to the site), there is one Natura 2000 site (Rye Water Valley/Carton SAC) within 15km and three National conservation sites (Royal Canal pNHA, Rye Water Valley/Carton pNHA, and Liffey Valley pNHA) within five kilometres of the proposed development site. The distance and details of the conservation sites within 15km of the proposed development, and beyond 15km with the potential for a hydrological pathway, are seen in Table 6.2a and Table 6.2b. There is an indirect hydrological pathway to designated conservation sites located within Dublin Bay via the proposed foul and surface water drainage strategy. Foul wastewater drainage will be directed to a network that ultimately discharges to Ringsend Wastewater Treatment Plant (WwTP). Foul wastewater will be treated along this network. After attenuation onsite, surface water drainage from the development will be directed to the onsite watercourse, drainage ditch and surface water network, which outfalls to the River Tolka and ultimately the marine environment at Dublin Bay. Given the scale of the proposed development and the fact that in-stream works are proposed, in the absence of mitigation, there is the potential for downstream impacts on designated conservation sites located within Dublin Bay during the construction and operational phases of development via pollution during in-stream works and contaminated surface water runoff which may enter the River Tolka. Watercourses and designated conservation sites located proximate to the proposed development site are demonstrated in Figures 6.6-6.12.

Natura 2000 Site	Distance	Direct Hydrological / Biodiversity Connection
Special Areas of Conservation		
Rye Water Valley/Carton SAC	4.5 km	No
South Dublin Bay SAC	18.3 km	No (indirect)
North Dublin Bay SAC	19.1 km	No (indirect)
Special Protection Areas		
South Dublin Bay and River Tolka Estuary	16.2 km	**Yes**
North Bull Island	19.1 km	No (indirect)

Table 6.2a. Natura 2000 sites within 15km, and beyond 15km with the potential for a hydrological pathway, of the proposed development

Designation	Conservation Sites	Distance	Direct Hydrological / Biodiversity Connection
pNHA	Royal Canal	2.9 km	No
pNHA	Liffey Valley	4.3 km	No
pNHA	Rye Water Valley/Carton	4.9 km	No
pNHA	Grand Canal	8.6 km	No
pNHA	North Dublin Bay	16 km	No (indirect)
pNHA	South Dublin Bay	18.2 km	No (indirect)
pNHA	Dolphins, Dublin Docks	18.9 km	No
Ramsar	Sandymount Strand / Tolka Estuary	18.3 km	**Yes**

Ramsar	North Bull Island	19.3 km	No (indirect)

Table 6.2b. Nationally designated and Ramsar sites within 15km, and beyond 15km with the potential for a hydrological pathway, of the proposed development

Figure 6.1 – Proposed Development Site (approximate site area in red)

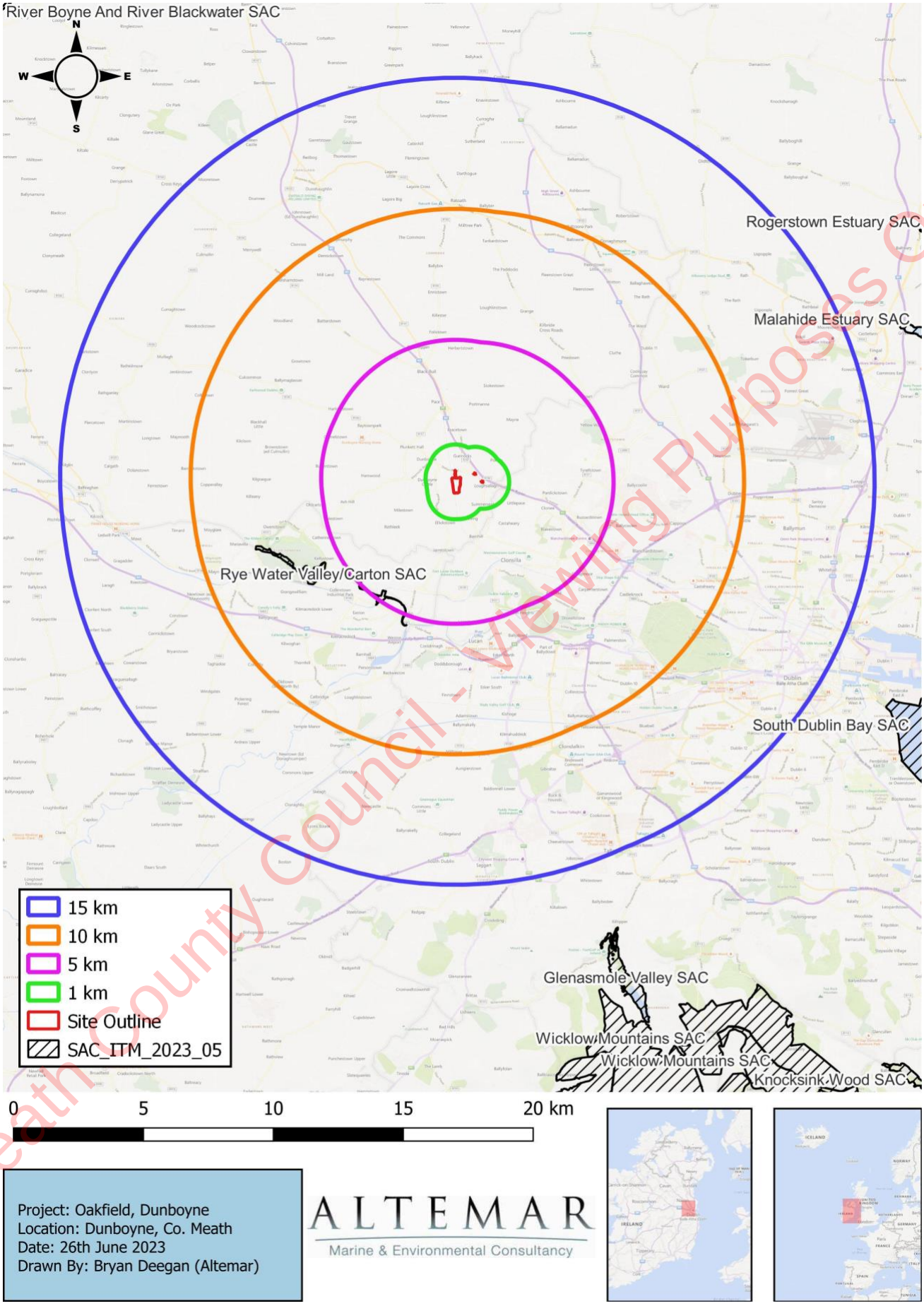


Figure 6.2 – Special Areas of Conservation within 15km

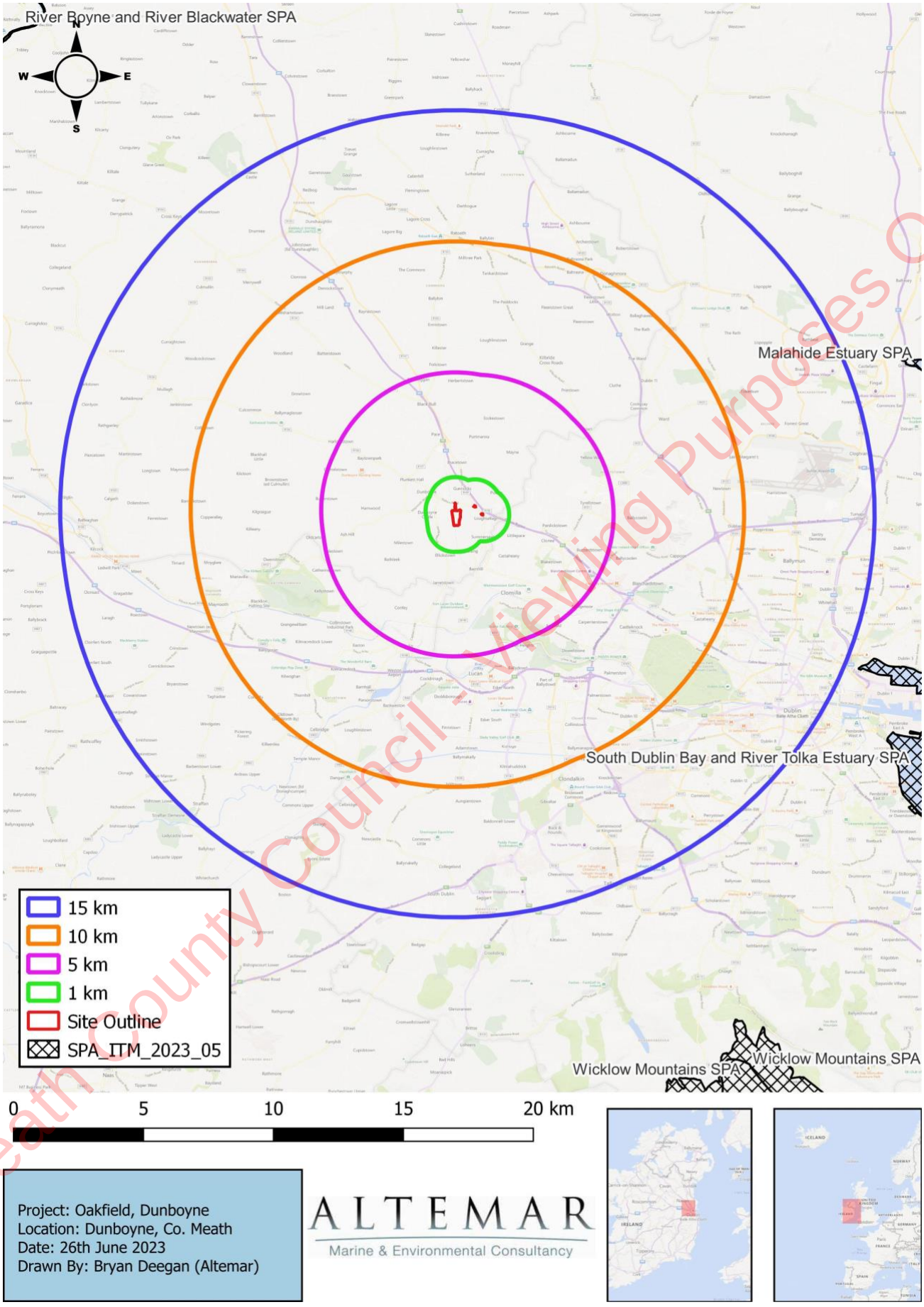


Figure 6.3– Special Protection Areas within 15km

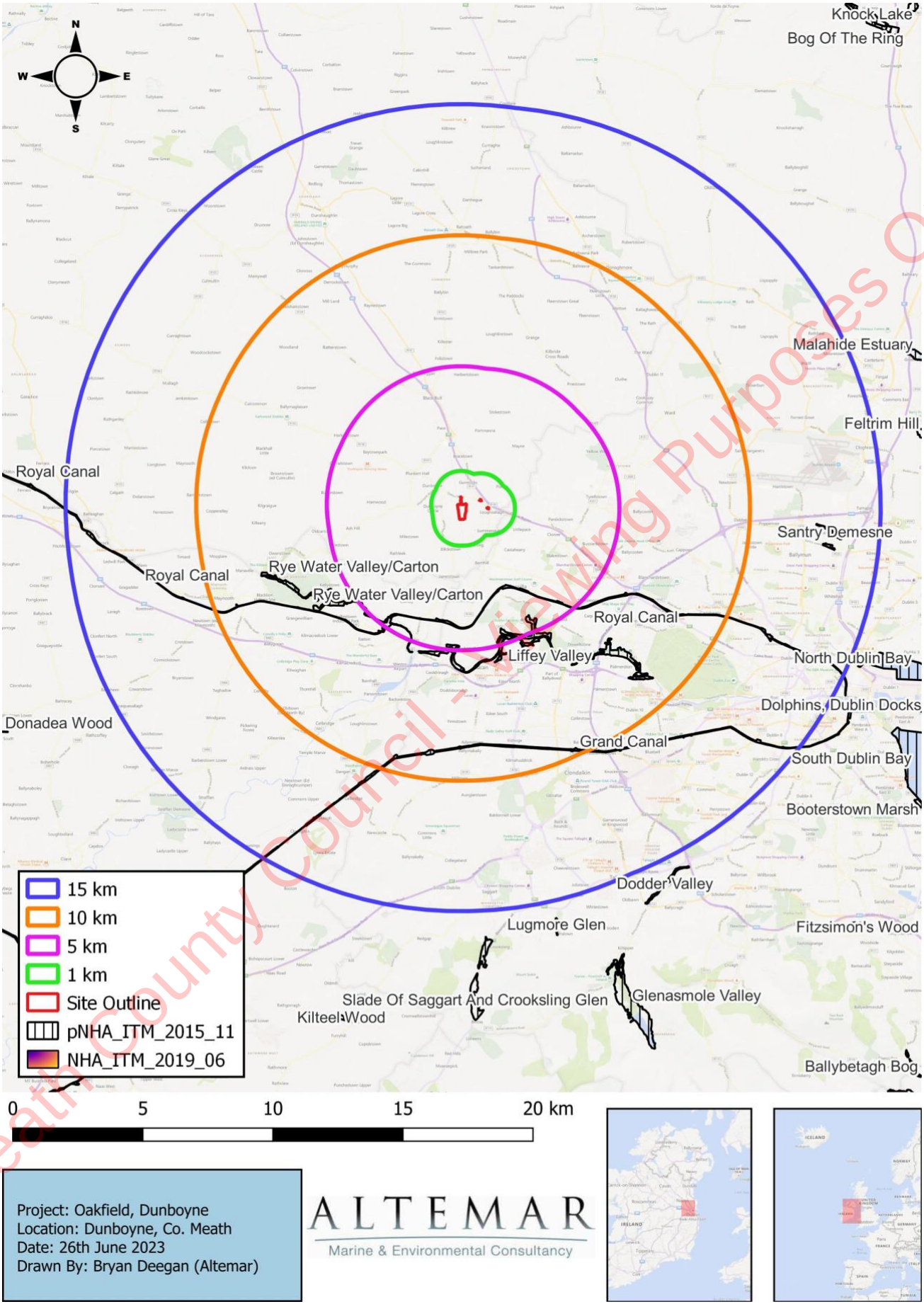


Figure 6.4 – Natural Heritage Areas and proposed Natural Heritage Areas within 15km.

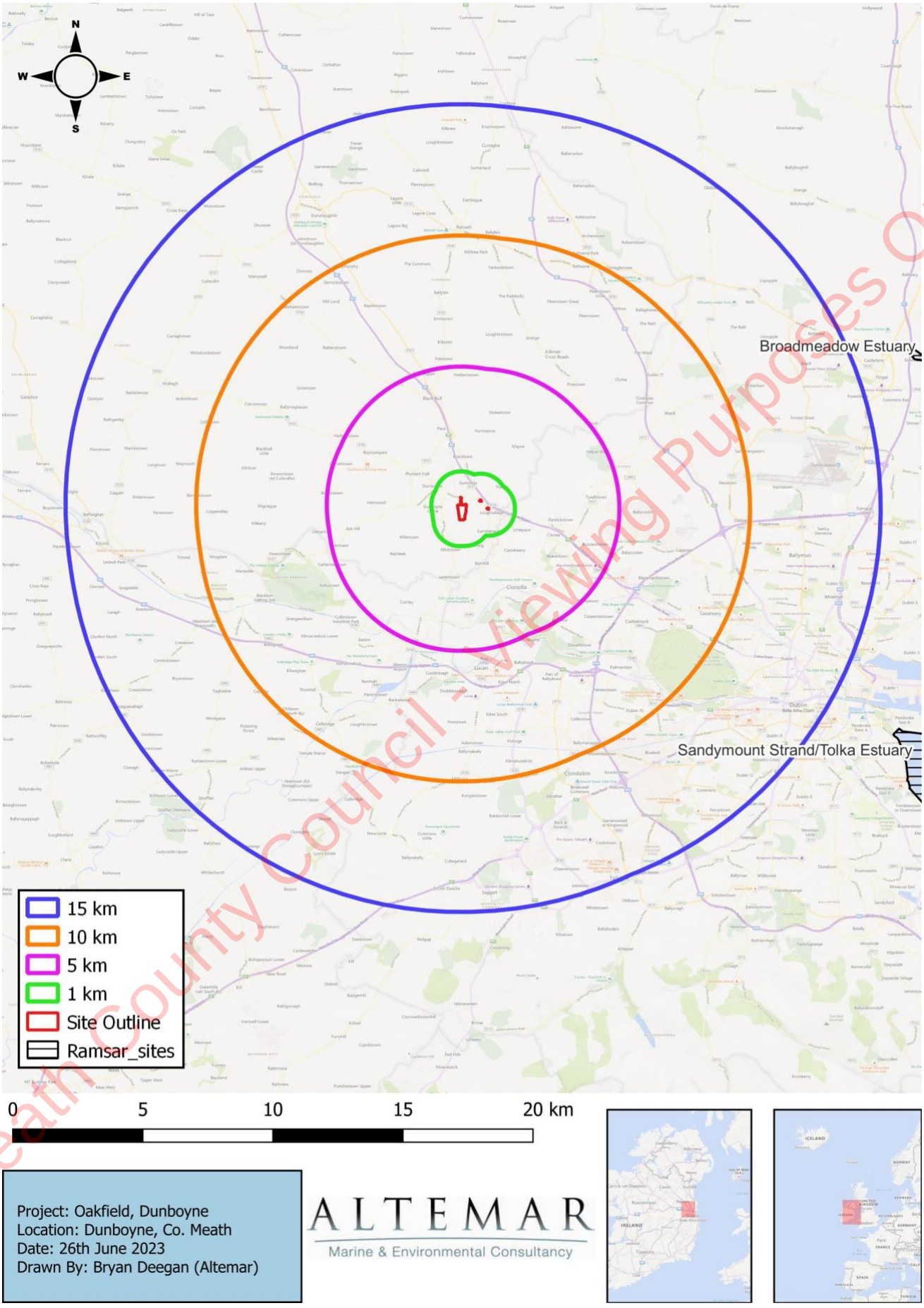


Figure 6.5 – Ramsar Sites within 15km

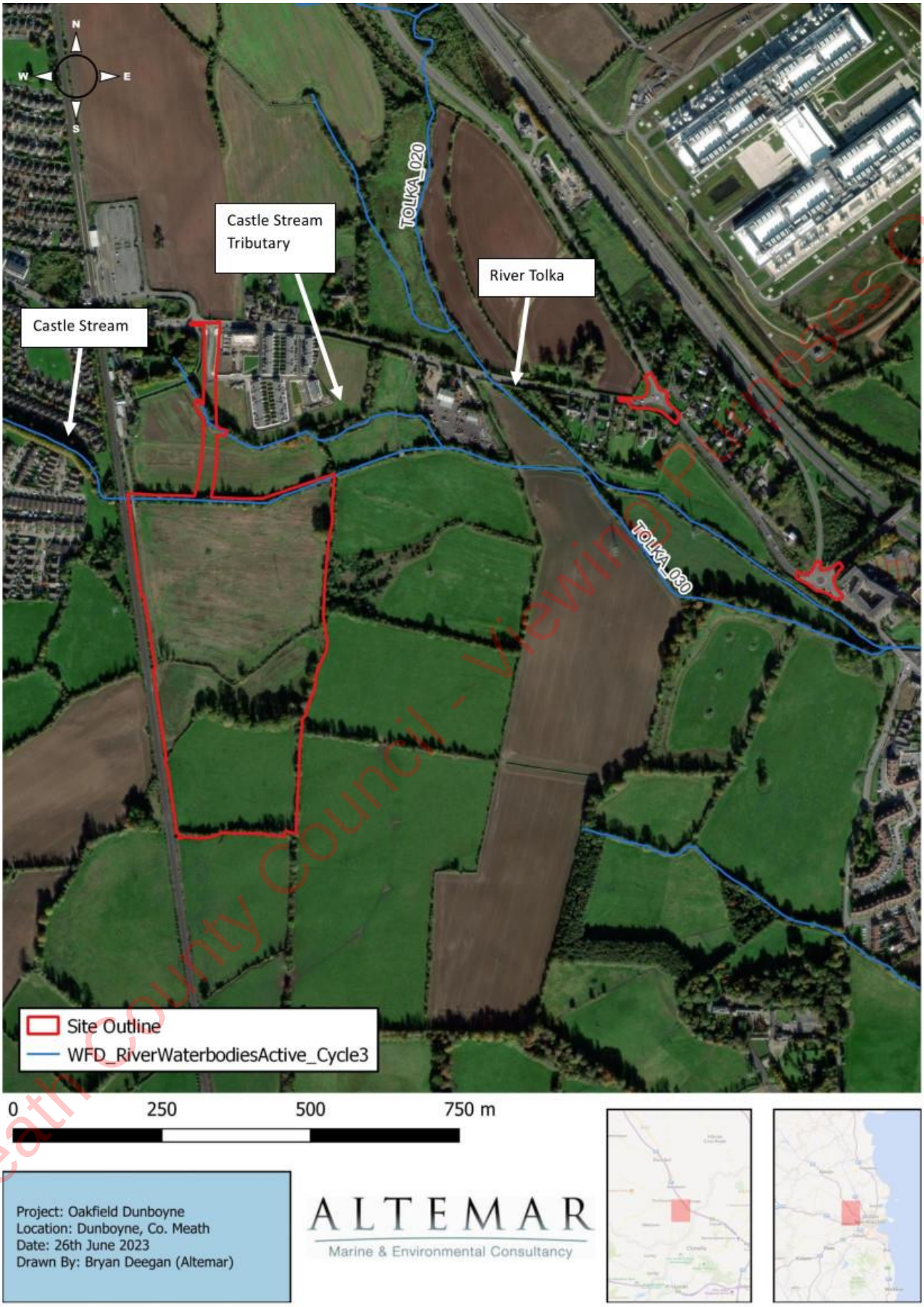


Figure 6.6 – Watercourses within the subject site

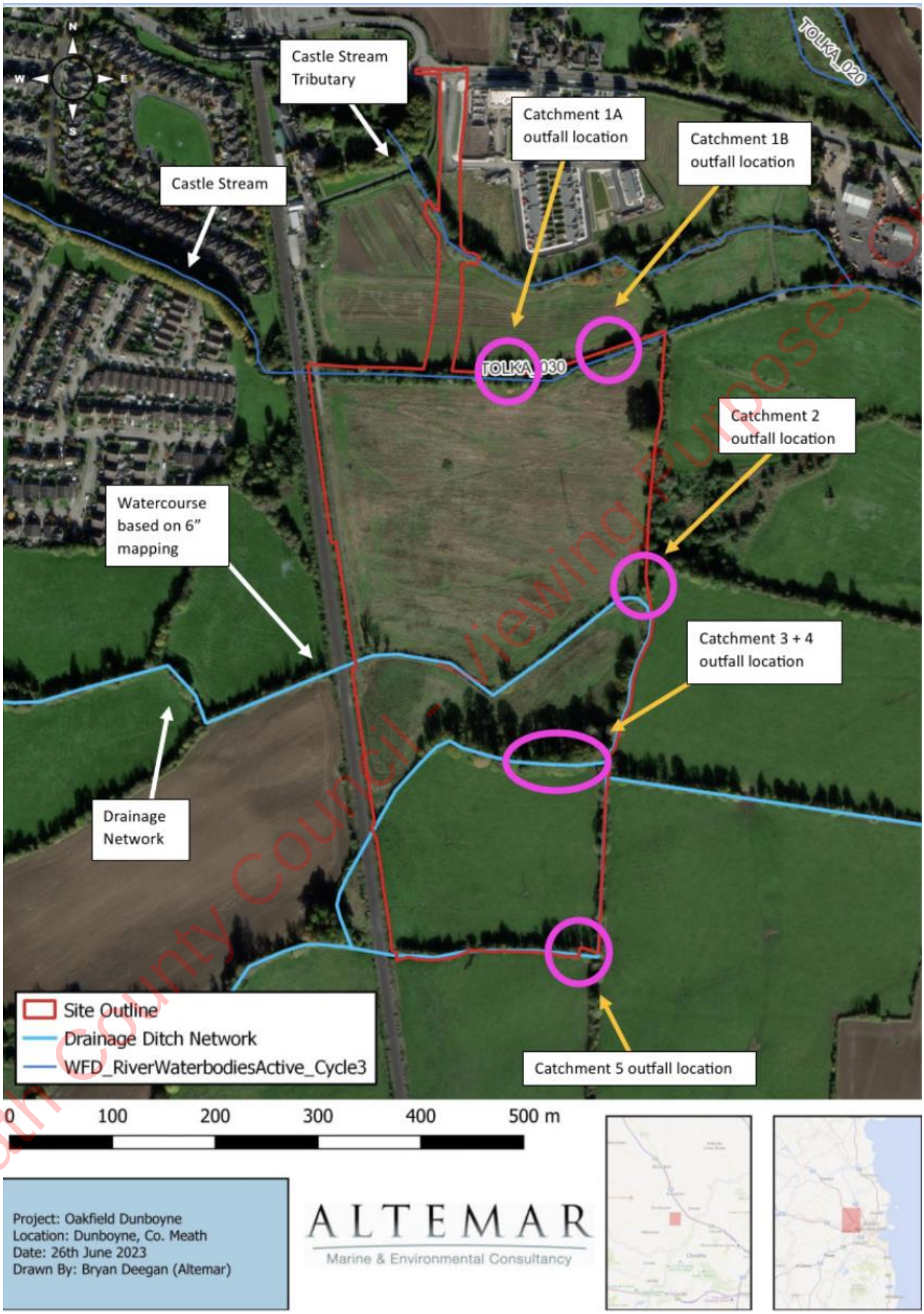


Figure 6.7 – Watercourses and drainage ditches within the subject site

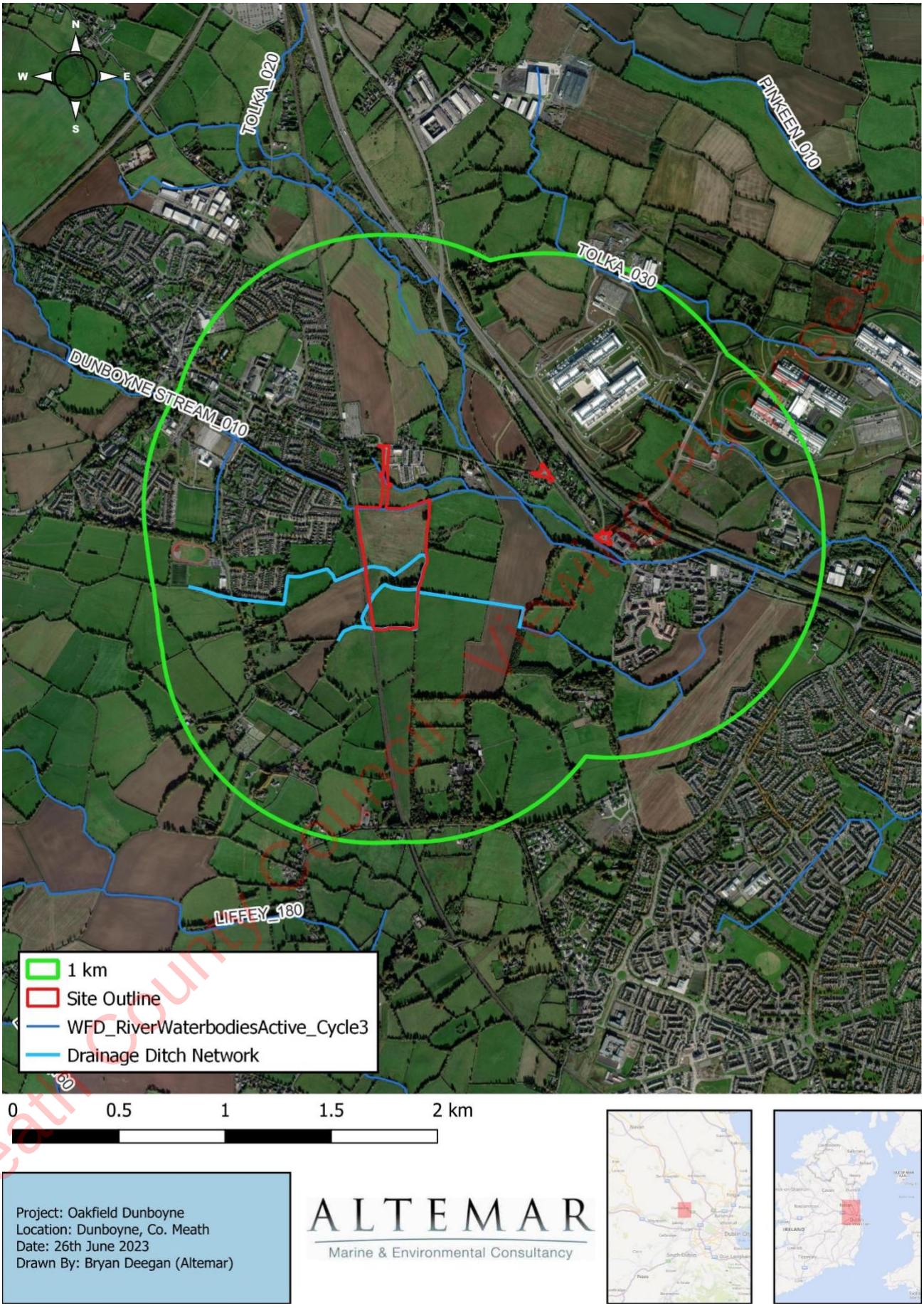


Figure 6.8 – Watercourses and drainage ditches within 1km of the subject site

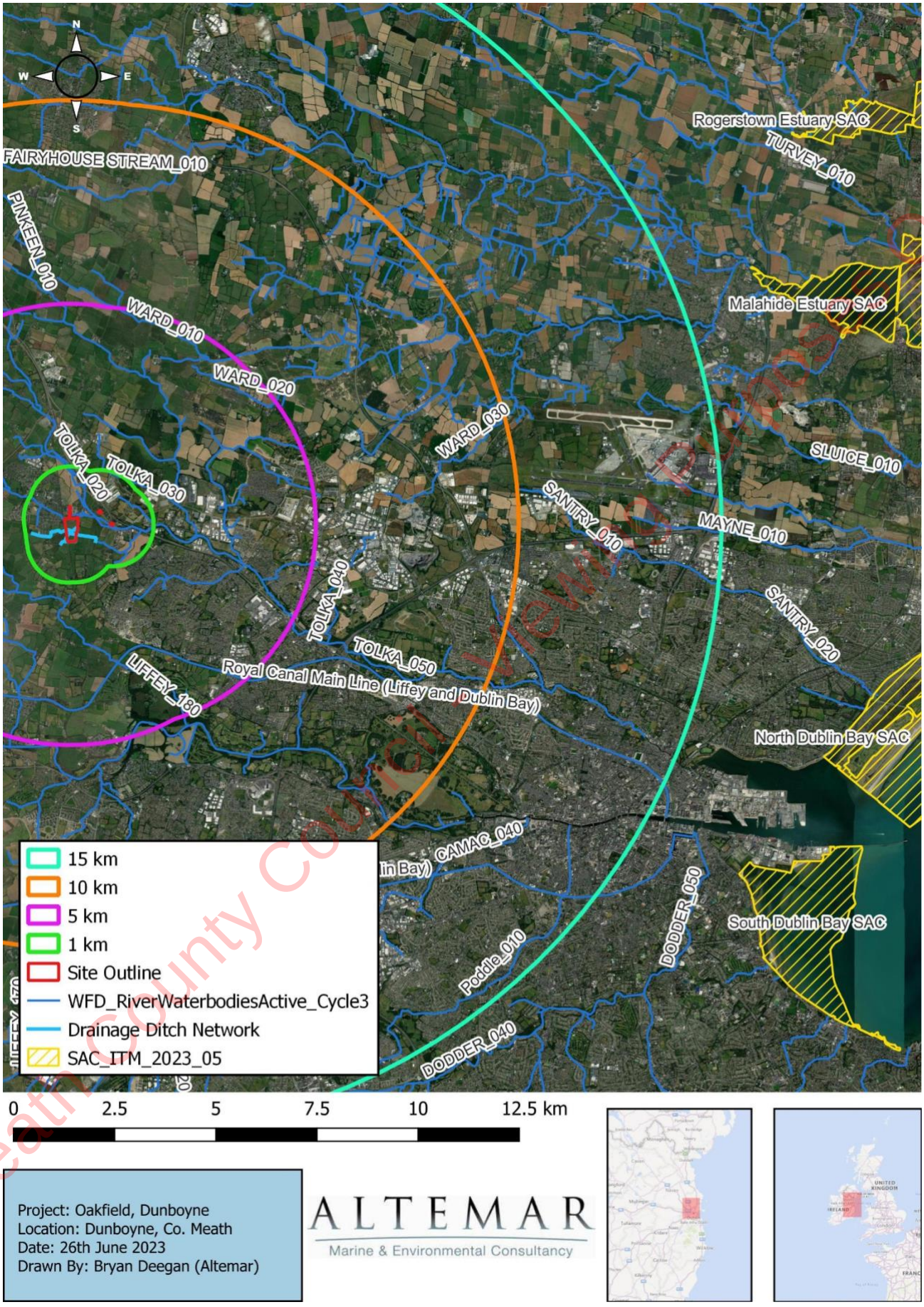


Figure 6.9 – Watercourses and SACs with the potential for a hydrological connection

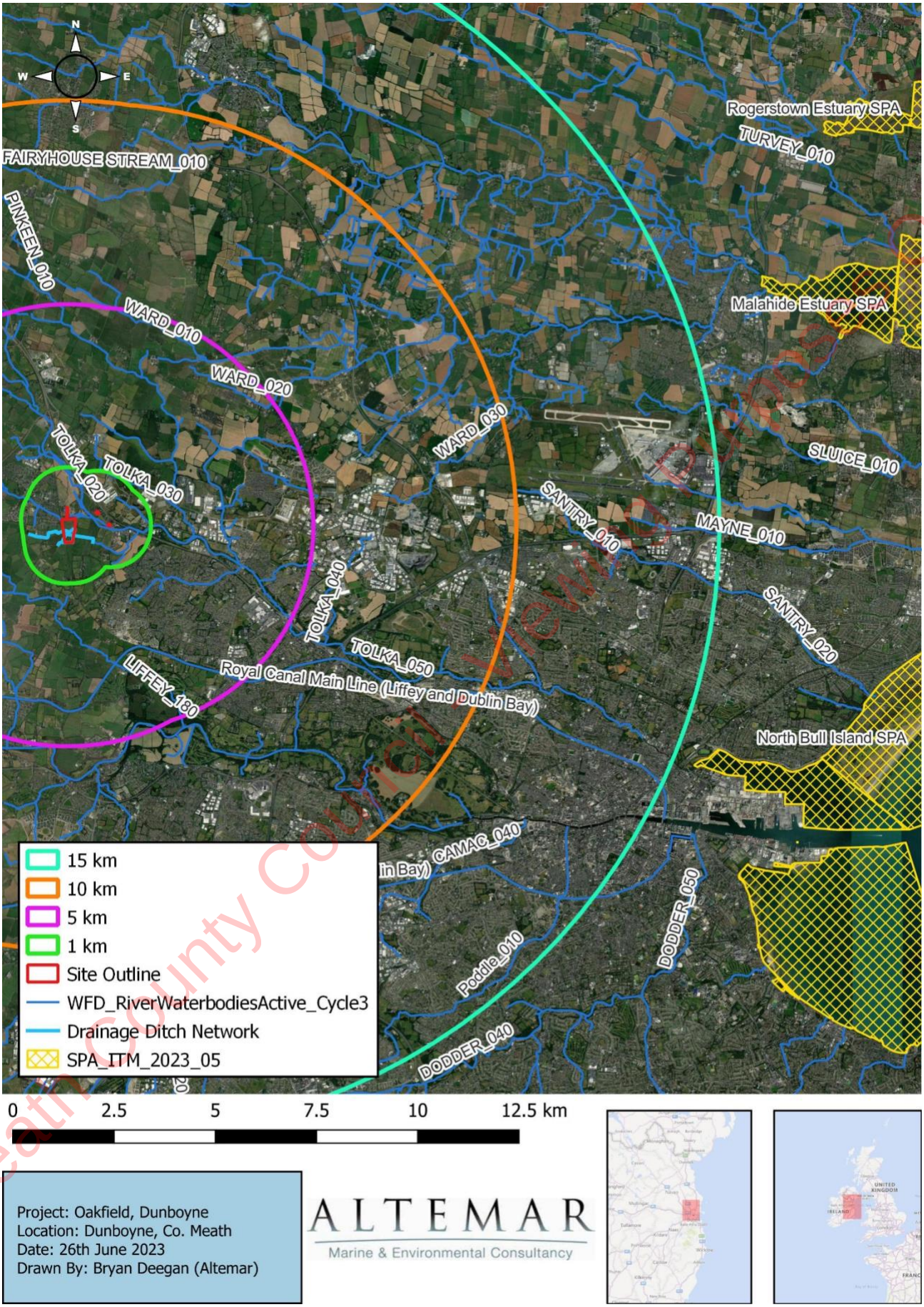


Figure 6.10 – Watercourses and SPAs with the potential for a hydrological connection

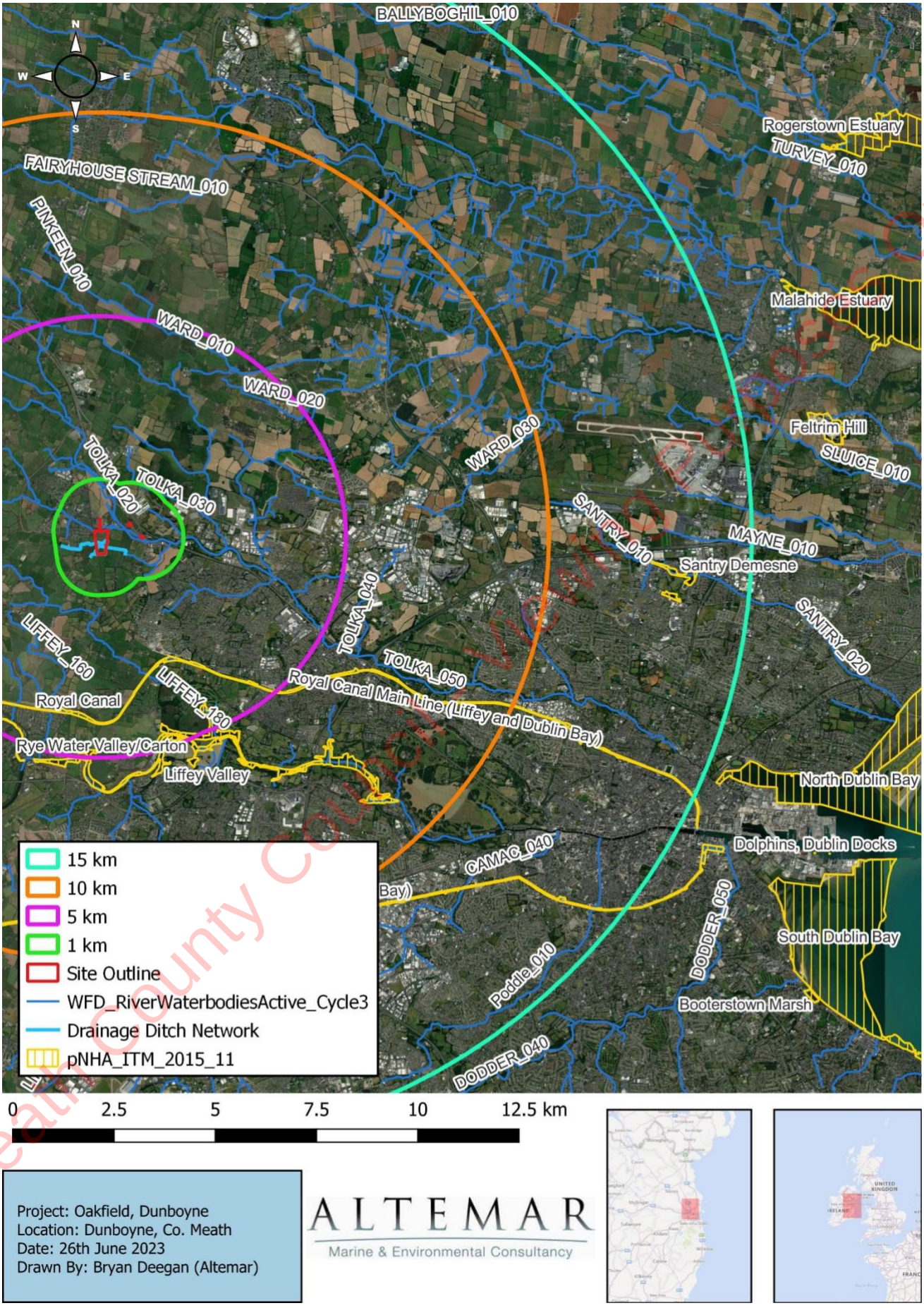


Figure 6.11 – Watercourses and pNHAs with the potential for a hydrological connection

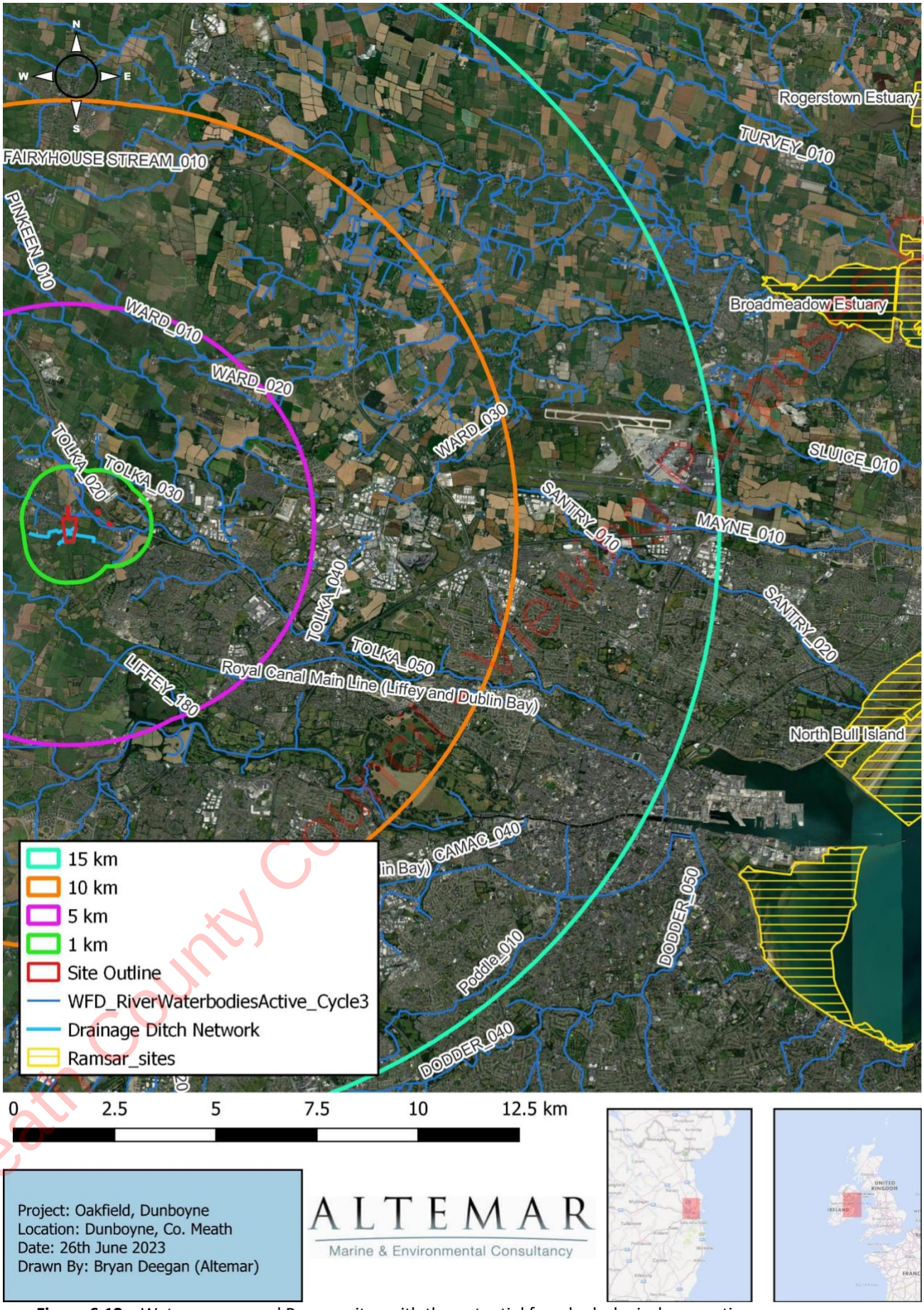


Figure 6.12 – Watercourses and Ramsar sites with the potential for a hydrological connection

6.3.3 Species data

It should be noted that no species of conservation importance were noted on site, based on NPWS and NBDC records as fine resolution. Species recorded within the 2km^2 grid include are seen in Table 6.3

Table 6.3. National Biodiversity Data Centre Records within the 2km^2 grid (O04F)

Acari; Erpobdella; Glossiphonia; Helobdella; Limnodrilus hoffmeisteri; Lumbricidae; Tubifex tubifex; Little Egret (Egretta garzetta); Stone Loach (Barbatula barbatula); Asellus; Asellus aquaticus; Gammarus; Gammarus duebeni; Dugesia; flatworms (Tricladida); Dytiscidae; Elmidae; Elmis aenea; Haliplidae; Nebrioporus; Green-veined White (Pieris napi); Painted Lady (Vanessa cardui); Peacock (Inachis io); Ringlet (Aphantopus hyperantus); Small Tortoiseshell (Aglais urticae); Agapetus; Cyrnus trimaculatus; Hydropsyche; Hydropsyche pellucidula; Hydropsyche siltalai; Hydropsychidae; Limnephilidae; Limnephilus lunatus; Limnephilus marmoratus; Plectrocnemia conspersa; Polycentropus flavomaculatus; Rhyacophila dorsalis; Rhyacophilidae; Sericostoma; Sericostoma personatum; Common Blue Damesfly (Sympetrum striolatum), Common Darter (Sympetrum striolatum); Large Red Damselfly (Pyrrhosoma nymphula); Angler's Curse (Caenis luctuosa); Baetis; Baetis rhodani; Caenis; Ecdyonurus; Ephemerella notata; Serratella ignita; Capnia bifrons; Nemoura cinerea; Ceratopogonidae; Chironomidae; Dicranota; Simuliidae; Tipulidae; Jenkins' Spire Snail (Potamopyrgus antipodarum); Sphaeriidae; Wandering Snail (Radix balthica); Brown Long-eared Bat (Plecotus auritus); Eurasian Badger (Meles meles); Irish Hare (Lepus timidus subsp. hibernicus); Lesser Noctule (Nyctalus leisleri); Natterer's Bat (Myotis nattereri); Pipistrelle (Pipistrellus pipistrellus sensu lato); Red Fox (Vulpes vulpes); Soprano Pipistrelle (Pipistrellus pygmaeus); West European Hedgehog (Erinaceus europaeus)

Table 6.4. Species found by NPWS proximate to the subject site

Common Frog (Rana temporaria); Eurasian Badger (Meles meles); Irish Hare (Lepus timidus subsp. hibernicus); Smooth Newt (Triturus vulgaris); Eurasian Otter (Lutra lutra); West European Hedgehog (Erinaceus europaeus); Opposite-leaved Pondweed (Groenlandia densa); Pale Flax (Linum bienne); Hairy St. John's-wort (Hypericum hirsutum)

No species of conservation importance have been noted on site by NPWS.

6.3.4 Site Survey

Site assessments were carried out on the 20th March 2021, 3rd September 2021, 22nd April 2022, 23rd April 2023 and 01st June 2023. Habitats within the proposed development site were classified according to Fossitt (2000) (Figure 6.13) and the species noted within each habitat are described.

Figure 6.13a. Fossitt Habitats on site (See habitat descriptions for the explanation to the Fossitt codes). (Orange circle- Evidence of otter activity. Blue circle-frogspawn in pond. Red circle- single badger paw print.)

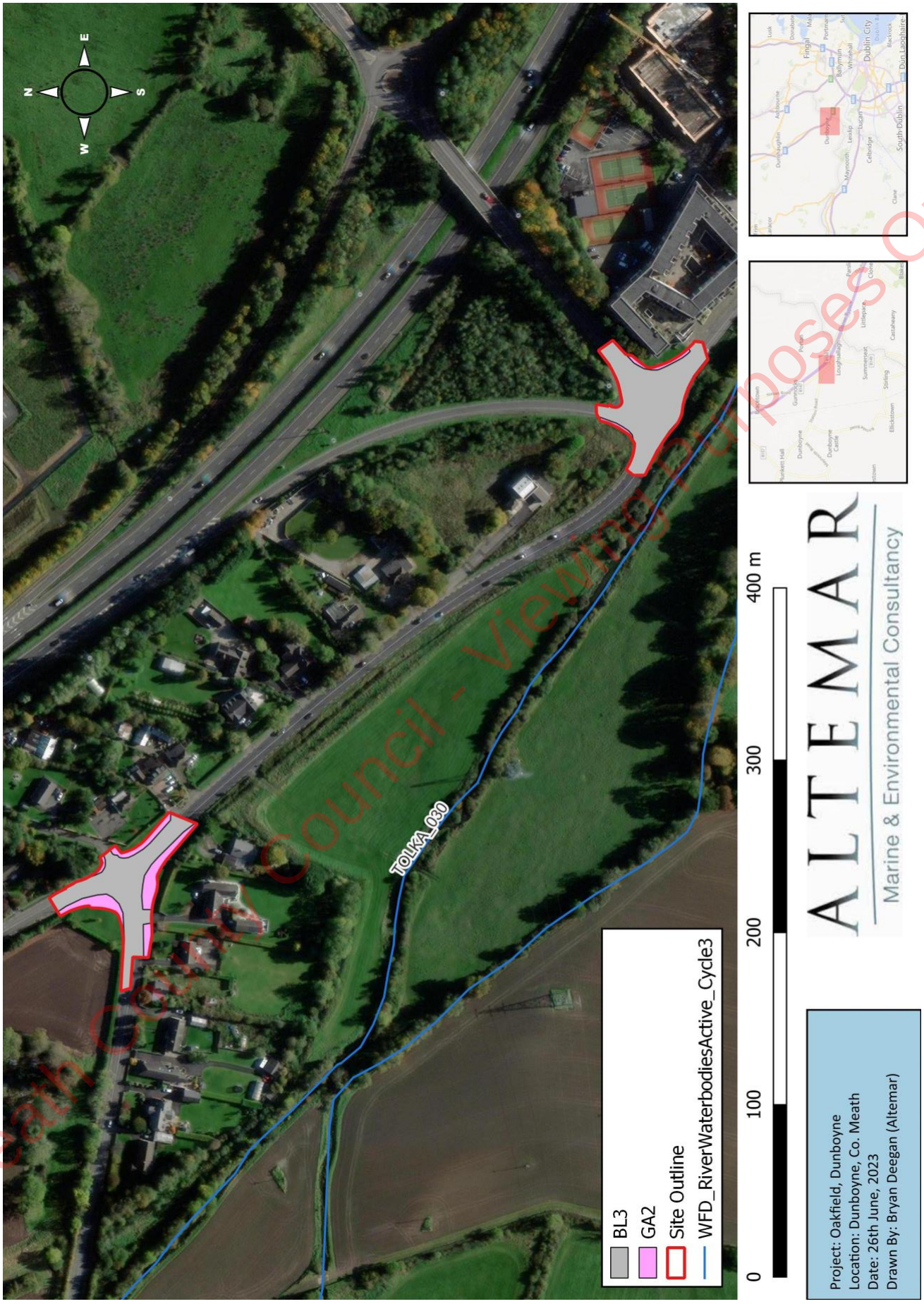


Figure 6.13b. Fossitt Habitats on site (See habitat descriptions for the explanation to the Fossitt codes).

GA1-Agricultural Grassland

Plate 6.1. GA1-Agricultural Grassland.

Improved agricultural grassland is located in the southern portion of the site. The field was actively grazed by cattle. Biodiversity in these areas was poor and the field was dominated by thistles (*Cirsium arvense*, *C. vulgare*), clover (*Trifolium repens*), plantains (*Plantago spp*.), creeping buttercup (*Ranunculus repens*), dandelion (*Taraxacum spp*.) and docks (*Rumex spp*.). No species of conservation importance or invasive species were noted.

WL2-Treeline

Plate 6.2. WL2-Treeline

A prominent mature Oak (Quercus sp) treeline is located within the centre of the site. This habitat would be seen to form the most important terrestrial habitat on site. Species within the habitat included ash (*Fraxinus excelsior*), ivy (*Hedera helix*), wood anemone (*Anemone nemorosa*), pedunculate oak (*Quercus robur*), lords and ladies (*Arum maculatum*), meadowsweet (*Filipendula ulmaria*), primrose (*Primula vulgaris*), bramble (Rubus fruticosus agg.), birch (*Betula sp*.), ramsons (*Allium ursinum*), hazel (*Corylus avellana*), hawthorn (*Crataegus monogyna*), holly (*Ilex aquifolium*), self-heal (*Prunella vulgaris*), common vetch (*Vicia sativa ssp. Segetalis*), beech (*Fagus sylvatica*), elder (*Sambucus nigra*), great willowherb (*Epilobium hirsutum*), cow parsley (*Anthriscus sylvestris*), wild carrot (*Daucus carota*) and common mouse-ear (*Cerastium fontanum*). It is important to note that bat foraging was noted proximate to the treeline with Common pipistrelle (*Pipistrellus pipistrellus*), *soprano pipistrelle* (Pipistrellus pygmaeus), Leislers bat (*Nyctalus leisleri*) and Brown long-eared bat (Plecotus auritus) being noted in this area (Appendix 6.1) in the 2022 survey. A single badger paw print was noted to the south west of the treeline in 2023.

BC1- Arable Crops

Plate 6.3. Arable Crops

Arable crops were growing within the main eastern field. Opportunistic flora species were present. Species noted included creeping buttercup (*Ranunculus repens*), dandelion (*Taraxacum spp*.), docks (*Rumex spp*.), plantains (*Plantago spp*.), nettle (*Urtica dioica),* groundsel (*Senecio vulgaris*), prickly sowthistle (*Sonchus asper*), thistles (*Cirsium arvense*, *C. vulgare*), pineapple weed (*Matricaria discoidea*), scarlet pimpernel (*Anagallis arvensis*), shepherd's purse (*Capsella bursa-pastoris*), common field-speedwell (*Veronica persica*), common vetch (*Vicia cracca*), mouse-ear chickweed (*Cerastium fontanum*), broad leaved willowherb (*Epilobium montanum*), common fumitory (*Fumaria officinalis*), redshank (*Polygonum persicaria*) and fat hen (*Chenopodium album*). No species of conservation importance were noted.

WL1- Hedgerows

Plate 6.4 WL1- Hedgerows (inset pond (FL8) within hedgerow to the south of the site.)

Field boundaries on site consist primarily of mature unkempt hedgerows many of which are beginning to form treelines. Species within the hedgerows included bramble (*Rubus fruticosus*), elder (*Sambucus nigra)*, blackthorn (*Prunus spinosa)*, hawthorn *(Crataegus monogyna),* holly *(Ilex aquifolium),* sycamore *(Acer pseudoplatanus),* alder *(Alnus glutinosa),* dog-rose *(Rosa canina), crab apple (Malus sylvestris),* ash *(Fraxinus excelsior),* ivy *(Hedera helix), teasel (Dipsacus fullonum),* rosebay willowherb *(Epilobium angustifolium),*gorse *(Ulex europaeus), poplars (Populus spp.),* elm *(Ulmus glabra),* privet *(Ligustrum sp),* plantains (*Plantago spp*.), hedge bindweed (*Calystegia sepium*), nettle (*Urtica dioica*), butterfly-bush (Buddleja davidii), cow parsley (Anthriscus sylvestris), birch (Betula sp.), horse chestnut (*Aesculus hippocastanum*), willow (*Salix sp*.), oak (Quercus sp.), oxeye daisy (*Leucanthemum vulgare*),.lesser burdock (Arctium minus) and cleavers *(Galium aparine)* were noted. No species of conservation importance or invasive species were noted.

A pond is located at the south western portion of the site (Figure 6.13a. Plate 6.4 (inset)). It should be noted that frogspawn from the common frog (*Rana temporaria*) was noted within this pond in 2022 and it would be considered a locally important feature.

FW1 Eroding upland river.

There is a watercourse (the Castle Stream) that traverses through the centre of the subject site. It should be noted that this watercourse is a tributary of the River Tolka. It is located approximately 2m below the field level either side of the stream. This watercourse is heavily tunnelled by the hedgerows that are located on each bank either sire of the stream. Plant species are primarily shade tolerent species including hart's-tongue (*Asplenium scolopendrium*), male fern (*Dryopteris filix-mas*), nettle (*Urtica dioica*), lesser water-parsnip (*Berula erecta*), meadowsweet (*Filipendula ulmaria*), docks (*Rumex spp*.), ivy (Hedera helix), mosses (Sphagnum sp.), wild angelica (Angelica sylvestris). Evidence of otter (*Lutra lutra*) (spraint) was noted at the western (upstream area of the site) in 2022. No otter holts were noted.

Evaluation of Habitats

The proposed development site consists of built land, arable crops, amenity grassland agricultural grassland, watercourses, hedgerows and treelines. No habitats of conservation importance were noted on site. However, the oak treeline, pond and watercourses would be considered to be of local ecological importance.

Birds

No bird species of conservation importance have been noted on site. However, Barn swallow (*Hirundo rustica*) (Amber listed) and sand martin (*Riparia riparia*) (Amber listed) were noted overhead. The following bird species were noted on site:

Common Name	***Scientific Name***
Woodpigeon	*Columba palumbus*
Barn swallow	*Hirundo rustica (Amber) (overhead)*
Wren	*Troglodytes troglodytes*
Hooded crow	*Corvus cornix*
Jackdaw	*Corvus monedula*
Pheasant	*Phasianus colchicus*
Robin	*Erithacus rubecula*
Blue tit	*Parus caeruleus*
Great tit	*Parus major*
Rook	*Corvus frugilegus*
Goldfinch	*Carduelis carduelis*
Sand martin	Riparia riparia (Amber) (overhead).
Buzzard	*Buteo buteo* (overhead)

Table 6.5: Bird Species noted in the vicinity of the proposed development.

Plant Species

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

Bat Fauna

Four bat species was noted foraging on site (Soprano Pipistrelle, Common Pipistrelle, Lesser Noctule, and Brown Long-eared Bat). Bat foraging was noted on site and noted to be particularly active in the vicinity of the oak treeline in the centre of the site. Trees of bat roosting potential are noted on site. However, no bats were noted emerging from trees on site.

Amphibians/Reptiles

A frog spawning area was noted in a pool in the south west corner of the site, proximate to the railway.

Terrestrial Mammals

No resting or breeding places of mammals of conservation importance have been noted on site. However, evidence of otter activity has been noted on the upstream boundary of the Castle Stream (Figure 6.13a). In addition, a single badger paw print was noted on the south eastern section of the site. It is expected, that the site forms part of the foraging range of a wider badger community.

6.4 Potential Impact of the Proposed Development

Altemar has consulted with the design team to limit the potential impact of the proposed development on biodiversity. The proposed development will involve the removal of a portion of the existing terrestrial habitats on site, re-profiling, excavations, in-stream and culverting works, and the construction of residential units.

6.4.1 Proposed Development

6.4.1.1 Construction Stage

In the absence of mitigation the construction of the proposed development would 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, excavations, in-stream and roundabout works, the construction of bridges, and the building phases of the proposed development.

Construction phase mitigation measures are required on site particularly as reprofiling of the site is proposed which will remove/alter existing terrestrial habitats and can lead to silt laden and contaminated runoff to the watercourses traversing the subject site and proximate surface water drainage networks. In the absence of mitigation measures, there is the potential for contaminated surface water runoff to enter the onsite watercourses, drainage ditch network, and proximate surface water drainage networks with the potential for downstream impacts on the River Tolka and designated conservation sites located within Dublin Bay. In addition, habitats of local importance are on site and need to be protected. Bats, frogs, badgers and otters are noted on site and need to be protected during the construction stage.

Designated Conservation sites within 15km, and outside 15km with a potential hydrological pathway

The proposed development is not within a designated conservation site. The nearest designated conservation site is Royal Canal pNHA (2.9 km). The nearest Natura 2000 site is South Dublin Bay and River Tolka Estuary SPA (16.3 km). In-stream works and runoff during site re-profiling and construction of project elements could impact on the Castle Stream Tributary, the Castle Stream, River Tolka, and the surface water network with water quality impacts into the marine environment from the proposed development site. In the absence of mitigation, impacts on the watercourses would be seen as the primary pathway for impacts on conservation sites. Given the scale of the proposed development, the nature of the construction works (which include in-stream works), and recognising that it is proposed to direct surface water drainage to onsite watercourses, drainage ditch network, and proximate surface water drainage networks, out of an abundance of caution it is considered that the potential ZOI of the proposed works extends beyond the site outline to include the onsite watercourses, the River Tolka, and designated conservation sites located within Dublin Bay. In the absence of mitigation, there is the potential for dust and contaminated surface water runoff to enter the River Tolka with the potential for downstream impacts on downstream conservation sites.

Impacts: Low adverse / International/ Negative Impact / Not significant / short term. Mitigation is needed to prevent impacts on the watercourse, drainage ditch network, surface water network, and downstream designated sites.

Biodiversity

The impact of the development during the construction phase will be a loss of the majority of existing habitats and species on site. In the absence of mitigation, it would be expected that the flora and fauna associated with these habitats would also be displaced.

<u>Terrestrial mammalian species</u>

No badgers or badger activity was noted on site. No resting or breeding places of mammals of conservation importance have been noted on site. However, evidence of otter activity has been noted on the upstream boundary of the tributary of the River Tolka. The riparian corridor is to be maintained. Pollution and silt from the site could lead a reduction in the water quality of the River Tolka and impact on the prey of otter.

Impacts: Low adverse / local / Negative Impact / Not significant / short term. Mitigation is needed in the form of a pre-construction inspection for terrestrial mammals of conservation importance and the protection of the River Tolka from silt and pollution.

Flora

No protected flora was noted on site. However, a treeline of mature oak was noted on site. Site clearance will remove the flora species on site and in particular several hedgerows on site. The oak treeline and riparian corridor of the River Tolka are to be maintained.

Impacts: Low adverse / site / Negative Impact / Not Significant / Short term. Mitigation is required on site to protect treelines and hedgerows on site from construction activities.

Bat Fauna

Four bat species were noted foraging on site (Soprano Pipistrelle, Common Pipistrelle, Lesser Noctule, and Brown Long-eared Bat). Bat foraging was noted on site and noted to be particularly active in the vicinity of the oak treeline in the centre of the site. No bats were noted roosting on site. Lighting during construction could impact on foraging activity.

Impacts: Moderate adverse / local/ Negative Impact / Not significant / short term. Mitigation is needed in the form of ecological supervision of lighting on site and for the protection of treelines and hedgerows on site.

Aquatic Biodiversity

There are a number of watercourses and a drainage ditch network traversing through the subject site. In addition, a frog spawning area was noted in a pool in the south west corner of the site, proximate to the railway line. Given the nature of the proposed works, and the fact that it is proposed to discharge surface water drainage to the existing watercourses and drainage ditch network located on site, there is the potential for impacts on aquatic biodiversity from silt or petrochemicals via contaminated surface water runoff.

Impacts: Moderate adverse / local / Negative Impact / Not Significant / Short term. Mitigation is required to protect aquatic habitats on site from silt and pollution. The riparian corridor surrounding the River Tolka also requires protection from construction works.

Bird Fauna

The proposed development is over 15km from the nearest SPA. No bird species of conservation importance have been noted on site. However, site clearance could impact on bird nesting.

Impacts: Low adverse / Local / Negative Impact / Not significant / short term. Mitigation is needed in the form of site clearance outside bird nesting season.

6.4.1.2 Operational Stage

Once constructed all onsite drainage will be connected to separate foul and surface water systems. Surface water runoff will comply with SUDS. Key habitats including the oak treeline and River Tolka will be maintained. The biodiversity value of the site would be expected to improve as the landscaping matures.

Designated Conservation sites within 15km, and outside 15km with a potential hydrological pathway

Given that it is proposed to discharge surface water drainage to a watercourse, drainage ditch network, and surface water network, in the absence of mitigation, there is the potential for downstream impacts on designated sites via contaminated surface water runoff which may enter the River Tolka during operation.

Impacts: Low adverse / local / Negative Impact / Not significant / long term. Standard mitigation in relation to surface water is required.

Biodiversity

Biodiversity value of the site will improve as landscaping matures.

Terrestrial mammalian species

No resting or breeding places of mammals of conservation importance have been noted on site. However, evidence of otter activity has been noted on the upstream boundary of the tributary of the River Tolka. In addition, badger activity was noted on site.

Impacts: Low adverse / site / Negative Impact / Not significant / long term.

Flora

No protected flora was noted on site. However, a treeline of mature oak was noted on site which is deemed to be of local ecological importance. Discussions too place throughout the design stage to protect the treeline. The integrity of the treeline of mature oak will be principally retained. Landscaping will increase flora diversity on site.

Impacts: Low adverse / site / Negative Impact / Not significant / long-term

Bat Fauna

The proposed development will change the local environment as new structures are to be erected and some of the existing vegetation will be removed. No bat roosts or potential bat roosts will be lost due to this development. A potential loss in foraging by four species of bats will be noted as a result of the proposed development. However, lighting has been designed to be compliant with bat lighting guidelines, with the implementation of low-level warm lighting. However, light spill from the apartments could in the long term reduce bat foraging on the northern side of the oak treeline. The proposed development would not be seen to have a significant collision risk for bat strikes.

Impacts: Moderate adverse / International / Negative Impact / Not significant / long term.
Mitigation is required in relation to light spill on site.

Aquatic Biodiversity

Given that it is proposed to discharge surface water drainage, after attenuation, to the onsite watercourse, drainage ditch and surface water network, and ultimately the River Tolka, in the absence of mitigation, there is the potential for downstream impacts on aquatic biodiversity via contaminated surface water runoff during operation.

Impacts: Low adverse / local/ Negative Impact / Not Significant / Short term

Bird Fauna

The proposed development will change the local environment as new structures are to be erected. The buildings are comprised of solid materials consisting of a solid material on the exterior which includes sections of concrete and glass. These buildings would be clearly visible to bird species and would not pose a significant collision risk. However, the presence of buildings on site and landscaping may provide additional nesting and foraging potential for garden bird species. The proposed development would not be seen to have a significant collision risk for bird strikes.

Impacts: Low adverse / site / Negative Impact / Not significant / long term.

6.4.1.3 Do-Noting Impact

The site would continue to be farmed and the biodiversity value would remain stable. The watercourses traversing through the subject site would remain unchanged.

6.4.2 Cumulative

Cumulative Impacts can be defined as "*impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project*". Effects which are caused by the interaction of effects, or by associated or off-site projects, are classed as indirect effects. Cumulative effects are often indirect, arising from the accumulation of different effects that are individually minor. Such effects are not caused or controlled by the project developer.

A review of other off-site developments and proposed developments was completed as part of this assessment. The following projects and plans were reviewed and considered for possible cumulative effects with the Proposed Development.

Table 6.5a & 6.5b detail the existing, proposed and granted planning permissions on record in the area:

6.4.2.1 Construction Stage

Planning Ref. No.	Address	Summary of Development
212395	Mill Farm Cottage , Station Road, Dunboyne, Co. Meath	the demolition of an existing single storey cottage including partially demolished ancillary structures
RA180561	Site South Of Station Road, Dunboyne, Co. Meath	the construction of 83 no. dwellings and a creche on a site area of 2.6ha. The proposed development consists of the construction of 10 no. 1, 2 & 3 bed apartments in a 3 storey building, 16 no. 2 & 3 bed duplex units in 2 no. 3 storey blocks and 57 no. 2, 3 & 4 bedroom, 2 & 3 storey detached, semi-detached and terraced houses. The proposed development also provides for a single storey creche (117m2), open spaces, landscaping, car parking and all associated site development works. Access to the development will be via a newly constructed access road, directly off Station Road and associated upgrade works, including provision of new bus stop, along the boundary of the site with Station Road. Significant further information/revised plans submitted on this application
RA170175	Loughshallagh Pumping Station, Clonee, Co. Meath	a ten year planning permission for development which will consist of the construction of a 98.18 sq.m Water Pumping Station with access to the nearby R147 including associated site works to replace the existing Loughsallagh Water Pumping Station as part of improvements to the water supply network
RA150605	Lands at Portan, Gunnocks and Clonee, County Meath	Construction of a data centre campus in two phases within 10 years which consists of the following: In Phase 1: Construction of two data centre buildings containing 8 no. data halls with a gross floor area of 50,800 m2 and with a data capacity of 36MW per building (each building is 25,400 m2 and contains 4 no. data halls) together with associated mechanical and electrical spaces and parking. 1 No. single storey ancillary administration/office building with gross floor area of 6,424 m2 linking and accessing the data centre buildings. Ground-level emergency back-up generators (with internal fuel tanks).

Planning Ref. No.	Address	Summary of Development
		New site access and temporary construction access and car parking arrangements (including utilisation of existing farm access) off the Kilbride Road (L5028). Closure of existing accesses (following the demolition of 2no. residential units). Site infrastructure to include entrance gates and appropriate signage, security hut (36m2), internal roadways & footpaths, 217 car parking spaces in total across the site in both phases, bicycle shelter, a water sprinkler tank, pumping facilities, water tanks, drainage networks, attenuation ponds and a connection to the public sewer on the R147. Bridges and culverts over the Pace and Portan streams. Hard and soft landscaping. Demolition of two existing residential dwellings on Kilbride Road (L0528), 150 metres northeast of R147/L5028. Upgrade to L5028 Kilbride Road to provide cycle path and pedestrian footpath between the R147 and the proposed new site access. Installation of temporary electrical infrastructure to service the data centre campus before final connection. Ancillary site works including underground electricity 20kV cables between substation and data centres.

Table 6.5a. Potential Cumulative Impacts (Construction Stage)

As part of the assessment of the impact of the proposed development, account has also been taken of cumulative projects, i.e. developments that are currently permitted or under construction within the surrounding area, but whose environmental impact are not yet fully realised within the existing environmental baseline. Following a review of projects located in proximity to the proposed development it was determined that no significant projects are proposed or currently under construction that could potentially cause in combination effects on designated conservation sites.

Given this, it is considered that in combination effects on biodiversity, with other existing and proposed developments in proximity to the application area, would be unlikely, neutral, not significant and localised. It is concluded that no significant effects on designated conservation sites will be seen as a result of the proposed development alone or in combination with other projects.

6.4.2.2 Operational Stage

Planning Ref. No.	Address	Summary of Development
212395	Mill Farm Cottage , Station Road, Dunboyne, Co. Meath	the demolition of an existing single storey cottage including partially demolished ancillary structures
RA180561	Site South Of Station Road, Dunboyne, Co. Meath	the construction of 83 no. dwellings and a creche on a site area of 2.6ha. The proposed development consists of the construction of 10 no. 1, 2 & 3 bed apartments in a 3 storey building, 16 no. 2 & 3 bed duplex units in 2 no. 3 storey blocks and 57 no. 2, 3 & 4 bedroom, 2 & 3 storey detached, semi-detached and terraced houses. The proposed development also provides for a single storey

Planning Ref. No.	Address	Summary of Development
		creche (117m2), open spaces, landscaping, car parking and all associated site development works. Access to the development will be via a newly constructed access road, directly off Station Road and associated upgrade works, including provision of new bus stop, along the boundary of the site with Station Road. Significant further information/revised plans submitted on this application
RA170175	Loughshallagh Pumping Station, Clonee, Co. Meath	a ten year planning permission for development which will consist of the construction of a 98.18 sq.m Water Pumping Station with access to the nearby R147 including associated site works to replace the existing Loughsallagh Water Pumping Station as part of improvements to the water supply network
RA150605	Lands at Portan, Gunnocks and Clonee, County Meath	Construction of a data centre campus in two phases within 10 years which consists of the following: In Phase 1: Construction of two data centre buildings containing 8 no. data halls with a gross floor area of 50,800 m2 and with a data capacity of 36MW per building (each building is 25,400 m2 and contains 4 no. data halls) together with associated mechanical and electrical spaces and parking. 1 No. single storey ancillary administration/office building with gross floor area of 6,424 m2 linking and accessing the data centre buildings. Ground-level emergency back-up generators (with internal fuel tanks). New site access and temporary construction access and car parking arrangements (including utilisation of existing farm access) off the Kilbride Road (L5028). Closure of existing accesses (following the demolition of 2no. residential units). Site infrastructure to include entrance gates and appropriate signage, security hut (36m2), internal roadways & footpaths, 217 car parking spaces in total across the site in both phases, bicycle shelter, a water sprinkler tank, pumping facilities, water tanks, drainage networks, attenuation ponds and a connection to the public sewer on the R147. Bridges and culverts over the Pace and Portan streams. Hard and soft landscaping. Demolition of two existing residential dwellings on Kilbride Road (L0528), 150 metres northeast of R147/L5028. Upgrade to L5028 Kilbride Road to provide cycle path and pedestrian footpath between the R147 and the proposed new site access. Installation of temporary electrical infrastructure to service the data centre campus before final connection. Ancillary site works including underground electricity 20kV cables between substation and data centres.

Table 6.5b. Potential Cumulative Impacts (Operational Stage)

As part of the assessment of the impact of the proposed development, account has also been taken of cumulative projects, i.e. developments that are currently permitted or under construction within the surrounding area, but whose environmental impact are not yet fully realised within the existing environmental baseline. Following a review of projects located in proximity to the proposed development it was determined that no significant projects are proposed or currently under construction that could potentially cause in combination effects on designated conservation sites.

Given this, it is considered that in combination effects on biodiversity, with other existing and proposed developments in proximity to the application area, would be unlikely, neutral, not significant and localised. It is concluded that no significant effects on designated conservation sites will be seen as a result of the proposed development alone or in combination with other projects.

6.4.2.3 Do-Noting Impact

The site would continue to be farmed. The watercourses traversing through the subject site would remain unchanged.

6.5 Mitigation Measures (Ameliorative, Remedial or Reductive Measures)

6.5.1 Proposed Development

6.5.1.1 Construction Stage

- A project ecologist will be appointed to oversee all works.
- The watercourses onsite and drains will be protected from dust, silt and surface water throughout the works.
- Local silt traps established throughout site.
- Mitigation measures on site include dust control, stockpiling away from watercourse and drains
- Stockpiling of loose materials will be kept to a minimum of 40m from watercourses and drains.
- Stockpiles and runoff areas following clearance will have suitable barriers to prevent runoff of fines into the drainage system and watercourses.
- Fuel, oil and chemical storage will be sited within a bunded area. The bund will be at least 50m away from drains, ditches or the watercourse, excavations and other locations where it may cause pollution.
- Bunds will be kept clean and spills within the bund area will be cleaned immediately to prevent groundwater contamination. Any water-filled excavations, including the attenuation tank during construction, that require pumping will not directly discharge to the stream. Prior to discharge of water from excavations adequate filtration will be provided to ensure no deterioration of water quality.
- Petrochemical interception and bunds in refuelling area
- On-site inspections to be carried out by project ecologist prior to commencement of works on site. This will include mammal, amphibian and tree inspections for bats. Should the resting or breeding places of any mammals or amphibians be noted during the on site inspections NPWS will be informed and relevant licences will be acquired from NPWS prior to works commencing in these areas in compliance with legislation and NPWS guidelines.
- All instream and drainage ditch works will be carried out in consultation with Inland Fisheries Ireland under an approved methodology submitted to Inland Fisheries Ireland prior to commencement.
- Daily turbidity, oxygen and photographic monitoring of watercourses (upstream, within & downstream of works) will take place during works and the results supervised by the project ecologist. This would be particularly important following high rainfall events and works within the riparian zone. It is recommended that sufficient baseline readings are made prior to construction commencing to understand the existing turbidity on site. This will be carried out in consultation with the project ecologist and linked to areas of work on site. All records will be kept for inspection by Inland Fisheries Ireland if required.

- Prior to site clearance the ecologist and arborist will assess the site works and oversee habitat protection measures. These would include tree protection measures in the vicinity of the oak treeline and riparian corridor.
- Mitigation measures outlined in the bat survey report will be followed this include the control of light spillage on site into adjacent habitats to avoid light contamination of the surrounding treelines and woodlands. Lighting on site will be subject to approval of the ecologist and during construction will not involve the lighting of the treelines and bat foraging corridor.
- Relevant guidelines and legislation (Section 40 of the Wildlife Acts, 1976 to 2012) in relation to the removal of trees and timing of nesting birds will be followed e.g. do not remove trees or shrubs during the nesting season (1st March to 31st August). Should this not be possible, vegetation will be inspected by an ecologist for nesting birds prior to removal.
- Frog habitat will be protected from on site works in consultation with the project ecologist.

6.5.1.2 Operational Stage

- A project ecologist will be appointed to oversee completion of all landscape, lighting and drainage works.
- Petrochemical interception will be inspected by the project ecologist to ensure compliance with Water Pollution Acts.
- Post Construction assessment/compliance with proposed lighting strategy Mitigation During Operation
- Mitigation measures will be in place to comply with Water Pollution Acts.
- No external lighting will be in place on the apartments facing the treeline.
- Any internal lighting from stairwells within buildings proximate to the oak treeline will comply with bat lighting guidelines and will have shields in place where possible and in discussion with the ecologist, to prevent external spill to the treeline.
- Upon moving in, residents within the apartment blocks will be provided with an information pack in relation to the sensitivities of the treeline and bat foraging. This will outline measures in relation to ensure lighting spill is contained and recommendations for enhancing biodiversity including the use of scented plants for attracting insects.

6.5.2 Cumulative

6.5.2.1 Construction Stage

No mitigation is required in relation to cumulative impact during construction.

6.5.2.2 Operational Stage

No mitigation is required in relation to cumulative impact during construction.

6.6 Residual Impact of the Proposed Development

The construction and operational mitigation proposed for the development satisfactorily addresses the mitigation of potential impacts on the sensitive receptors through the design and the application of construction and operational phase controls. In relation to bats foraging on site in the vicinity of the oak treeline would be reduced and this would be considered to be a moderate adverse/negative/site/long term/ not significant impact on bats. The overall impact on the ecology of the proposed development will result in a low Adverse / Negative/ site/ not significant / long term impact on the ecology of the area and locality overall. This is primarily as a result of the loss of

terrestrial habitats including arable land and hedgerows on site, supported by the creation of an improved biodiversity focused riparian corridor, additional biodiversity features, standard construction and operational controls and a sensitive native landscaping strategy.

6.7 Monitoring

6.7.1 Proposed Development

6.7.1.1 Construction Stage

A project ecologist will oversee works on site.

6.7.1.2 Operational Stage

A project ecologist will oversee works on site including the lighting, landscape and drainage networks.

6.8 Difficulties Encountered

No difficulties were encountered in relation to the preparation of the Biodiversity report. The bat surveys were undertaken within the active bat period (April to September) and a detector survey was possible. Insects were observed in flight during the bat survey. Flora, habitat and mammal assessments were carried out within the optimal survey period.

7 LAND, SOILS AND GEOLOGY

7.1 Introduction

This chapter assesses and evaluates the potential impacts of the Proposed Development on the land, soil, geological and hydrogeological aspects of the site and surrounding area, in accordance with the requirements of Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (i.e. the EIA Directive) (European Union, 2014a). This Chapter also provides a characterisation of the receiving hydrogeological environment within the proposed Project and within a wider study area in the vicinity of the proposed Project. In assessing likely potential and predicted effects, account is taken of both the importance of the attributes and the predicted scale and duration of the likely effects.

This chapter was prepared by Marcelo Allende (BSc, BEng). Marcelo is a Senior Environmental Consultant (Hydrologist) at AWN with over 15 years of experience in Environmental Consulting and water resources. Marcelo holds a degree in Water Resource Civil Engineering from the University of Chile. He has worked on a wide of range of projects including multi-aspect environmental investigations, geo-environmental impact assessments, groundwater resource management, hydrological and hydrogeological conceptual and numerical modelling, strategic and site specific flood risk assessments, Due Diligence reporting, baselines studies, soils, surface water and groundwater monitoring and field sampling programmes on a variety of brownfield and greenfield sites throughout Ireland as well as overseas in Chile, Argentina, Peru and Panama. He also has detailed knowledge of environmental guidance, legislation, regulations & standards and expertise in GIS (expert level) and MATTE studies at COMAH establishments. He is currently a member of the International Association of Hydrogeologists (Irish Group) and a member of Engineers Ireland (MIEI).

7.2 Assessment Methodology

The hydrological baseline assessment has been carried out in accordance with the following guidance and established best practice:

- Environmental Protection Agency (EPA) Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2022a).
- TII/National Roads Authority Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (TII/formerly NRA, 2009).
- Water Framework Directive (WFD) - Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy. This relates to the improvement of water quality across Ireland including rivers and groundwater bodies.
- River Basin Management Plan 2018-2021 (including regional plans by Local Authority Waters Programme (Waters and Communities 2020)). Draft River Basin Management Plan 2022-2027.
- Institute of Geologists Ireland (IGI) -Geology in Environmental Impact Statements, a guide (IGI, 2002) and Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements (IGI, 2013).

Water resource management in Ireland is dealt with in the following key pieces of legislation and guidelines:

- European Communities Environmental Objectives (Groundwater) Regulations 2010 (S.I. No. 9 of 2010).
- European Communities Environmental Objectives (Groundwater) Amendment Regulations 2016 (S.I. No. 366 of 2016); European Communities Environmental Objectives (Groundwater) (Amendment) Regulations 2022 S.I. No. 287 of 2022.
- Part IV of the First Schedule of the Planning and Development Act 2000, as amended.

- European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003)
- Environmental Protection Agency 'Towards Setting Guideline Values for the Protection of Groundwater in Ireland Interim Report', (EPA 2003).
- European Union (Drinking Water) Regulations 2014 (S.I. No. 122/2014).
- European Union (Drinking Water) (Amendment) Regulations (S.I. No. 464 of 2017).

7.2.1 Criteria for rating of effects

This chapter evaluates the effects, if any, which the development has had or will have on Land, Soils, Geology and Hydrogeology as defined Environmental Protection Agency (EPA) 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports' (EPA, 2022). In addition, the document entitled 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes' by the National Roads Authority (NRA/TII, 2009) is referenced where the methodology for assessment of impact is appropriate.

The rating of potential environmental effects on the hydrological environment is based on the standard EIAR impact predictions included in Chapter 1 which takes account of the quality, significance, duration and type of effect characteristic identified (in accordance with impact assessment criteria provided in the EPA Guidelines (2022) publication).

The NRA/TII criteria for rating the magnitude and significance of impacts and the importance of geological and hydrogeological attributes at the site during the EIA stage are also relevant in assessing the impact and are presented in Tables 1-5 in Appendix 7.1.

The principal attributes (and effects) to be assessed include the following:

- Geological heritage sites in the vicinity of the perimeter of the subject site;
- Landfills, industrial sites in the vicinity of the site and the potential risk of encountering contaminated ground;
- The quality, drainage characteristics and range of agricultural uses of soil around the site;
- Quarries or mines in the vicinity, the potential implications (if any) for existing activities and extractable reserves;
- The extent of topsoil and subsoil cover and the potential use of this material on site as well or requirement to remove it off-site as waste for disposal or recovery;
- High-yielding water supply springs/ wells in the vicinity of the site to within a 2km radius and the potential for increased risk presented by the proposed development;
- Classification (regionally important, locally important etc.) and extent of aquifers underlying the site perimeter area and increased risks presented to them by the proposed development associated with aspects such as for example removal of subsoil cover, removal of aquifer (in whole or part), drawdown in water levels, alteration in established flow regimes, change in groundwater quality;
- Natural hydrogeological/karst features in the area and potential for increased risk presented by the activities at the site; and
- Groundwater-fed ecosystems and the increased risk presented by operations both spatially and temporally.

7.2.2 Sources of Information

Desk-based geological information on the substrata (both Quaternary deposits and bedrock geology) underlying the extent of the subject site was obtained through accessing databases and other archives where available. Data was sourced from the following:

- Geological Survey of Ireland (GSI) - on-line mapping, Geo-hazard Database, Geological Heritage Sites & Sites of Special Scientific Interest, Bedrock Memoirs and 1: 100,000 mapping;
- Teagasc soil and subsoil database;
- Ordnance Survey Ireland - aerial photographs and historical mapping;
- Environmental Protection Agency (EPA) – website mapping and database information;
- National Parks and Wildlife Services (NPWS) – Protected Site Register.

Site specific data was derived from the following sources:

- Site Investigation Report. Station Road, Dunboyne, Co. Meath. Site Investigation Ltd., June 2022;
- Various design site plans and drawings; and
- Consultation with site engineers.

7.3 Receiving Environment

The receiving environment is discussed in terms of land geology, soils, hydrogeology and site history including potential for existing and historical contamination.

7.3.1 General Description of the Site

The Proposed Development site extends to over 16.92 ha. on adjacent lands located in the Townlands of Castle Farm, Ruskin and Clonee, Dunboyne, County Meath on lands generally bound to the east and south by agriculturally zoned lands, to the west by the Iarnród Éireann rail line, and to the north by the residential development permitted under Meath County Council (MCC) Reg. Ref. RA180561, agricultural lands and the L2228 (Station Road/Clonee Road). Improvement works to two no. roundabouts on the R147 (Old Navan Road) are located in at lands in the townlands of Loughsallagh and Clonee, Dunboyne, County Meath (Refer to Figure 7.1 below).

The site is located on multiple greenfield lands that are currently used for agricultural purposes. Part of the site also comprises of existing road at the L2228 (Station Road) and R147 (Old Navan Road). The subject land has a high point located on the western edge of the site from where it generally slopes to the north and to the south. The existing ground levels range between c. 67.96 m OD Malin to c. 64.60 m OD Malin.

There is an existing townland boundary which passes through the site, and which has a ditch with some water flow during periods of wet weather.

Figure 7.1: Approximate Site Boundary and Surrounding Area

7.3.2 Site Investigation Works

Site investigations were carried out by Site Investigations Ltd. in June 2022 throughout the subject site. The fieldworks comprised the following:

- Excavation of fifteen 15 no. trial pits (TP; depths up to 3.1 mbgl);
- Drilling of three (3) no. Cable Percussion Boreholes followed by rotary coreholes (depths ranging from 2.3mbgl (BH03) to 4.2mbgl (BH01)up to 6.7 mbgl).
- 5 no. environmental testing was completed for a Waste Soil Classification.

Site Investigation Report is included as Appendix 7.2. Locations of Site Investigation points is presented in Figure 7.2 below.

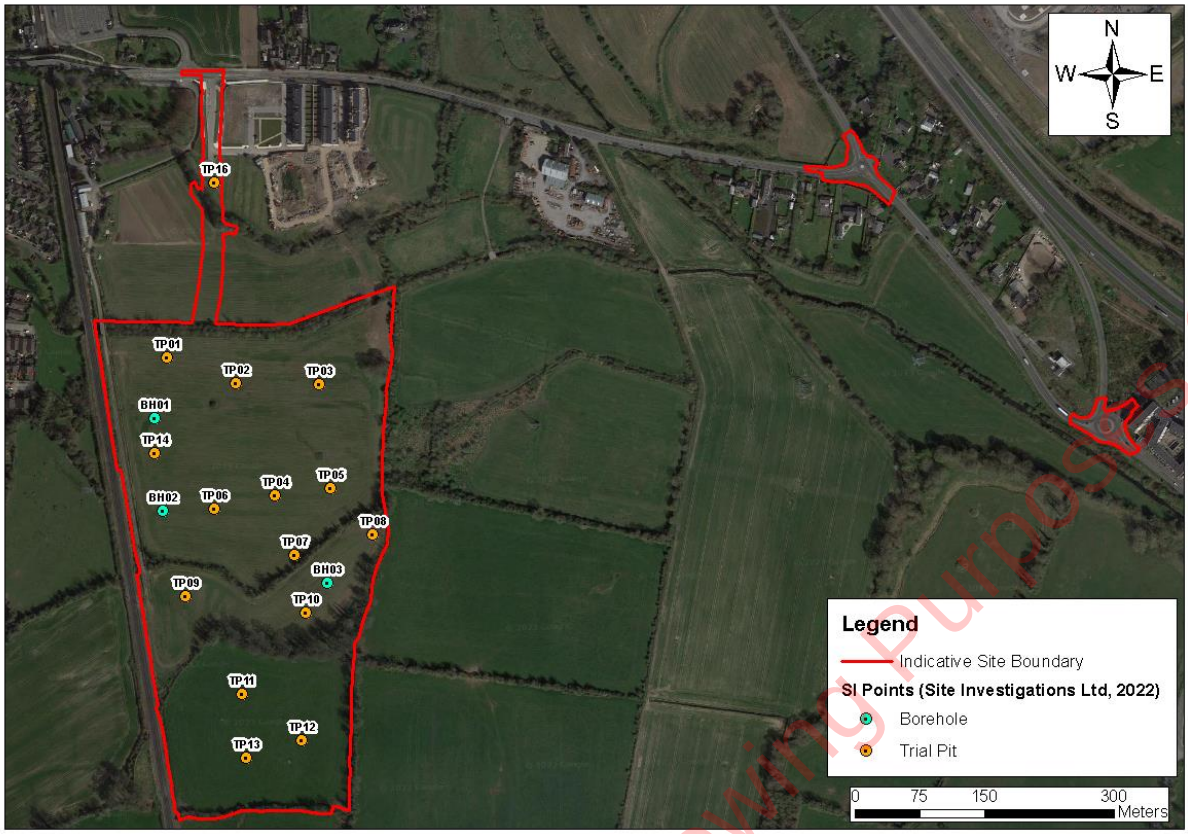


Figure 7.2: Site Investigation Points

7.3.3 Land Use

The site is currently occupied by multiple greenfield lands separated by ditches and hedgerow which are currently used for agricultural purposes. Part of the site also comprises of existing road at the L2228 (Station Road) and R147 (Old Navan Road).

Land in the vicinity of the site display a mixed land use/function. Land to the west and south of the site are dominated by agricultural land, while the land to the north of the site is occupied by residential housing, Clonee Sawmills manufacturer, Dunboyne Herbal Clinic, Dunboyne Train Station and the link roadway L2228. Land to the west of the site is dominated by residential land accompanied by an educational centre (Gaelscoil Thulach na nOg), commercial services (David Allen Market) and leisure infrastructure and facilities including St. Peters GAA and Dunboyne Athletics club.

The historic mapping below indicates the prior use of the site from the earliest mapping available 1837-1842 through to the present day. The Ordnance Survey Ireland (OSi) online historical maps were consulted as part of this assessment. OSi maps were available from 1830 historic 6" maps and 1900 from the historic 25" maps. The historic maps indicate that the subject site was a greenfield prior to the current development in the area. No evidence indicates industrial processes being undertaking in the vicinity of the site on any of these maps (refer to Figure 7.3 to Figure 7.6 below).

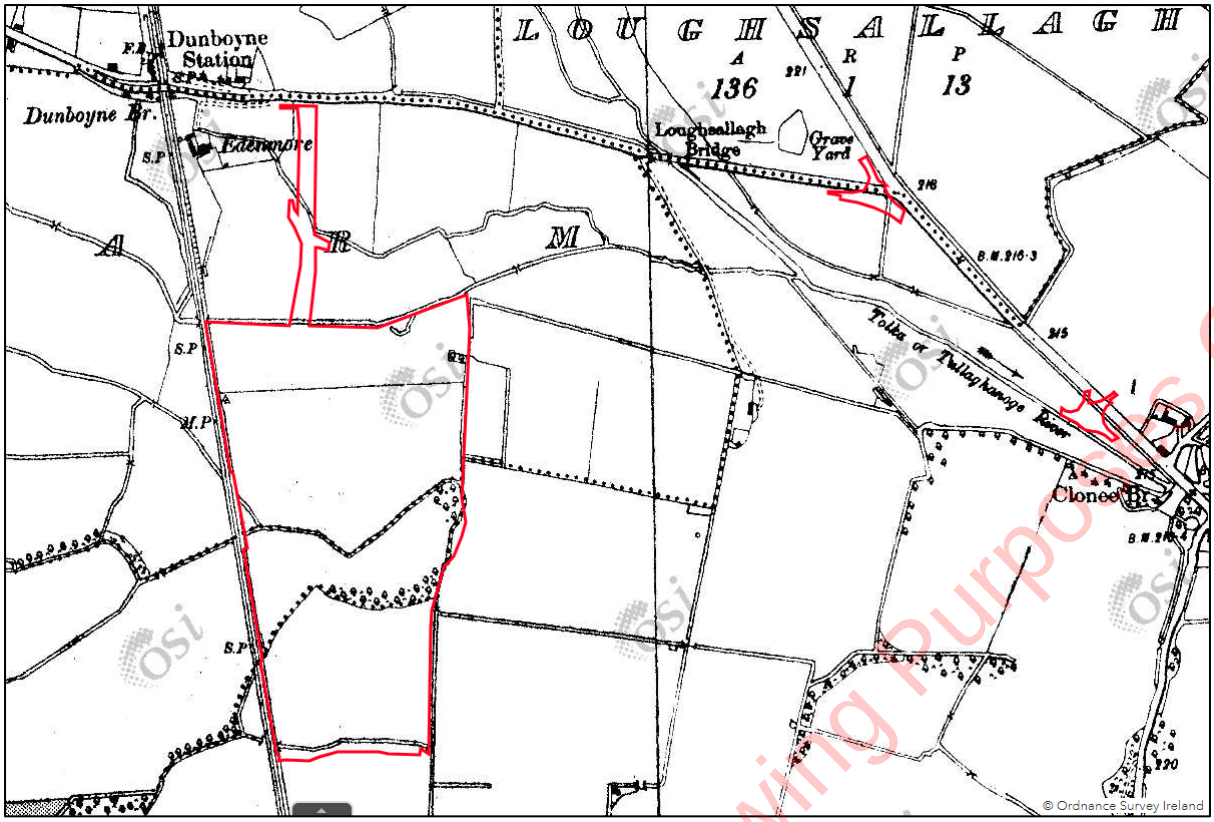


Figure 7.3: Historic 6" Mapping (Site boundary approximated. Source: OSI, 2023)

Figure 7.4: Historic 1995 Aerial Map (Site boundary approximated. Source: OSI, 2023)

Figure 7.5: Historic 1999-2003 Aerial Map (Site boundary approximated. Source: OSI, 2023)

Figure 7.6: Historic 2005-2012 Aerial Map (Site boundary approximated. Source: OSI, 2023)

According to the EPA (2023) there are no licensed IPPC/ IEL facilities in the vicinity of the subject site. The nearest licensed facilities are associated to the Damastown Industrial Park located across the M3 (i.e., downgradient the site); and therefore, hydraulically disconnected from the subject site.

7.3.4 Soils

The GSI/ Tegasc mapping shows that the soil type beneath the local area is composed predominantly of BminDW (mainly basic deep well-drained mineral soils) coupled with BMinPD (mainly basic poorly drained soils) as presented in Figure 7.7 below. BminSW mainly basic shallow well drained soils and AlluvMIN alluvial deposits are found in lesser abundance underlying small sections in the south and north portion of the site, respectively (Refer to Figure 7.3).

According to the ground investigation undertaken by Site Investigation Ltd. (2022), made ground was encountered up to 0.9mbgl and consist of cohesive sandy gravelly silty Clay.

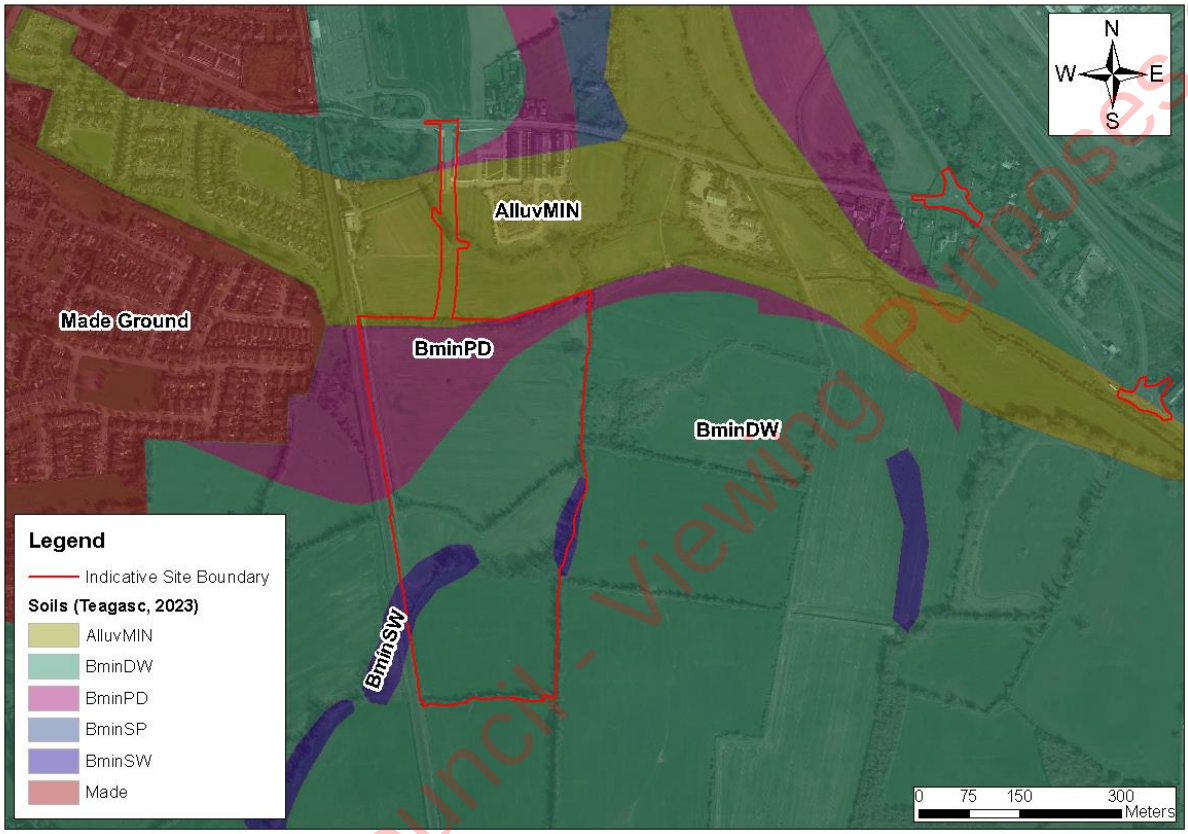


Figure 7.7: Soils Map (Source: Teagasc, 2023) Site boundary approximated.

7.3.5 Subsoils

The Quaternary geological period extends from about 1.5 million years ago to the present day and can be sub-divided into the Pleistocene Epoch, which covers the Ice Age period, and which extended up to 10,000 years ago and the Holocene Epoch, which extends from that time to the present day.

The GSI/ Teagasc mapping database of the subsoils in the area of the subject site indicates one principal soil type, as shown in Figure 7.8below. The quaternary subsoil type present across the site is:

- Limestone till Carboniferous (TLs). The subject site is composed primarily of TILL derived from limestone. This till is made up of glacial CLAYs which are less permeable than alluvium subsoils.
- Bedrock Outcrop or shallow underlying Subcrop. According to GSI mapping, a combination of bedrock outcrop and shallow buried subcrop are found exposed or close to the surface in areas in the south portion of the site.
- Alluvium (A). Alluvium deposits from the floodplains of the proximal Dunboyne Stream and River Tolka tributaries are found in the north portion of the site underlying the access route to the site (Refer to Figure 7.8)

The EPA soil mapping indicates that the soils comprise primarily of Carboniferous limestone diamictons (tills). The EPA have classed this area as non-irrigated agricultural land with arable farming function.

Figure 7.8: Subsoils Map (Source: GSI, 2023) Site boundary approximated

This is consistent with the soil profile encountered during the Site Investigations undertaken in 2022, which can be summarised accordingly as follows:

- Topsoil: Made ground encountered from ground level up to 0.7-0.9mbgl.
- Subsoil: The natural ground conditions in the boreholes and trial pits were dominated by cohesive sandy gravelly Clay with cobbles and boulders. TP01, TP02, TP03, TP07 and TP16 to the north of the site did record some granular GRAVEL and SAND deposits. These deposits were encountered at depths up to 1.7-4.2mbgl.
- No Bedrock was encountered throughout the entirety of the intrusive ground investigations. However, obstruction due to possible bedrock was encountered from 1.7mbgl (TP12, to the east of the site) to 4.2mbgl (BH01, to the northwest)

This profile encountered at the site is considered to be representative for characterising the site in question. Trial pit and borehole logs from the above investigation can be viewed in Appendix 7.2.

7.3.6 Bedrock Geology

Inspection of the available GSI (2023) records (Data Sheet 16 and on-line mapping database) shows that the bedrock geology of the site and the surrounding area is dominated by Carboniferous Dark limestone and shale referred to as part of the Lucan Formation (Rock Unit code: CDLUCN). (Refer to Figure 7.9 below).

Figure 7.9: Bedrock Geology Map (Source: GSI, 2023) Site boundary approximated

While bedrock was not encountered during the ground investigation undertaken by Site Investigations Ltd (2022), inspection of the GSI mapping database indicates small areas of bedrock outcrops or near surface subcrops located in the south portion of the site. Possible bedrock was encountered during the site investigation work at depths between 1.7-4.2mbgl.

7.3.7 Regional Hydrogeology

The GSI has devised a system for classifying the bedrock aquifers in Ireland. The aquifer classification for bedrock depends on a number of parameters including, the area extent of the aquifer (km2), well yield (m3/d), specific capacity (m3/d/m) and groundwater transmissivity (mm3/d). There are three main classifications: regionally important, locally important and poor aquifers. Where an aquifer has been classified as regionally important, it is further subdivided according to the main groundwater flow regime within it. This sub-division includes regionally important fissured aquifers (Rf) and regionally important karstified aquifers (Rk). Locally important aquifers are sub-divided into those that are generally moderately productive (Lm) and those that are generally moderately productive only in local zones (Ll). Similarly, poor aquifers are classed as either generally unproductive except for local zones (Pl) or generally unproductive (Pu).

From analysis of GSI National data the bedrock aquifer underlying the study site is classified as (Ll) Locally Important which is characterised as bedrock that is moderately productive only in Local Zones (refer to Figure 7.10 below).

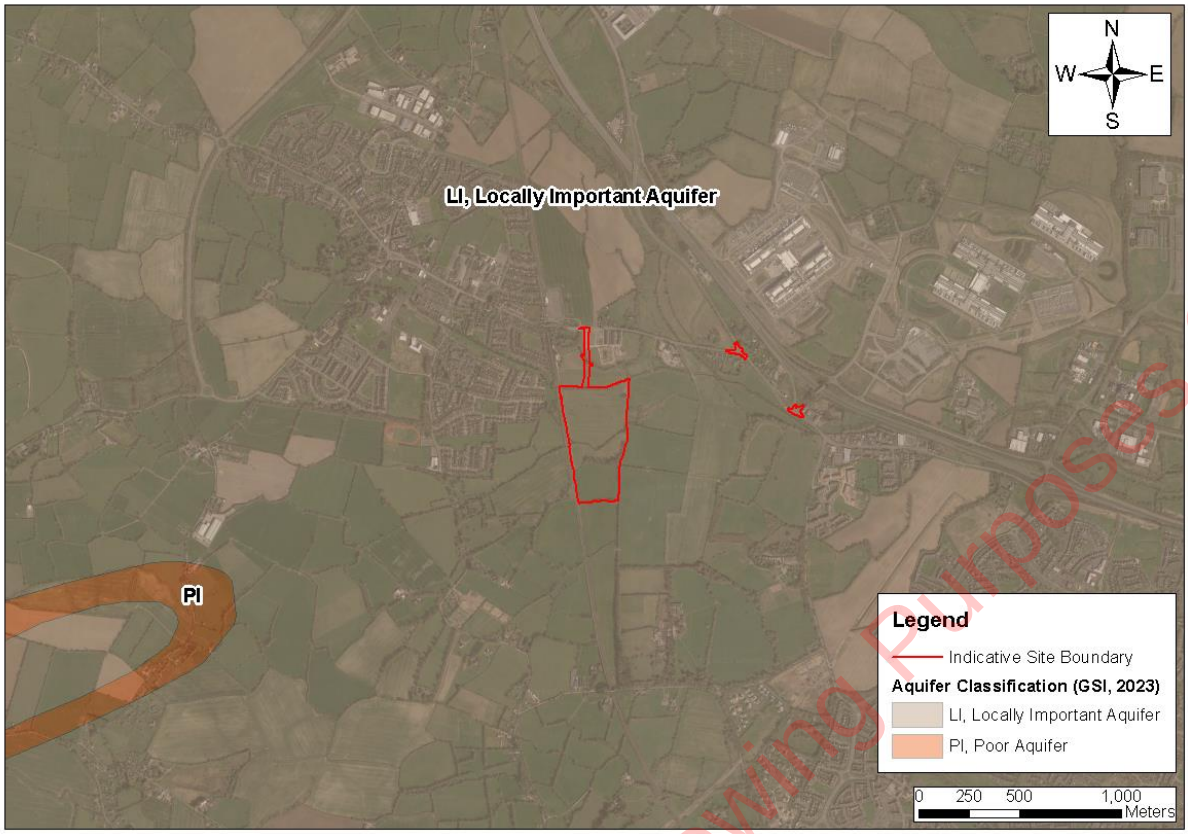


Figure 7.10: Aquifer Classification Map (Source: GSI, 2023) Site boundary approximated

7.3.8 Aquifer Vulnerability

Aquifer vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated generally by human activities. Due to the nature of the flow of groundwater through bedrock in Ireland, which is almost completely through fissures, the main feature that protects groundwater from contamination, and therefore the most important feature in protection of groundwater, is the subsoil (which can consist solely or of mixtures of peat, sand, gravel, glacial till, clays or silts).

The GSI currently displays/shows varied aquifer vulnerability across in the region. The approximate northwest half of the site overlies a 'Moderate' vulnerable aquifer, while moving further north the vulnerability is classifies as 'Low'. The south portion of the site is underlain predominantly by an aquifer characterised by 'High Vulnerability' with some localized zones of 'Extreme Vulnerability' which are associated and coincide with outcrop and near surface subcrops. The area associated to the 2 no. roundabouts on the R147 (Old Navan Road) is classified as having 'Low' vulnerability.

The GSI (2023) classifies the aquifer vulnerability in the region as 'Low' (to the north) to 'Extreme' (to the centre and south of the site) which indicates a general overburden depth potential of >10 m to 0-3 m respectively (refer to **Error! Reference source not found.** below). The aquifer vulnerability class in the region of the site is presented below as Figure 7.11.

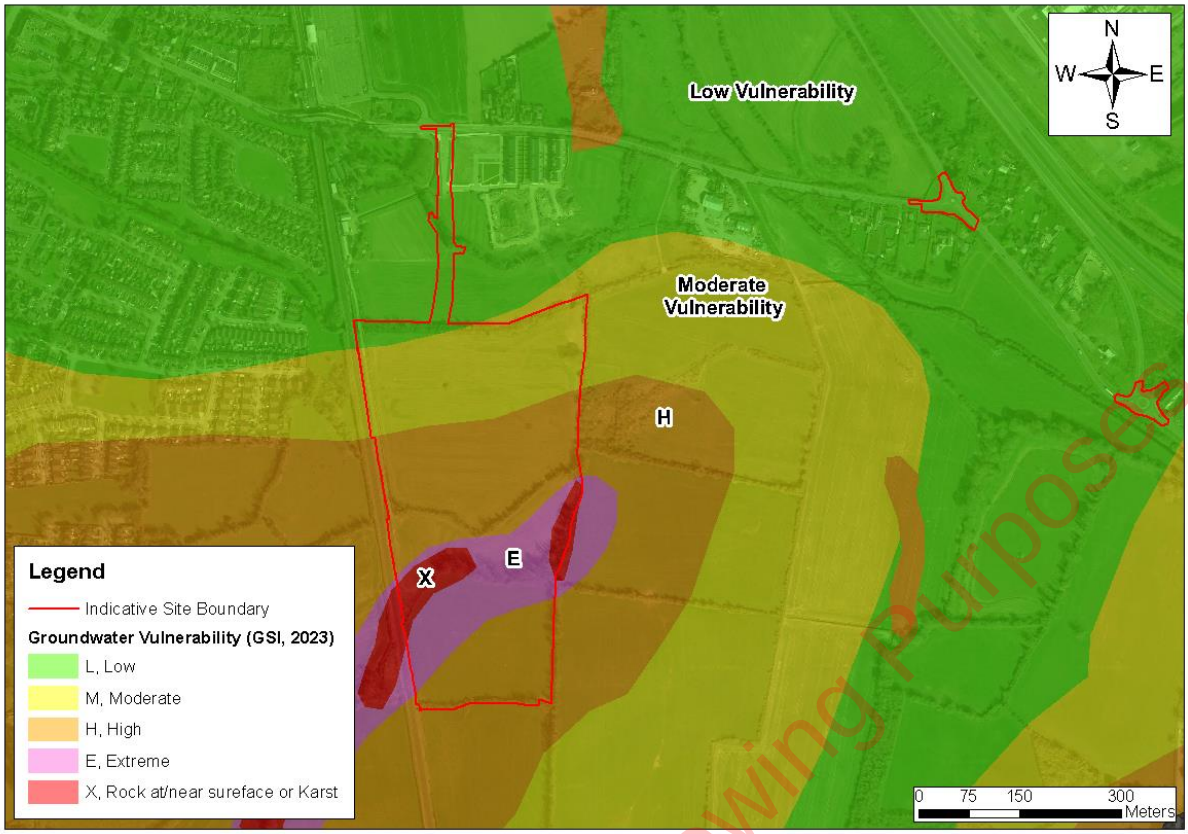


Figure 7.11: Aquifer Vulnerability Map (Source: GSI, 2023) Site boundary approximated

Vulnerability Rating	Hydrogeological Condition				
	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 m	0 - 3 m	0 - 3 m	0 - 3 m	-
High (H)	> 3 m	3 - 10 m	3 - 5 m	> 3 m	n/a
Moderate (M)	n/a	> 10 m	5 - 10 m	n/a	n/a
Low (L)	n/a	n/a	> 10 m	n/a	n/a

Notes: (1) n/a: Not applicable
(2) Precise permeability values cannot be given at present
(2) Release point of contaminants is assumed to be 1-2 below ground surface

Table 7.1: Vulnerability Mapping Guidelines

According to the site investigations undertaken in 2022, bedrock is encountered between 1.7-4.2mbgl, which is indicative of a 'High' to 'Extreme' vulnerability throughout the site.

7.3.9 Groundwater Wells and Flow Direction

The GSI Well Card Index is a record of wells drilled in Ireland, water supply and site investigation boreholes. It is noted that this record is not comprehensive as licensing of all wells is not currently a requirement in the Republic of Ireland. This current index does not show any wells drilled or springs at the site while multiple wells are located within the immediate vicinity which are mainly associated to the junction of the Dunboyne Stream (also known as Castle Stream) and the River Tolka. None of the wells is the surrounding area listed are categorised as domestic use. The area is serviced by Local

Authority mains therefore it is unlikely that any wells are used for potable supply. The site is not located near any public groundwater supplies or group schemes. There are no groundwater source protection zones in the immediate vicinity of the site. The zone in closest proximity is approximately 1.6 km to the northwest (Dunboyne PWS) and the proposed site is outside of the zone of contribution of this supply.

Figure 7.12 below presents the GSI well search for the area surrounding the site (note this source does not include all wells). There are no details of this recorded well in the GSI Well Card Index.

Regional groundwater flow would most likely be to the east-northeast towards the junction between Dunboyne Stream (also known as Castle Stream) and River Tolka and towards Dublin Bay, following the regional topography.

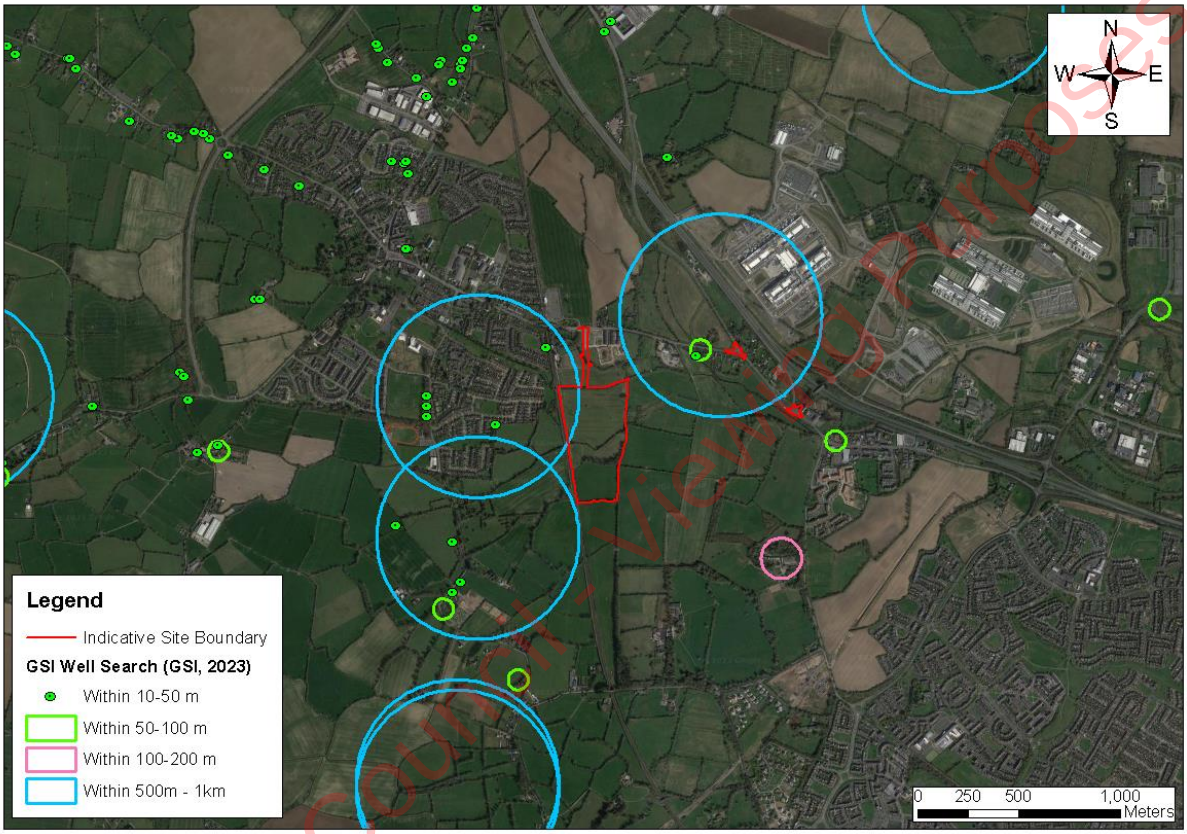


Figure 7.12: GSI Well Search Map (Source: GSI, 2023)

7.3.10 Soil Quality

There are no legislated threshold values for soils in Ireland. As such soil samples were compared to a Generic Assessment Criteria (GAC) derived to be protective of human health, water bodies (including groundwater) and also ecology for a resident and commercial/industrial end use.

GAC in the UK has been derived using the Contaminated Land Exposure Assessment (CLEA) model to be protective of human health for a number of different land uses. LQM (Land Quality Management) and the CIEH (Chartered Institute of Environmental Health) developed a document in July 2009 detailing their own research and derivation of their own 'LQM GACs'. A total of 82 substances including many organic substances had LQM GACs derived, for the standard land uses of residential, commercial/industrial and allotments. This was updated in 2015 following further research and the derived results are now called LQM/CIEH Suitable 4 Use Level (S4UL). The LQM/CIEH S4ULs are intended for use in assessing the potential risks posed to human health by contaminants in soil and as transparently derived and cautious "trigger values" above which further assessment of the risks or remedial action may be needed. For each contaminant S4ULs have been derived for six land use scenarios based on assessing exposure pathways in each planning scenario. In this instance the

commercial scenario has been considered. Soil type and soil organic matter (SOM) has an influence on the behaviour of contaminants. S4ULs have been derived for three SOM contents (1%, 2.5% and 6%) to cover the likely range in soils. A prudent approach has been taken by considering the lower 1% SOM content.

The UK values do not have any legal standing within the Republic of Ireland and no statutory guidance for assessing the significance of soil contamination currently exists. However, the values do provide a means of placing the data within context when considering magnitude of risk and have been used in that capacity for this assessment.

In total, 5 no. soil samples were collected throughout the intrusive ground investigation exercise at the subject site and analysed for a range of parameters to examine the soil quality and to investigate any present and/or past contamination occurred across the site. Full laboratory result tables for the soil samples are presented in Appendix 7.2.

The soil samples were analysed by ALS Life Sciences LTD, UK for the following parameters:

- Metals (An, As, Ba Cd, Cr, Cu, Pb, Hg, Mo, Ni Se, and Zn);
- Polychlorinated Biphenyls (PCB);
- Total Petroleum Hydrocarbons Criteria Working Group (TPH CWG);
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Mineral oil;
- BTEX compounds (benzene, toluene, ethylbenzene and xylenes) and methyl tert-butyl ether (MTBE);
- Total organic carbon (TOC); and
- Waste Acceptance Criteria (WAC) for inert waste landfills in accordance with the 2002 European Landfill Directive (2002/33/EC).;

The full analytical laboratory report is presented within the Appendix 7.2. For this EIAR the soil results were compared to the GAC concentrations. GACs are soil concentrations that have been derived for a defined set of generic assumptions and are used as trigger values in determining whether further risk management action is required in cases where detailed quantitative risk assessment is not being undertaken.

7.3.10.1 Metals

All metal parameter concentrations recorded values below the most conservative threshold value for the LQM/CIEH for HHRA (Human Health Risk Assessment) Residential Threshold at 1% SOM.

Total Petroleum Hydrocarbon Criteria Working Group (TPH CWG)

All parameters recorded below the laboratory's limit of detection (LOD) for all soil samples collected across the site. Therefore, there are no exceedances recorded when these concentrations were compared to the most conservative threshold i.e. LQM/CIEH for HHRA Residential Threshold at 1% SOM.

7.3.10.2 PCBs

All parameters recorded below the laboratory's LOD for all samples collected across the site.

7.3.10.3 PAHs

All parameters recorded below the laboratory's LOD for all samples collected across the site. Therefore, there are no exceedances recorded when these concentrations were compared to the most conservative threshold i.e. LQM/CIEH for HHRA Residential Threshold at 1% SOM.

7.3.10.4 Waste Acceptance Criteria (WAC) Analysis

The 5 no. samples were analysed and compared against Waste Acceptance Criteria (WAC) set out by the adopted EU Council Decision 2003/33/EC which established criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 and Annex II of Directive 1999/31/EC (2002). There was no fill material noted during trial pit excavations with all samples being recorded as original clay subsoil.

The WAC analysis identifies all the representative samples are suitable for classification as Category A – Inert. Based on the laboratory results and parametric concentrations obtained from the site investigation, material from the sample locations would be acceptable at inert waste facilities (Category A). It should be noted that waste facilities develop facility specific criteria also and this should be considered should any soil/ material to be removed from site in the future. The comparison tables for the analysed samples against current WAC criteria can be seen in Appendix 7.2.

7.3.11 Groundwater Quality

The Water Framework Directive (WFD) Directive 2000/60/EC, was adopted in 2000 as a single piece of legislation covering rivers, lakes, groundwater and transitional (estuarine) and coastal waters. In addition to protecting said waters, its objectives include the attainment of 'Good Status' in water bodies that are of lesser status at present and retaining 'Good Status' or better where such status exists at present. 'Good Status' was to be achieved in all waters by 2015, as well as maintaining 'high status' where the status already exists. The EPA co-ordinates the activities of the River Basin Districts, local authorities and state agencies in implementing the directive, and operates a groundwater quality monitoring programme undertaking surveys and studies across the Republic of Ireland.

Presently, the groundwater body in the region of the site (Dublin GWB) is classified under the WFD Risk Score system (EPA, 2023) as 'Under Review'. The Dublin GWB was given a classification of "Good" for the last WFD cycle (2016-2021).

7.3.12 Economic Geology

The GSI (2023) mineral database was consulted to determine whether there were any mineral sites in the area of the subject site. The designated mineral locality in closest proximity to the subject site is a Gravel pit containing non-metallic unsorted sands and gravels composed primarily of limestone fragments and siliurian clasts. These mineral deposits are located approximately 1.7 km north of the site.

7.3.13 Geological Heritage

The Geological Survey of Ireland (GSI) Public Viewer (www.gsi.ie/mapping) was reviewed to identify sites of geological heritage for the site and surrounding area. The Louisa Bridge Cold Spring (Site Code KE016) approximately 5.4 km to the south east is the closest audited site. The Huntstown Quarry (Site Code DF022) and the Phoenix Park and Glasnevin Cemetery are located within a 10km radius of the site.

7.3.14 Radon

According to the EPA pre May 2022 (now incorporating the Radiological Protection Institute of Ireland) the site location in Dunboyne is a Low Radon Area where is it estimated that less than 1% of dwellings within the given 10 km grid square will exceed the Reference Level of 200 Bq/m3. This is the lowest of the five radon categories which are assessed by the EPA.

7.3.15 Geohazards

Much of the Earth's surface is covered by unconsolidated sediments which can be especially prone to instability. Water often plays a key role in lubricating slope failure. Instability is often significantly increased by man's activities in building houses, roads, drainage and agricultural changes. Landslides, mud flows, bog bursts (in Ireland) and debris flows are a result. In general, Ireland suffers few landslides. Landslides are more common in unconsolidated material than in bedrock, and where the sea constantly erodes the material at the base of a cliff and leads to recession of the cliffs. Landslides have also occurred in Ireland in recent years in upland peat areas due to disturbance of peat associated with construction activities. The GSI landslide database was consulted and the landslide in closest proximity to the proposed development was approximately 0.8 km to the east of the site, referred to as the M3 J4 Clonee 2014 which occurred on 3rd February 2014. There have been no recorded landslide events at the site. Due to the generally flat/level local topography and the underlying strata there is a negligible risk of a landslide event occurring at the site.

In Ireland, seismic activity is recorded by the Irish National Seismic Network. The Geophysics Section of the School of Cosmic Physics at the Dublin Institute for Advanced Studies (DIAS) has been recording seismic events in Ireland since 1978. The station configuration has varied over the years. Currently there are five permanent broadband seismic recording stations in Ireland and operated by DIAS. The seismic data from the stations comes into DIAS in real-time and are studied for local and regional events. Records since 1980 show that the nearest seismic activity to the proposed location was in the Irish sea (1.0 – 2.0 Ml magnitude) and ~55 km to the south in the Wicklow Mountains. There is a very low risk of seismic activity to the proposed development site.

There are no active volcanoes in Ireland so there is no risk from volcanic activity.

7.3.16 Areas of Conservation

The lands in which the proposed development is located have no formal designations. The closest area of ecological importance is the Royal Canal proposed Natural Heritage Area (pNHA) (Site Code 002103) which is approximately 4.0km to the south of the site. The Liffey Valley pNHA (Site Code 000128) is located approximately 4.4km to the south of the site. The site has no hydrological connectivity to any of these sites.

A review of the EPA (2023) on-line database indicates there are no NPWS protected areas in the immediate vicinity of the Proposed Development site. The nearest Natura 2000 Sites are the Rye Water Valley/Carton Special Area of Conservation (SAC)/ Special Protection Area (SPA)/ proposed Natural Heritage Area (pNHA) which are c. 4.7 Km to the south of the site. There would not be hydrological connection between the proposed development and these sites.

There would be an indirect discharge to Dublin Bay waterbody from the Proposed Development site through the stormwater and foul water site drainage as described in Chapter 8. The South Dublin Bay hosts a range of Natura 2000 Sites (SPA/SAC/pNHA). These Natura 2000 Sites are located c. 16 Km to the southeast of the subject site. Figure 7.13 below presents the location of these protected areas in the context of the proposed development site.

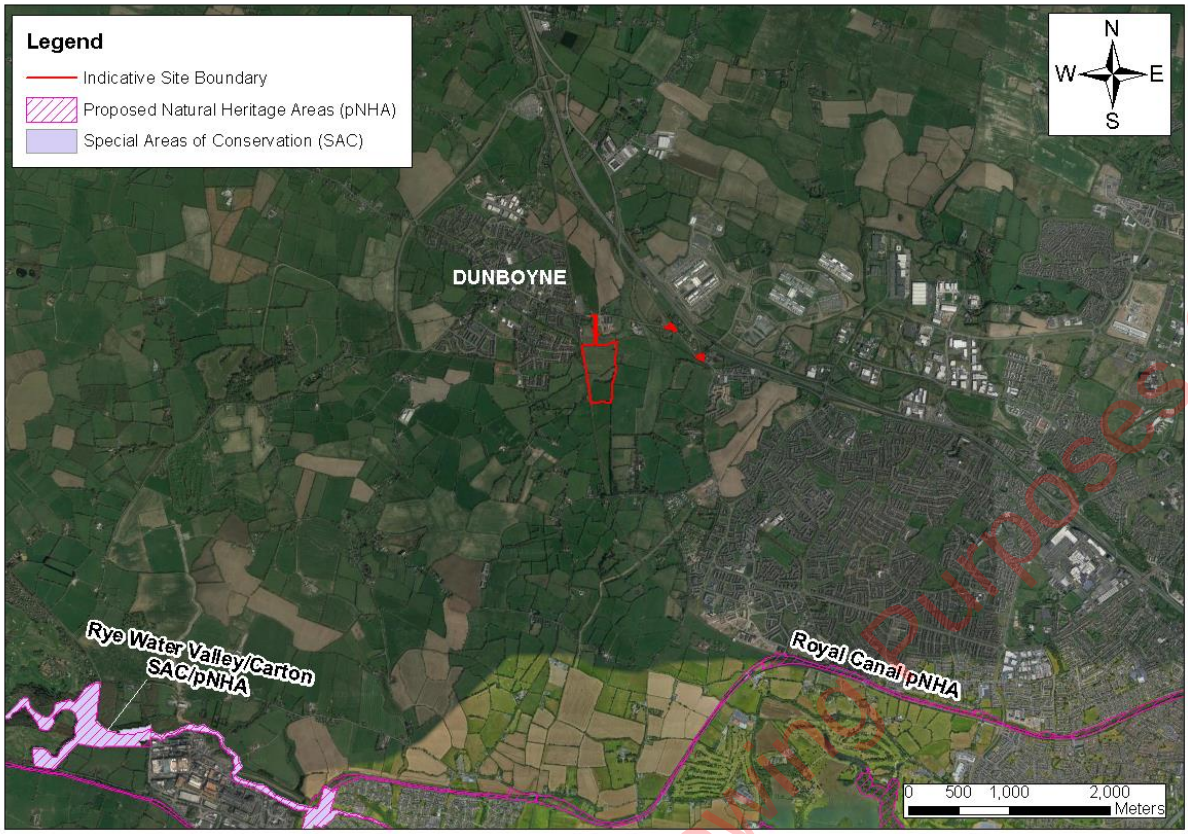


Figure 7.13: Natura Sites in the Context of the Subject Site (Source: NPWS, 2022) Site boundary approximated

7.3.17 Conceptual Site Model

A local cross section of the site are presented below in Figure 7.14. This cross section and the description below present the Conceptual Site Model (CSM). The CSM was developed in order to identify any likely Source-Pathway-Receptor linkages relating to the site and the Proposed Development. The summary of the current CSM for the Proposed Development is as follows:

- The site is currently occupied by multiple greenfield lands separated by ditches and hedgerow which are currently used for agricultural purposes. The existing landscape in the area of the proposed works is a mixture of agricultural land, railway and residential housing.
- The natural overburden consist low permeability cohesive deposits associated to till derived from limestones and alluvial deposits associated to the Dunboyne Stream. Subsoil has been identified up to depths ranging between 1.7 to 4.2 mbgl. This soil has been noted as sandy gravelly Clay and some granular deposits. This indicates a 'High' to 'Extreme' Aquifer Vulnerability classification due to thickness and type of overburden present.
- The bedrock beneath the site is Carboniferous Dark limestone (Lucan Formation), this is a (Ll) Locally Important Aquifer which are generally moderately productive only in local zones. Regional groundwater flow would most likely be to the east-northeast towards the junction between Dunboyne Stream and River Tolka and towards Dublin Bay, following the regional topography.
- Based on the low-level detection of constituents of concern below the available soil standards and guideline values, the subsoil and local aquifer are considered to be relatively clean. According to the WAC analysis undertaken, all subsoils can be classified as Inert.
- Review of the hydrogeology and geology in the surrounding region indicates that there are no sensitive receptors such as groundwater-fed wetlands, Council Water Supplies/ Group Water Schemes or geological heritage sites which could be impacted by this development. No

evidence of disposal of waste material was identified the location area proposed for excavation. As mentioned above, collection and analysis of representative soil for a wide range of parameters shows no evidence of contamination.

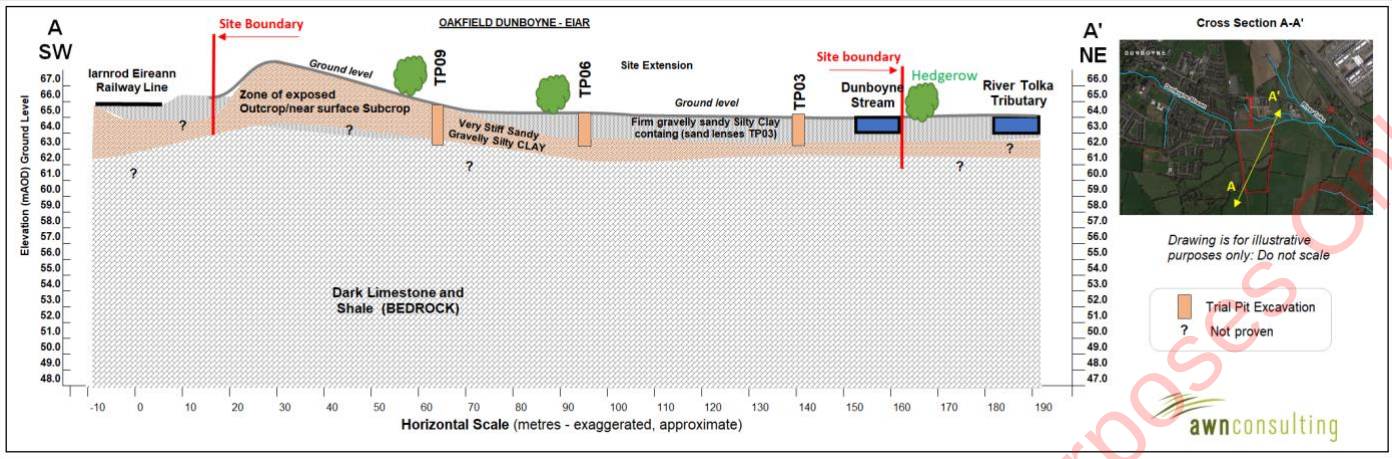


Figure 7.14: Regional Cross Section

7.3.18 Rating of Importance of Geological and Hydrogeological Attributes

Based on the TII methodology (2009) (See Appendix 7.1) the importance of the hydrogeological features at this site is rated as 'Low importance' based on the assessment that the attribute has a low quality significance or value on a local scale.

Based on the TII methodology (2009) (See Appendix 7.1), criteria for rating site importance of geological features, the importance of the bedrock and soil features at this site is rated as 'Low importance' based on the assessment that the attribute has a low quality significance or value on a local scale.

7.4 Characteristics of the Proposed Development

7.4.1 Proposed Development

Permission is sought for a period of 10 Years for a proposed development on a site of approximately 16.9Ha consisting of 716no. residential units in a mix of houses, duplex and apartment buildings ranging in height from 2 to 7 storeys overall; comprising of 155no. 2 storey houses; 517no. apartments accommodated in 8no. buildings ranging in height from 4 to 7 storeys; 44no. duplex units accommodated in 2no. 3 storey terraces; 1no. childcare facility (c.602sqm) located at ground floor level of Block B1; public open space; communal and private open space; public lighting; car parking, including basement car parking under some of the apartments; secure bicycle parking; and all associated and ancillary site development and infrastructural works, hard and soft landscaping and boundary treatment works, provision of c. 470m of new distributor road; provide a 200mm diameter watermain in existing section of southern distributor road adjacent to recently constructed Castle Farm development; upgrade of junction of southern distributor road and L2228 (Station Road) to provide a signalised junction with pedestrian crossings, including ancillary adjustments to road markings on both roads; provision of foul drainage pumping station; provision of a compensatory storage area adjacent to Castle Stream; ESB Sub-Stations; and improvement works to 2 no. roundabouts on the R147 (Old Navan Road).

The proposed development is described in further detail in Chapter 3 Project Description and in the Construction Environmental Management Plan. The activities associated with the proposed Project which are relevant to the land, soils, geology and hydrogeological environment are detailed in Table 7.2 below.

Phase	Activity	Description
Construction	Discharge to Ground	Stormwater run-off percolating to ground at the construction site.
	Earthworks: Excavation of Superficial Deposits	Cut and fill will be required to facilitate construction of the proposed project, basements and associated ancillary services. Excess material which cannot be re-used on-site will be disposed off-site at a suitably licensed facility in accordance with the Construction and Demolition Waste Management Plan (C&D WMP). The level of excavation required to facilitate installation of services, basements and foundations is 4mbgl. There will be no excavation of bedrock required; therefore, no aquifer dewatering required. Subsoil stripping and localised stockpiling of soil will be required during construction. It is estimated that approximately 43,307m^3 of soils will be excavated to facilitate construction of the proposed project. It is anticipated that 10,000m^3 of the excavated used to raise the level of the southern field. Approximately 33,307m^3 of material will be removed from site. Volume of clean material to be imported to site (i.e. under roads, pavements, building, etc.) is approximately 19,580m^3 Suitable excavated material will be reused for site levelling, roads, car parking areas, berms and other landscaping purposes. Material removed from site may be re-used off-site for beneficial use on other sites with appropriate planning / waste permissions / derogations (e.g. in accordance with Article 27 of the European Communities (Waste Directive) Regulations 2011) as amended, or will be reused, recovered and / or disposed off-site at appropriately authorised waste facilities
	Storage of soils/aggregates	Aggregate materials such as sands and gravels will be stored in clearly marked receptacles within a secure compound area to prevent contamination. Temporary storage of spoil will be managed to prevent accidental release of dust and uncontrolled surface water run-off which may contain sediment and solid matter. Materials will be sent off site for recycling where possible and, if not suitable for recycling, materials will be disposed of to an appropriate permitted/licensed waste disposal facility.
	Storage of hazardous Material	Temporary storage of fuel required for on site for construction traffic. Liquid materials i.e., fuel storage will be located within temporary bunded areas, doubled skinned tanks or bunded containers (all bunds will conform to standard bunding specifications - BS8007-1987) to prevent spillage. These will be stored within the contractor yard.
Operation	Increase/ Decrease in hardstanding area	Altering of local recharge (percolation to ground) only due to the modification in hard standing area. There will be an increase in hardstanding area of c. 6.003Ha.
	Storage of hazardous Material	No bulk fuel or chemical storage at the Site. Only potential for minor fuel leaks from parked cars, service vehicles, HGV deliveries, etc.

Table 7.2: Summary of Site Activities

7.5 Potential Impact of the Proposed Development

An analysis of the potential effects of the Proposed Development on the land, soils, geology and hydrogeological environment during the construction and operation is outlined below. Due to the inter-relationship between soils, geology and hydrogeology and surface water (Hydrology), the following impacts discussed are also applicable to both Chapter 6 and 7 (Hydrology) of the EIAR. Mitigation measures included in the design of this project to address these potential impacts are presented in Section 7.6 below.

7.5.1 Proposed Development

7.5.1.1 Construction Phase

In the absence of mitigation, the following potential effects to land, soil and groundwater (hydrogeology) have been considered for the construction phase.

Excavation and Infilling

Due to the lack of previous development at the site and the historical agricultural use at the site, the risk of contaminated soils being present onsite is low and this was confirmed by onsite soil sampling and analysis. Nonetheless material, which is exported from site, if not correctly managed or handled, could impact negatively on human beings (onsite and offsite) as well as water and soil environments.

The levelling of ground and excavation for foundations will require the excavation of topsoil and subsoil. The maximum excavation level would be c. 4.0mbgl.

It has been estimated that 43,307m^3 of excavated subsoil and topsoil will be generated. It is anticipated that 10,000m^3 of the excavated material will be used to raise the level of the southern field. Import of fill will not be required.

Site investigation and laboratory analysis has not identified any existing contamination. However, if contaminated soil/water is encountered, it will be required to be removed by a licensed waste contractor.

It is expected during the excavation works that localised dewatering of the subsoils will be required to address perched groundwater. It can be expected minor ingress of rainfall in the excavation during construction phase.

In the absence of mitigation, the effect on the local and regional environment is likely to be ***short-term, slight*** and ***negative***. The effect is considered to be 'slight' due to there will not be intervention on the geological and hydrological regime on a local or regional scale.

Accidental Spills and Leaks

As with all construction projects there is potential for water (rainfall and/or groundwater) to become contaminated with pollutants associated with construction activity. Contaminated water which arises from construction sites can pose a significant temporary risk to groundwater quality for the duration of the construction if contaminated water is allowed percolate to the aquifer.

During construction of the development, there is a risk of accidental pollution incidences from the following sources:

- Suspended solids (muddy water with increase turbidity) – arising from excavation and ground disturbance;
- Cement/concrete (increase turbidity and pH) – arising from construction materials;
- Hydrocarbons (ecotoxic) – accidental spillages from construction plant or onsite storage;
- Wastewater (nutrient and microbial rich) – arising from accidental discharge from on-site toilets and washrooms.

Accidental spillages which are not mitigated may result in localised contamination of soils and groundwater underlying the site, should contaminants migrate through the subsoil's and impact the underlying groundwater. Groundwater vulnerability at the site is currently classified as 'High' to 'Extreme'. Any soil stripping will also further reduce the thickness of subsoil and the natural protection they provide to the underlying aquifer.

In the absence of mitigation, the effect on the local and regional environment is likely to be ***short-term, slight*** and ***negative***. The effect is considered to be 'slight' due to there will not be intervention on the geological and hydrological regime on a local or regional scale.

Loss of Agricultural Land

There will be local loss of agricultural soil however, the area of development is small in the context of the overall agricultural land available in the region. The majority of the land is zoned for development. Within the overall context of Ireland's available farmland, the loss is negligible. There will be no impact to mineral resources in the area as a result of the Proposed Development.

7.5.1.2 Operational Phase

There will be an increase in hardstand as a result of the development of the facilities of c. 6,003Ha. Incorporation of hard stand area on previous greenfield area and the use of SUDs techniques (refer to Chapter 8) will have a minor effect on local recharge to ground; however, the impact on the overall groundwater regime will be insignificant considering the proportion of the site area in relation to the total aquifer.

In the absence of mitigation, the effect on the geological and hydrogeological environment is likely to be ***long-term, slight*** and ***negative***. The effect is considered to be 'slight' due to there will not be intervention on the geological and hydrological regime on a local or regional scale.

7.5.1.3 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 at this site. There would, therefore, be a neutral effect on the geological and hydrogeological environment in terms of waste.

The site is zoned for development, and it is likely that in the absence of this subject proposal that a development of a similar nature would be progressed on the site that accords with national and regional policies and therefore the likely significant effects would be similar to this proposal. A potential increase in hardstanding areas would result in local changes to recharge and hydrological flow patterns.

7.6 Mitigation Measures (Ameliorative, Remedial or Reductive Measures)

The design has taken account of the potential impacts of the development on the soils, geology and hydrogeology environment local to the area where construction is taking place and containment of contaminant sources during operation. Measures have been incorporated in the design to mitigate the potential effects on the surrounding soils, geology and hydrogeology. These are described below.

Due to the inter-relationship between soils, geology, hydrogeology and hydrology, the following mitigation measures discussed will be considered applicable to all. Waste Management is also considered an interaction in some sections.

7.6.1 Proposed Development

7.6.1.1 Construction Phase

Construction Environmental Management Plan (CEMP)

In advance of work starting on site, the works Contractor will prepare a detailed Construction Environmental Management Plan (CEMP). The detailed CEMP will set out the overarching vision of how the construction of the Proposed Development will be managed in a safe and organised manner by the Contractor. The CEMP will be a live document and it will go through a number of iterations before works commence and during the works. It will set out requirements and standards which must be met during the construction stage and will include the relevant mitigation measures outlined in the EIA Report and any subsequent planning conditions relevant to the Proposed Development.

As a minimum, the CEMP should be formulated in accordance with best international practice including but not limited to:

- CIRIA, (2001), Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors, (C532) Construction Industry Research and Information Association;
- CIRIA (2002) Control of water pollution from construction sites: guidance for consultants and contractors (SPI56) Construction Industry Research and Information Association
- CIRIA (2005), Environmental Good Practice on Site (C650); Construction Industry Research and Information Association
- BPGCS005, Oil Storage Guidelines;
- Eastern Regional Fisheries Board, (2006), Fisheries Protection Guidelines: Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites;
- CIRIA 697, The SUDS Manual, 2007; and
- UK Pollution Prevention Guidelines (PPG) UK Environment Agency, 2004.

In order to reduce impacts on the soil, geological and hydrogeological environment, a number of mitigation measures will be adopted as part of the construction works on site as outlined below.

Control of Soil Excavation

Site preparation, excavations and levelling works required to facilitate construction of foundations, access roads and the installation of services will require imported material. Suitable soils will be reused on site as backfill in the grassed areas, where possible. Contractors shall be required to submit and adhere to a method statement indicating the extent of areas likely to be affected and demonstrating that this is the minimum disturbance necessary to achieve the required works.

According to onsite investigations, the bedrock vulnerability is 'High' to 'Extreme'. However, removal and reinstatement of subsoil cover will not alter the vulnerability category of the underlying bedrock. The deposition of infill soil would increase the overburden thickness and thus may even decrease the groundwater vulnerability.

Temporary storage of soil will be carefully managed in such a way as to prevent any potential negative impact on the receiving environment and the material will be stored away from any open surface water drains. Movement of material will be minimised in order to reduce degradation of soil structure and generation of dust.

Although there is no evidence of historical contamination in the proposed development area, all excavated materials will be visually assessed for signs of possible contamination such as staining or strong odours. Site investigations classified the subsoils as 'inert'. Should any unusual staining or odour be noticed, samples of this soil will be analysed for the presence of possible contaminants in order to ensure that historical pollution of the soil has not occurred. Should it be determined that any of the soil excavated is contaminated, this will be disposed of by a licensed waste disposal contractor.

Stockpiles have the potential to cause negative impacts on air and water quality. The effects of soil stripping and stockpiling will be mitigated against through the implementation of appropriate earthworks handling protocol during construction. It is anticipated that any stockpiles will be formed within the boundary of the site and there will be no direct link or pathway from this area to any surface water body. Overburden material will be protected from exposure to wind by storing the material in sheltered parts of the site, where possible.

Fuel and Chemical Handling

To minimise any impact on the underlying subsurface strata from material spillages, all oils, solvents and paints used during construction will be stored within temporary bunded areas. Oil and fuel storage tanks shall be stored in designated areas, and these areas shall be bunded to a volume of 110% of the capacity of the largest tank/container within the bunded area(s) (plus an allowance of 30 mm for rainwater ingress). Drainage from the bunded area(s) shall be diverted for collection and safe disposal.

Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles will take place in a designated area (or where possible off the site) which will be away from surface water gulleys or drains. In the event of a machine requiring refuelling outside of this area, fuel will be transported in a mobile double skinned tank. An adequate supply of spill kits and hydrocarbon adsorbent packs will be stored in this area. All relevant personnel will be fully trained in the use of this equipment. Guidelines such as "Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors" (CIRIA 532, 2001) will be complied with.

Where feasible all ready-mixed concrete will be brought to site by truck. A suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline wastewaters or contaminated storm water to the underlying subsoil. Wash down and washout of concrete transporting vehicles will take place at an appropriate facility offsite.

In the case of drummed fuel or other chemical which may be used during construction, containers should be stored in a dedicated internally bunded chemical storage cabinet and labelled clearly to allow appropriate remedial action in the event of a spillage.

Control of Water during Construction

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.

Should any discharge of construction water be required during the construction phase, discharge will be to foul sewer. Pre-treatment and silt reduction measures on site will include a combination of silt fencing, settlement measures (silt or sediment traps, 20 m buffer zone between machinery and watercourses, refuelling of machinery off site) and hydrocarbon interceptors. All water runoff from designated refuelling areas will be channelled to an oil interceptor or an alternative treatment system prior to discharge.

Any minor ingress of groundwater and collected rainfall in the excavation will be pumped out during construction. It is estimated that the inflow rate of groundwater will be low and limited to the northeast of the site. It is therefore proposed that the water be discharged via the existing stormwater sewer network. Extensive monitoring will be adopted to ensure that the water is of sufficient quality to discharge to the sewer. The use of slit traps and an oil interceptor (if required) will be adopted if the monitoring indicates the requirements for the same with no silt or contaminated water permitted to discharge to the sewer. There may be localised pumping of surface run-off from the excavations during and after heavy rainfall events to ensure that the excavations are kept relatively dry. Due to the very low permeability of the Dublin Boulder Clay and the relative shallow nature for excavations, infiltration to the underlying aquifer is not anticipated.

Monitoring Measures

Daily visual inspection will be undertaken by the contractor at the silt trap/ settlement tank to ensure adequate internal settlement is occurring. Where the visual assessment highlights elevated suspended sediments higher than expected, the water will be re-circulated for further settlement.

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 10 m from surface water receptors. Regular inspection of surface water run-off and any sediment control measures (will be carried out during the construction phase.

Regular auditing of construction / mitigation measures will be undertaken, e.g. concrete pouring, refuelling in designated areas, etc. A log the regular 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 occur.

7.6.1.2 Operational Phase

The proposed development will provide full attenuation for increase in hardstand area in compliance with the requirements of the Greater Dublin Strategic Drainage Study. A number of measures will be put in place to minimise the likelihood of any spills entering the groundwater environment to include the design of the car park, fitting of refuelling areas with hydrocarbon interceptors and on-site speed restrictions. Refer to Chapter 8 for further details.

The design includes hardstand cover and permeable paving across the site prior to discharge into the attenuation system. Therefore, the risk of accidental discharge has been adequately addressed through design.

Petrol interceptors will be installed as part of the SuDS measures to capture any potential oil or hydrocarbon contamination prior to discharge into the attenuation system on site (refer to Chapter 8 for further details). This together with hardstand cover and permeable paving will minimise the potential for any impact to the hydrogeological environment.

7.7 Residual Impact of the Proposed Development

7.7.1 Proposed Development

7.7.1.1 Construction Phase

The implementation of mitigation measures outlined above will ensure that the predicted impacts on the geological and hydrogeological environment do not occur during the construction phase and that the residual impact will be ***short-term-imperceptible-neutral***. Following the TII criteria (refer to Appendix 7.1) for rating the magnitude and significance of impacts on the geological and hydrogeological related attributes, the magnitude of impact is considered ***negligible***.

7.7.1.2 Operational Phase

The implementation of mitigation measures outlined above will ensure that the predicted impacts on the geological and hydrogeological environment do not occur during the operational phase and that the residual impact will be ***long-term-imperceptible-neutral***. Following the TII criteria (refer to Appendix 7.1) for rating the magnitude and significance of impacts on the geological and hydrogeological related attributes, the magnitude of impact is considered ***negligible***.

7.7.2 Cumulative Development

As mentioned in section 7.4.2. above, the following considers the cumulative impacts of the proposed development and proposed and permitted and operating facilities in the surrounding area in relation to Land, Soils, Geology and Hydrology. This considers the proposed development and other surrounding proposed and permitted developments as follows:

- **Exempted Development** - In order to accommodate this development and other developments in and around the Dunboyne area, Irish Water will be required to upgrade c. 1,100m of existing 200mm uPVC watermain so as to provide a 400mm ID watermain in its place. This is to be undertaken by Irish Water under their exempted development provisions and these works do not form part of this planning application as a result.
- **Future Development** - The planning application includes an 470m length of distributor road linking to that part of the distributor road already built as part of the Castle Farm Meadows development which ultimately connects with Station Road. This proposed road forms part of the overall Dunboyne Distributor Road; an objective of the Meath County Development Plan 2021-2027. It is intended as part of that Development Plan objective that in the future that distributor road would be extended southwards and then eastwards over the railway line. The design for this future extension to the distributor road and bridge has been included in this application as evidence that it provides a viable workable solution, however permission

for that extension is not being sought at this time as it is not required to cater for this development.

- **Residential Development Meath County Council Reg. Reg. 22675** - On 24 May 2022, Darcon Properties Ltd. applied for permission for 8 no. two storey semi-detached houses with habitable attic accommodation, 2 no. two storey end-terrace houses with habitable attic accommodation, 2 no. two storey mid terrace houses, a three storey apartment building accommodating 9 no. apartments and all ancillary and associated site development works. Further information was sent to Meath County Council on the 17 April 2023. This application was granted on the 24th May 2023.
- **Dart + West**– A railway order was submitted to An Bord Pleanála for a Railway Order for DART+ West Project on 29th July 2022. This project has completed its public consultation and is now currently undergoing detailed design and beginning the procurement process.

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.

7.7.2.1 Construction Phase

Contractors for the Proposed Development will be contractually required to operate in compliance with the CEMP which includes the mitigation measures outlined in this EIA report. Other developments will also have to incorporate measures to protect soil and water quality in compliance with legislative standards for receiving water quality (European Communities Environmental Objectives (Groundwater) Regulations (S.I. 9 of 2010 and S.I. 266 of 2016). As a result, there will be minimal cumulative potential for change in soil quality or the natural groundwater regime. The cumulative impact is considered to be ***neutral*** and ***imperceptible***.

7.7.2.2 Operational Phase

There are no other large projects proposed within this area of the aquifer so no cumulative impact on recharge to the aquifer. All developments are required to manage groundwater discharges in accordance with S.I. 9 of 2010 and S.I. 266 of 2016 amendments. As such there will be no cumulative impact to groundwater quality and therefore there will be no cumulative impact on the Groundwater Body Status. The operation of the proposed development is concluded to have a ***long-term***, ***imperceptible*** significance with a ***neutral*** impact on soil and water quality.

7.8 Monitoring

7.8.1 Proposed Development

7.8.1.1 Construction Stage

Daily visual inspection will be undertaken by the contractor at the silt trap/ settlement tank to ensure adequate internal settlement is occurring. Where the visual assessment highlights elevated suspended sediments higher than expected, the water will be re-circulated for further settlement.

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 10 m from surface water receptors. Regular inspection of surface water run-off and any sediment control measures (will be carried out during the construction phase.

Regular auditing of construction / mitigation measures will be undertaken, e.g. concrete pouring, refuelling in designated areas, etc. A log the regular 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 occur.

7.8.1.2 Operational Stage

No monitoring measures are required during the operational stage.

7.9 Reinstatement

This section is not applicable to this chapter.

7.10 Difficulties Encountered

There were no difficulties encountered in compiling and assessing the data for this section of the EIAR.

8 WATER

8.1 Introduction

This chapter assesses and evaluates the potential impacts of the Proposed Development on the hydrological aspects of the site and surrounding area, in accordance with the requirements of Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (i.e. the EIA Directive) (European Union, 2014a). This Chapter also provides a characterisation of the receiving hydrological environment within the proposed Project and within a wider study area in the vicinity of the proposed Project. In assessing likely potential and predicted effects, account is taken of both the importance of the attributes and the predicted scale and duration of the likely effects.

This chapter was prepared by Marcelo Allende (BSc, BEng). Marcelo is a Senior Environmental Consultant (Hydrologist) at AWN with over 15 years of experience in Environmental Consulting and water resources. Marcelo holds a degree in Water Resource Civil Engineering from the University of Chile. He has worked on a wide of range of projects including multi-aspect environmental investigations, geo-environmental impact assessments, groundwater resource management, hydrological and hydrogeological conceptual and numerical modelling, strategic and site specific flood risk assessments, Due Diligence reporting, baselines studies, soils, surface water and groundwater monitoring and field sampling programmes on a variety of brownfield and greenfield sites throughout Ireland as well as overseas in Chile, Argentina, Peru and Panama. He also has detailed knowledge of environmental guidance, legislation, regulations & standards and expertise in GIS (expert level) and MATTE studies at COMAH establishments. He is currently a member of the International Association of Hydrogeologists (Irish Group) and a member of Engineers Ireland (MIEI).

8.2 Assessment Methodology

The hydrological baseline assessment has been carried out in accordance with the following guidance and established best practice:

- Environmental Protection Agency (EPA) Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2022).
- Environmental Impact Assessment of Projects, Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017).
- Transport Infrastructure Ireland - Road Drainage and Water Environment (TII, 2015).
- Transport Infrastructure Ireland (previously National Road Authority) - Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (TII, 2009).
- Water Framework Directive (WFD) - Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy. This relates to the improvement of water quality across Ireland including rivers and groundwater bodies.
- The Planning System and Flood Risk Management, Guidelines for Planning Authorities (Department of the Environment, Heritage and Local Government (DoEHLG) and the Office of Public Works (OPW)).
- Guidelines on protection of fisheries during construction works in and adjacent to waters (Inland Fisheries Ireland, 2016).
- Guidelines for the Crossing of Watercourses during Construction of National Road Schemes, (TII, 2008).

Water resource management in Ireland is dealt with in the following key pieces of legislation and guidelines:

- European Communities Environmental Objectives (Surface Waters); Regulations, 2009 (S.I. No. 272 of 2009 as amended by SI No. 77 of 2019).
- Part IV of the First Schedule of the Planning and Development Act 2000, as amended.
- European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003).
- Environmental Protection Agency 'Towards Setting Guideline Values for the Protection of Groundwater in Ireland Interim Report', (EPA 2003).
- European Union (Drinking Water) Regulations 2014 (S.I. No. 122/2014).
- European Union (Drinking Water) (Amendment) Regulations (S.I. No. 464 of 2017).

8.2.1 Criteria for rating of effects

This chapter evaluates the effects, if any, which the proposed development will have on Hydrology as defined in the Environmental Protection Agency (EPA) 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports' (EPA, 2022). In addition, the document entitled 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes' by the Transport Infrastructure Ireland (TII, 2009) is referenced where the methodology for assessment of impact is appropriate.

The rating of potential environmental effects on the hydrological environment is based on the standard EIAR impact predictions table included in Chapter 1 which takes account of the quality, significance, duration, and type of effect characteristic identified (in accordance with impact assessment criteria provided in the EPA Guidelines (2022) publication).

The duration of each effect is considered to be either momentary, brief, temporary, short-term, medium term, long-term, or permanent. Momentary effects are considered to be those that last from seconds to minutes. Brief effects are those that last less than a day. Temporary effects are considered to be those which are construction related and last less than one year. Short term effects are seen as effects lasting one to seven years; medium-term effects lasting seven to fifteen years; long-term effects lasting fifteen to sixty years; and permanent effects lasting over sixty years.

The TII criteria for rating the magnitude and significance of impacts on the geological related attributes and the importance of hydrogeological attributes at the site during the EIA stage are also relevant in assessing the impact and are presented in Tables 1-5 in Appendix 8.1.

The principal attributes (and effects) to be assessed include the following:

- River and stream water quality in the vicinity of the site (where available);
- Surface watercourses near the site and potential impact on surface water quality arising from proposed development related works including any discharge of surface water run-off;
- Localised flooding (potential increase or reduction) and floodplains including benefitting lands and drainage districts (if any); and
- Surface water features within the area of the site.

8.2.2 Sources of Information

Desk-based geological information on the substrata (both Quaternary deposits and bedrock geology) underlying the extent of the subject site was obtained through accessing databases and other archives where available. Data was sourced from the following:

- Environmental Protection Agency (EPA) – website mapping and database information. Envision water quality monitoring data for watercourses in the area;
- River Basin Management Plan for Ireland 2018-2021.

- The Planning System and Flood Risk Management, Guidelines for Planning Authorities (Department of the Environment, Heritage and Local Government (DoEHLG) and the Office of Public Works (OPW));
- Office of Public Works (OPW) flood mapping data (www.floodmaps.ie)
- South Dublin City Council (2005), Greater Dublin Strategic Drainage Study: Technical Documents of Regional Drainage Policies. Dublin: Dublin City Council; and
- 'Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors' (CIRIA 532, 2001);
- National Parks and Wildlife Services (NPWS) – Protected Site Register.

Site specific data was derived from the following sources:

- Engineering Assessment Report. Proposed Residential Development at Station Road, Dunboyne, Co. Meath. Waterman Moylan, June 2023;
- Flood Risk Assessment. Oakfield, Dunboyne, Co. Meath. JBA Consulting, March 2023;
- Various design site plans and drawings; and
- Consultation with site engineers.

8.3 Receiving Environment

The Proposed Development site extends to over 16.83 ha. on adjacent lands located in the Townlands of Castle Farm, Ruskin and Clonee, Dunboyne, County Meath on lands generally bound to the east and south by agriculturally zoned lands, to the west by the Iarnród Éireann rail line, and to the north by the residential development permitted under Meath County Council (MCC) Reg. Ref. RA180561, agricultural lands and the L2228 (Station Road/Clonee Road). Improvement works to two no. roundabouts on the R147 (Old Navan Road) are located in at lands in the townlands of Loughsallagh and Clonee, Dunboyne, County Meath.

8.3.1 Hydrology

The subject site is located in the River Tolka WMU (Water Management Unit) within the former Eastern River Basin District (ERBD) (now the Irish River Basin District), as defined under the European Communities Directive 2000/60/EC, establishing a framework for community action in the field of water policy – this is commonly known as the Water Framework Directive (WFD).

The existing site is predominantly greenfield and is currently used for agricultural purposes. The subject site is bounded by a railway line to the west and by greenfield lands to the south and east. The subject land has a high point located on the western edge of the site from where it generally slopes to the north and to the south. There is an existing townland boundary which passes through the site and which has a ditch with some water flow during periods of wet weather.

There are 2 no. existing streams/watercourses along the boundary of the subject site. One is located along the northern boundary and the second (which is a local ditch) is located along the southern and east boundary.

According to the EPA maps, the proposed development site lies within the Liffey and Dublin Bay Catchment (Hydrometric Area 09) and the Tolka sub-catchment (refer to Figure 8.1 below). A review of the current EPA watercourse mapping and historical mapping records provided within the GeoHive website indicate 2 no. existing streams/watercourses along the boundary of the subject site.

The EPA on-line database identifies the watercourse along the northern boundary of the site as the Dunboyne Stream (refer to Figure 1.1 below). The Dunboyne Stream joins the River Tolka c. 900 m to the east of the proposed site.

The River Tolka stream generally flows in a south easterly direction to join various other tributaries down course before ultimately discharging/outfalls to the Irish Sea at the River Tolka Estuary (SPA) located directly North and east of Dublin Port Bull Isalnd (SPA), respectively. The hydrological environment is presented in Figure 8.1 below. The River Tolka Estuary is located approximately 16.3 km southeast for the site and is connected and adjacent to South Dublin Bay and North Bull Island both of which are Special Protection Areas (SPA), candidate Special Areas of Conservation (SAC), and proposed National heritage Areas (pNHA) and a RAMSAR sites.

Therefore, the subject site belongs to the Tolka sub-catchment (WFD name: Tolka_SC_010, Id 09_10) and would have a hydrological connection with the River Tolka Estuary (SPA/SAC/pNHA) through the local drainage network and the River Tolka as described in Section 8.4 below.

Figure 8.1: Local Hydrological Environment (EPA, 2022). Site Area Approximated.

8.3.2 Surface Water Quality

The Water Framework Directive (WFD) Directive 2000/60/EC was adopted in 2000 as a single piece of legislation covering rivers, lakes, groundwater and transitional (estuarine) and coastal waters. In addition to protecting said waters, its objectives include the attainment of 'Good Status' in water bodies that are of lesser status at present and retaining 'Good Status' or better where such status exists at present.

The WFD requires 'Good Water Status' for all European waters to be achieved through a system of river basin management planning and extensive monitoring by 2015 or, at the least, by 2027. 'Good status' means both 'Good Ecological Status' and 'Good Chemical Status'. In 2009 the ERBD River Basin Management Plan (RBMP) 2009-2015 was published. In the ERBD RBMP, the impacts of a range of pressures were assessed including diffuse and point pollution, water abstraction and morphological pressures (e.g., water regulation structures). The purpose of this exercise was to identify water bodies at risk of failing to meet the objectives of the WFD by 2015 and include a programme of measures to address and alleviate these pressures by 2015. This was the first River Basin Management planning cycle (2010-2015). The second cycle river basin management plan for was carried out between 2018-

2021 with the previous management districts now merged into one Ireland River Basin District (Ireland RBD). The third cycle (2022-2027) is currently being undertaken.

The primary aim of the plan is that Water bodies identified as being 'At Risk' of not achieving their environmental objectives need to have targeted measures implemented to achieve objectives under this Plan. 190 Areas for Action were identified across the 5 Local Authority regions. Within these 190 areas, a total of 726 water bodies were selected for initial actions during this RBMP cycle. There are 832 water bodies identified as being 'At Risk' of not achieving their environmental objectives under this Plan that have not been included in the Areas for Action. For most of these water bodies, targeted actions will be undertaken in the third cycle RBMP from 2022-2027. The draft third cycle RBMP has been reviewed in the context of ensuring mitigation measures comply with current and expected future measures required to be implemented for protection of water body status within the context of the proposed development.

The strategies and objectives of the WFD in Ireland have influenced a range of national legislation and regulations. These include the following:

- European Communities (Water Policy) Regulations, 2003 (S.I. No. 722 of 2003);
- European Communities (Drinking Water) Regulations 2014 (S.I. 122 of 2014);
- European Communities Environmental Objectives (Surface Waters); Regulations, 2009 (S.I. No. 272 of 2009 as amended SI No. 77 of 2019);
- European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010 S.I. No. 366 of 2016);
- European Communities (Good Agricultural Practice for Protection of Waters) Regulations, 2010 (S.I. No. 610 of 2010);
- European Communities (Technical Specifications for the Chemical Analysis and Monitoring of Water Status) Regulations, 2011 (S.I. No. 489 of 2011);
- Statutory Instrument (SI) No. 293 of 1988 European Communities (Quality of Salmonid Waters) Regulations 1988;
- Local Government (Water Pollution) Acts 1977-1990;
- SI No. 258 of 1988 Water Quality Standards for Phosphorus Regulations .

The Dunboyne Stream belongs to the Dunboyne_Stream_010 WFD surface waterbody (WFD code IE_EA_09D040500) from its origin until Rooske Road, c. 600 m upstream of the proposed development site. From this point, it belongs to the Tolka_030 waterbody (WFD code IE_EA_09T010800). The Dunboyne_Stream_010 waterbody has a 'Poor' Status for the period 2016-2021 whilst the Tolka_030 also has a 'Poor' Status (EPA, 2023); both waterbodies have WFD risk score 'At risk of not achieving good status'. The 'Poor' status of both waterbodies is due to their biological (invertebrate) status or potential.

The aforementioned status are based on data from the following EPA active quality monitoring stations:

- Dunboyne_Stream_010: 'Rusk Br' (EPA Code: IE_EA_09D040500), located in Dunboyne Stream in Rooske Road c. 600 upstream of the subject site.
- Tolka_030: 'Mulhuddart Br' (EPA Code: IE_EA_09T010600): located in the River Tolka approximately 4.2 km to the east of the subject site at Church Road (L3021) in Mullhuddart.

Surface water quality is monitored periodically by the EPA at various regional locations along with principal and other smaller watercourses. The EPA assess the water quality of rivers and streams across Ireland using a biological assessment method, which is regarded as a representative indicator of the status of such waters and reflects the overall trend in conditions of the watercourse. The biological indicators range from Q5 - Q1. Level Q5 denotes a watercourse with good water quality and high community diversity, whereas Level Q1 denotes very low community diversity and bad water quality.

Q Values for the Dunboyne Stream and Tolka River waterbodies are shown in Table 8.1 below and the descriptions of each of the Q Ratings are shown in Table 8.2. Refer to Figure 8.2 below for locations of these EPA quality monitoring points in the context of the site.

Watercourse	Station No.	Location	Q Value														
			1990	1991	1994	1996	1998	2002	2005	2007	2010	2013	2015	2016	2017	2018	2019	2022
Dunboyne Stream	RS09D040500	Rusk Br	2		2	2	2	2-3	3	3	3	3-4		3-4			3	3-4
Tolka	RS09T010800	Mulhuddart Br		2-3	3	2-3	3	3	3	2-3	2-3		2	2	2-3	2-3	2-3	2-3

Table 8.1: EPA Biological Q Rating for Dunboyne Stream and River Tolka

Quality Ratings	Quality Class	Pollution Status	Condition
Q5, Q4-5, Q4	Class A	Unpolluted	Satisfactory
Q3-4	Class B	Slightly Polluted	Unsatisfactory
Q3, Q2-3	Class C	Moderately Polluted	Unsatisfactory
Q2, Q1-2, Q1	Class D	Seriously Polluted	Unsatisfactory

Table 8.2: EPA Biological Q Ratings

Figure 8.2: EPA Surface Water Quality Stations (EPA, 2023) Site Area Approximated. (please note the roundabouts along the R147 and L2228 also form part of this application but are not shown in the red line above)

As can be seen in Table 8.1 above, the Dunboyne Stream has been classified as 'Slightly polluted' in 2022.

8.3.3 Foul Water and Water Supply Network

There is an existing 525mm diameter concrete combined sewer traversing the subject site along the northern boundary. As part of the proposed infrastructure works at the subject site, the combined sewer will be diverted. The diversion of the foul sewer will require a diversion agreement from Irish Water

The foul water from the proposed development eventually discharges to the Ringsend Waste Water Treatment Plant (WWTP) which in turn discharges into Dublin Bay.

There are existing watermains on the L2228. In order to service the proposed development site, it is proposed to tie into the existing watermain located within the L2228.

8.3.4 Flood Risk

According to the Site Specific Flood Risk Assessment carried out by JBA, the OPW Fluvial Flood Map the 1% AEP flood event (1 in 100 year) and the 0.1% AEP flood event (1 in 1000 year) do not inundate the site.

The detailed hydrological and hydraulic analysis indicates that the northern entrance road is partially located in Flood Zone B.

The development design has set floor levels to the 1% AEP climate change water level, plus a freeboard allowance of at least 500mm. Further, the finished floor level provides a minimum of 150mm above surrounding ground levels to provide protection against pluvial flooding. All residential buildings have also been located in Flood Zone C, further minimising the risk of inundation.

8.3.5 Areas of Conservation

The lands in which the proposed development is located have no formal designations. The closest area of ecological importance is the Royal Canal proposed Natural Heritage Area (pNHA) (Site Code 002103) which is approximately 4.0km to the south of the site. The Liffey Valley pNHA (Site Code 000128) is located approximately 4.4km to the south of the site. The site has no hydrological connectivity to any of these sites.

A review of the EPA (2022) on-line database indicates there are no NPWS protected areas in the immediate vicinity of the Proposed Development site. The nearest Natura 2000 Sites are the Rye Water Valley/Carton Special Area of Conservation (SAC)/ Special Protection Area (SPA)/ proposed Natural Heritage Area (pNHA) which are c. 4.7 Km to the south of the site. There would not be hydrological connection between the proposed development and these sites.

There would be a hydrological connection to Dublin Bay waterbody from the Proposed Development site through the stormwater and foul water site drainage as described in Section 1.4 below. The South Dublin Bay hosts a range of Natura 2000 Sites (SPA/SAC/pNHA). These Natura 2000 Sites are located c. 16 Km to the southeast of the subject site. Figure 8.3 below presents the location of these protected areas in the context of the proposed development site.

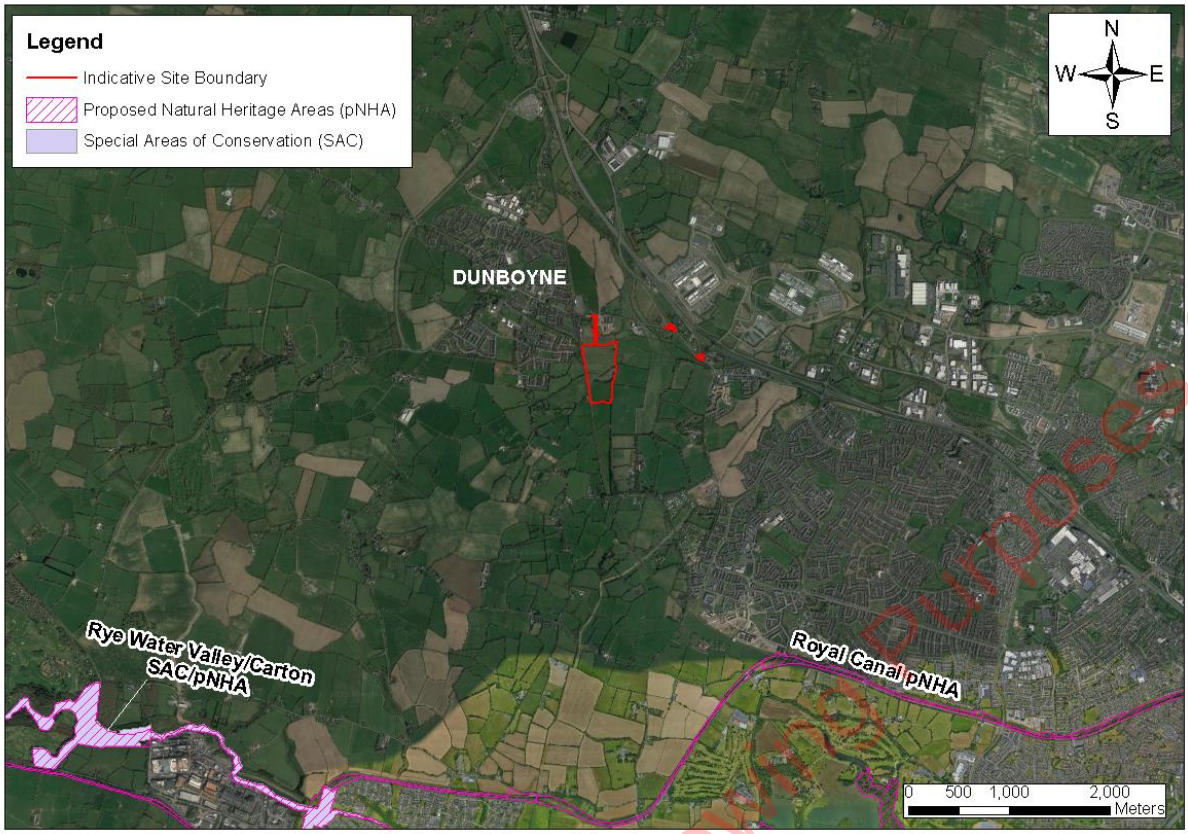


Figure 8.3: Natura Sites in the Context of the Subject Site (NPWS, 2023) Site Area Approximated.

8.3.6 Rating of Importance of Hydrological Attributes

Based on the TII methodology (2009) (See Appendix 8.1) the importance of the hydrological features at this site is rated as 'Low importance' based on the assessment that the attribute has a low quality significance or value on a local scale.

As set out in the Engineering Assessment Report prepared by Waterman Moylan (under separate cover as part of the planning application), surface water arising at the proposed development site will be attenuated to greenfield run-off rates and will comply with the policies and guidelines outlined in the Greater Dublin Strategic Drainage Study (GDSDS). Surface water will outfall to existing watercourse/ditches which bound the site (i.e., Dunboyne Stream).

There is a hydrological connection or pathway through the Dunboyne stream and protected sites within Dublin Bay; however, this is considered to be of negligible significance due to the significant distance from the site (16 km).

8.4 Characteristics of the Proposed Development

8.4.1 Proposed Development

Residential units with a mix of houses, duplex and apartment buildings ranging in height from 2 to 7 storeys overall; comprising 155no. 2 storey houses; 517no. apartments accommodated in 8no. buildings ranging in height from 5 to 7 storeys; 44no. duplex units accommodated in 2no. 3 storey terraced buildings ; 1no. childcare facility (c.602sqm) located at ground floor level of Block B1; public open space; communal and private open space; public lighting; car parking, including basement car parking under some of the apartments; secure bicycle parking; and all associated and ancillary site development and infrastructural works, hard and soft landscaping and boundary treatment works, provision of c. 470m in length of distributor road including signalised junction at L2228, compensatory storage measures at Castle Stream and improvement works to two no. roundabouts on the R147 (Old

Navan Road). Vehicular, cyclist and pedestrian access to serve the development will be provided from Station Road via existing access road permitted under Meath County Council Reg. Ref. RA180561.

The proposed development is described in further detail in Chapter 3 *Project Description* and in the CEMP. The details of the construction and operation of the development in terms of Hydrology are detailed in the subsections below.

8.4.1.1 Construction Stage

The key civil engineering works which will have a potential impact on the water and hydrological environment during construction of the proposed development are summarised below.

- Excavations are required for foundations of installation of associated services included within the development.
- Possible discharge of collected rainwater/ dewatering during excavation works and groundworks (the extent of which is dependent on the time of year development works are carried out); and
- Construction activities will necessitate storage of cement and concrete materials, temporary oils, and fuels on site. Small localised accidental releases of contaminating substances including hydrocarbons have the potential to occur from construction traffic and vehicles operating on site.
-

8.4.1.2 Operational Phase

The key activities which will have a potential impact on the hydrological environment during operation of the proposed development are summarised below.

Increase in Hardstanding Area

The proposed development represents an overall increase in hardstanding surfaces of c. 6,003Ha.

Surface Water Management Plan

It is proposed that surface water from the proposed development will drain via gravity through an underground pipe network. Various Sustainable Urban Drainage systems (SuDS) measures have been implemented to ensure runoff is attenuation and treated to the standards outlined in the Greater Dublin Strategic Drainage Study (GDSDS). The methodology involved in developing a Storm Water Management Plan for the subject site is based on recommendations set out in the GDSDS and in the SuDS Manual.

There are 2 no. existing streams/watercourses along the boundary of the subject site. One is located along the northern boundary (Dunboyne Stream [also known as Castle Stream]) and the second is located along the southern and east boundary. It is noted that both of these will be retained and will have a 10m riparian corridor.

There is an existing townland boundary which passes through the site and which has a ditch with some water flow during periods of wet weather. It is proposed to divert this ditch to flow to the southern watercourse. Surface water will outfall to existing watercourse/ditches which bound the site. Due to the topography of the site and the layout of the proposed development, surface water drainage is laid out in 6 No. Catchments.

It is proposed that surface water from the proposed development will drain via gravity through an underground pipe network. The proposed SuDS devices comprise permeable pavement, attenuation tank, roadside swales/ filter drains, petrol interceptor and detention basins.

The sitewide surface water system, which includes 4 No. detention basins, and 1 No attenuation tank, is in accordance with all the relevant design standards and Local Authority development plan. The

attenuation proposals are designed to be online and are designed to cater for flood events up to 1:100-years, plus an additional 20% for climate change. The surface water runoff generated from the proposed development will discharge from site through an existing flow control device (limiting the site runoff to a greenfield rate).

Refer to Engineering Assessment Report (Waterman Moylan, 2023) for further details.

Foul Water

Strict separation of surface water and wastewater will be implemented within the development. There is an existing 525mm diameter concrete combined sewer traversing the subject site along the northern boundary. As part of the proposed infrastructure works at the subject site, the combined sewer will be diverted. The diversion of the foul sewer will require a diversion agreement from Irish Water.

The site has been divided into two foul drainage catchments. The Catchment 1, located to the north, will be served with a series of 150mm, 225mm and 300mm diameter sewer networks. This network will ultimately outfall via gravity into the proposed diverted sewer along the northern boundary.

The Catchment 2, to the south will also be served with a series of 150mm and 225mm diameter sewer network and will outfall, via gravity, into a pumping station located within the western side of the catchment. The station will pump the foul by means of a rising main, which will then discharge into Catchment 1 and ultimately outfall into the proposed diverted sewer.

The foul water from the proposed development eventually discharges to the Ringsend Waste Water Treatment Plant (WWTP) which in turn discharges into Dublin Bay.

Water Supply

There are existing watermains on the L2228. In order to service the proposed development site, it is proposed to tie into the existing watermain located within the L2228.

In order to facilitate this connection Irish Water have identified that a watermain upgrade is required to the existing infrastructure. It is proposed to upsize the existing 200mm diameter watermain to a 400mm diameter watermain over a length of 1.1km. This work will be carried out directly by Irish Water as part of the Connection Agreement Process and does not form part of the development for which permission is being sought in this case as a result.

A pre-connection enquiry was submitted to Irish Water, Reg. Ref. CDS22002999. Irish Water confirmed on 01.06.2022 that a connection is feasible, however, the above-mentioned upgrade will be required in order to facilitate water supply to the subject site. It is noted that the Developer will enter into a Connection Agreement with Irish Water in this regard after planning permission has been granted.

8.5 Potential Impact of the Proposed Development

8.5.1 Proposed Development

An analysis of the potential impacts of the proposed development on the and hydrological environment during the construction and operation is outlined below. Due to the inter-relationship between soils, geology and hydrogeology and surface water the following impacts discussed will be considered applicable to both Chapter 7 and of the EIAR. Mitigation measures included in the design of this project to address these potential impacts are presented in Section 8.6 below.

It should be noted that no impacts are expected on Natura Sites within Dublin Bay. Given the potential loading and the distance from source to the Natura site (c. 16 Km), this risk would be imperceptible as any accidental discharge of potential contaminant would be attenuated, diluted and dispersed below statutory guidelines (i.e., S.I. European Communities Environmental Objectives Regulations, 2009 [S.I. No. 272 of 2009 as amended by SI No. 77 of 2019]).

8.5.1.1 Construction Phase

Increased Sediments Loading in Run-off

Surface water runoff during the construction phase may contain increased silt levels or become polluted from construction activities. Runoff containing large amounts of silt can cause damage to surface water systems and receiving watercourses. Silt water can arise from dewatering excavations, exposed ground, stockpiles and access roads.

During the construction phase at this site there is potential for an increase in run-off due to the compaction of soils. This will reduce the infiltration capacity and increase the rate and volume of direct surface run-off. The potential impact of this is a possible increase in surface water run-off and sediment loading which could potentially impact local drainage.

In the absence of mitigation, the effect on the local and regional hydrological environment is likely to be ***short-term, moderate*** and ***negative***. The effect is considered to be 'moderate' is related to the likely lack of contamination expected in the subsoils given the current greenfield condition of the subject site; therefore it is not expected a significant effect on local or regional hydrology.

Accidental Spills and Leaks

As with all construction projects there is potential for water (rainfall and/or groundwater) to become contaminated with pollutants associated with construction activity. Contaminated water which arises from construction sites can pose a significant temporary risk to groundwater quality for the duration of the construction if contaminated water is allowed percolate to the aquifer.

During construction of the development, there is a risk of accidental pollution incidences from the following sources:

- Suspended solids (muddy water with increase turbidity) – arising from excavation and ground disturbance;
- Cement/concrete (increase turbidity and pH) – arising from construction materials;
- Hydrocarbons (ecotoxic) – accidental spillages from construction plant or onsite storage;
- Wastewater (nutrient and microbial rich) – arising from accidental discharge from on-site toilets and washrooms.

Machinery activities on site during the construction phase may result in contamination of runoff/surface water. Potential impacts could arise from accidental spillage of fuels, oils, paints etc. which could impact surface water if allowed to infiltrate to runoff to surface water systems and/or receiving watercourses. However, implementation of the mitigation measures detailed below will ensure that this does not occur.

Concreting operations carried out near surface water drainage points during construction activities could lead to discharges to a watercourse. Concrete (specifically, the cement component) is highly alkaline and any spillage to a local watercourse would be detrimental to water quality and local fauna and flora. However, employment of the mitigation measures highlighted below will ensure that any impact will be mitigated.

In the absence of mitigation, the effect on the local and regional hydrological environment is likely to be ***short-term, significant*** and ***negative***. It is considered significant due to this potential leakage can affect the receiving waters (Dunboyne Stream and River Tolka) and degrade the current water body status (chemically, ecological and quantity) or its potential to meet the requirements and/or objectives in the second RBMP 2018-2021 (River Basin Management Plan) and draft third RBMP 2022-2027.

8.5.1.2 Operational Phase

Surface water drainage will discharge into an existing ditch network which ultimately outfalls into the Dunboyne Stream. The surface water network has been designed to provide sufficient capacity to

contain and convey all surface water runoff associated with the 1 in 100 year event to the attenuation basins without any overland flooding including an additional allowance of 20% in rainfall intensities due to climate change. Discharge flow will be restricted to the greenfield equivalent runoff for the catchment area.

The proposed development site includes car parking area at the site. Leakage of petrol/ diesel fuel may occur from these areas; run-off may contain a worst-case scenario of 70 litres for example. However, in the event of an accidental leakage of oil from the parking areas, this will be intercepted by the drainage infrastructure proposed and any releases to drainage will be mitigated through hydrocarbon interceptors.

The development will be fully serviced with separate foul and stormwater sewers which will have adequate capacity for the facility and discharge limits as required by Irish Water licencing requirements. Discharge from the site to the public foul sewer will be sewage and grey water only due to the nature of the proposed development. The foul discharge from the site will join the public sewer and will be treated at the Irish Water Ringsend Wastewater Treatment Plant (WWTP) prior to subsequent discharge to Dublin Bay. This WWTP is required to operate under an EPA licence and meet environmental legislative requirements as set out its licence.

There will be an increase in hardstanding as a result of the development of the facilities as the subject site is currently greenfield. The hardstanding area is expected to be 6,003Ha. This will have a minor effect on local recharge to ground; however, the impact on the overall hydrological regime will be insignificant.

In the absence of mitigation, the effect on the hydrological environment is likely to be ***long-term, imperceptible*** and ***neutral***. The effect is considered to be 'imperceptible' due to there will not be intervention on the hydrological regime on a local or regional scale due to the aforementioned design measures included in the surface water and foul water drainage.

8.5.1.3 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 at this site. There would, therefore, be a neutral effect on the hydrological environment in terms of hydrological environment.

The site is zoned for development, and it is likely that in the absence of this subject proposal that a development of a similar nature would be progressed on the site that accords with national and regional policies and therefore the likely significant effects would be similar to this proposal. A potential increase in hardstanding areas would be mitigated by requiring developers to maintain green field runoff rates as a result there would be no overall change to flooding but the trend in change of land use will result in local changes to recharge and hydrological flow patterns.

The temporal evolution of the current baseline in terms of water and hydrological environment involves climate change and its effects on the quantity or quality of the surface water. This can potentially affect the surrounding projected flooding.

8.6 Mitigation Measures (Ameliorative, Remedial or Reductive Measures)

8.6.1 Proposed Development

The design of the proposed development has taken account of the potential impacts of the development on the hydrological environment local to the area where construction is taking place and containment of contaminant sources during operation. Measures have been incorporated in the design to mitigate the potential effects on hydrology , including SuDS measures, as detailed above.

The site has a hydrological connection with Dublin Bay through the proposed surface water drainage system, the Dunboyne Stream and the River Tolka.

As stated above, no impacts are expected on Natura 2000 Sites within South Dublin Bay, given the potential loading, tenuous hydrological connectivity and the distance from source to the Natura 2000

site. The potential risk is considered to be imperceptible as potential contaminant would be attenuated, diluted and dispersed below statutory guidelines (i.e., S.I. European Communities Environmental Objectives Regulations, 2009 [S.I. No. 272 of 2009 as amended by SI No. 77 of 2019]).

Due to the inter-relationship between soils, geology, hydrogeology and hydrology, the following mitigation measures discussed will be considered applicable to all. Waste Management is also considered an interaction in some sections.

8.6.1.1 Construction Phase

Construction Environmental Management Plan (CEMP)

In advance of work starting on site, the works Contractor will prepare a detailed Construction Environmental Management Plan (CEMP). The detailed CEMP will set out the overarching vision of how the construction of the Proposed Development will be managed in a safe and organised manner by the Contractor. The CEMP will be a live document and it will go through a number of iterations before works commence and during the works. It will set out requirements and standards which must be met during the construction stage and will include the relevant mitigation measures outlined in the EIA Report and any subsequent planning conditions relevant to the Proposed Development.

A Preliminary Construction Environmental Management Plan has been prepared and accompanies the planning application in this case.

As a minimum, the CEMP should be formulated in accordance with best international practice including but not limited to:

- CIRIA, (2001), Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors, (C532) Construction Industry Research and Information Association;
- CIRIA (2002) Control of water pollution from construction sites: guidance for consultants and contractors (SPI56) Construction Industry Research and Information Association
- CIRIA (2005), Environmental Good Practice on Site (C650); Construction Industry Research and Information Association
- BPGCS005, Oil Storage Guidelines;
- Eastern Regional Fisheries Board, (2006), Fisheries Protection Guidelines: Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites;
- CIRIA 697, The SUDS Manual, 2007; and
- UK Pollution Prevention Guidelines (PPG) UK Environment Agency, 2004.

In order to reduce impacts on the soil, geological and hydrogeological environment, a number of mitigation measures will be adopted as part of the construction works on site as outlined below.

Surface Water Run-Off

As there is potential for run-off to enter current stormwater systems and indirectly discharge to a watercourse, mitigations will be put in place to manage run-off during the construction phase. 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.

Should any discharge of construction water be required during the construction phase, discharge will be to foul sewer. Pre-treatment and silt reduction measures on site will include a combination of silt fencing, settlement measures (silt or sediment traps, 20 m buffer zone between machinery and watercourses, refuelling of machinery off site) and hydrocarbon interceptors.

Any minor ingress of groundwater and collected rainfall in the excavation will be pumped out during construction. It is estimated that the inflow rate of groundwater will be low and limited to the northeast of the site. It is therefore proposed that the water be discharged via the existing stormwater sewer network. Extensive monitoring will be adopted to ensure that the water is of sufficient quality

to discharge to the sewer. The use of slit traps and an oil interceptor (if required) will be adopted if the monitoring indicates the requirements for the same with no silt or contaminated water permitted to discharge to the sewer. There may be localised pumping of surface run-off from the excavations during and after heavy rainfall events to ensure that the excavations are kept relatively dry. Due to the very low permeability of the Dublin Boulder Clay and the relative shallow nature for excavations, infiltration to the underlying aquifer is not anticipated.

Run-off water containing silt will be contained on site via settlement tanks and treated to ensure adequate silt removal. Silt reduction measures on site will include a combination of silt fencing and settlement measures (silt traps, silt sacks and settlement tanks/ponds).

The temporary storage of soil will be carefully managed. Stockpiles will be tightly compacted to reduce runoff and graded to aid in runoff collection. This will prevent any potential negative impact on the stormwater drainage and the material will be stored away from any surface water drains. Movement of material will be minimised to reduce the degradation of soil structure and generation of dust.

Excavations will remain open for as little time as possible before the placement of fill. This will help to minimise the potential for water ingress into excavations. Soil from works will be stored away from existing drainage features to remove any potential impact.

Weather conditions will be considered when planning construction activities to minimise the risk of run-off from the site and the suitable distance of topsoil piles from surface water drains will be maintained.

Fuel and Chemical Handling

To minimise any impact on the underlying subsurface strata from material spillages, all oils, solvents and paints used during construction will be stored within temporary bunded areas. Oil and fuel storage tanks shall be stored in designated areas, and these areas shall be bunded to a volume of 110% of the capacity of the largest tank/container within the bunded area(s) (plus an allowance of 30 mm for rainwater ingress). Drainage from the bunded area(s) shall be diverted for collection and safe disposal.

Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles will take place in a designated area (or where possible off the site) which will be away from surface water gulleys or drains. In the event of a machine requiring refuelling outside of this area, fuel will be transported in a mobile double skinned tank. An adequate supply of spill kits and hydrocarbon adsorbent packs will be stored in this area. All relevant personnel will be fully trained in the use of this equipment. Guidelines such as “Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors” (CIRIA 532, 2001) will be complied with.

Where feasible all ready-mixed concrete will be brought to site by truck. A suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline wastewaters or contaminated storm water to the underlying subsoil. Wash down and washout of concrete transporting vehicles will take place at an appropriate facility offsite.

In the case of drummed fuel or other chemical which may be used during construction, containers should be stored in a dedicated internally bunded chemical storage cabinet and labelled clearly to allow appropriate remedial action in the event of a spillage.

Soil Removal and Compaction

Temporary storage of soil will be carefully managed in such a way as to prevent any potential negative impact on the receiving environment. The material will be stored away from any surface water drains (see Surface Water Run-off section above). Movement of material will be minimised to reduce degradation of soil structure and generation of dust.

All excavated materials will be visually assessed for signs of possible contamination such as staining or strong odours. Should any unusual staining or odour be noticed, samples of this soil will be analysed for the presence of potential contaminants to ensure that historical pollution of the soil has not occurred. Should it be determined that any of the soil excavated is contaminated, this will be segregated and appropriately disposed of by a suitably permitted/licensed waste disposal contractor.

No contamination is expected within the site due to its current greenfield condition. Nonetheless, all excavated materials will be visually assessed for signs of possible contamination such as staining or strong odours. Should any unusual staining or odour be noticed, samples of this soil will be analysed for the presence of potential contaminants to ensure that historical pollution of the soil has not occurred. Should it be determined that any of the soil excavated is contaminated, this will be segregated and appropriately disposed of by a suitably permitted/licensed waste disposal contractor.

Monitoring Measures

Daily visual inspection will be undertaken by the contractor at the silt trap/ settlement tank to ensure adequate internal settlement is occurring. Where the visual assessment highlights elevated suspended sediments higher than expected, the water will be re-circulated for further settlement.

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 10 m from surface water receptors. Regular inspection of surface water run-off and any sediment control measures (will be carried out during the construction phase.

Regular auditing of construction / mitigation measures will be undertaken, e.g. concrete pouring, refuelling in designated areas, etc. A log the regular 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 occur.

8.6.1.2 Operational Phase

The proposed development will provide full attenuation for increase in hardstand area in compliance with the requirements of the Greater Dublin Strategic Drainage Study. A number of measures will be put in place to minimise the likelihood of any spills entering the water environment to include the design of the car park, fitting of refuelling areas with hydrocarbon interceptors and on-site speed restrictions. Refer to the Engineering Assessment Report for further details (Waterman Moylan, 2022).

It is proposed to ultimately discharge surface water from the proposed development, post attenuation and outflow restrictions into the existing local drainage. No further mitigation measures are to be required during the operational phase.

Maintenance of the surface water drainage system and foul sewers as per normal urban developments is recommended to minimise any accidental discharges to ground.

8.7 Residual Impact of the Proposed Development

8.7.1 Proposed Development

8.7.1.1 Construction Phase

The implementation of mitigation measures outlined above will ensure that the predicted impacts on the hydrological environment do not occur during the construction phase and that the residual impact will be ***short-term-imperceptible-neutral***. Following the TII criteria (refer to Appendix 8.1) for rating the magnitude and significance of impacts on the geological and hydrogeological related attributes, the magnitude of impact is considered ***negligible***.

8.7.1.2 Operational Phase

The implementation of mitigation measures outlined above will ensure that the predicted impacts on the hydrological environment do not occur during the operational phase and that the residual impact will be ***long-term-imperceptible-neutral***. Following the TII criteria (refer to Appendix 8.1) for rating the magnitude and significance of impacts on the geological and hydrogeological related attributes, the magnitude of impact is considered ***negligible***.

8.7.2 Cumulative Development

The following considers the cumulative impacts of the proposed development and proposed and permitted and operating facilities in the surrounding area in relation to Hydrology. This considers the proposed development and other surrounding proposed and permitted developments as follows:

- **Exempted Development** - In order to accommodate this development and other developments in and around the Dunboyne area, Irish Water will be required to upgrade c. 1,100m of existing 200mm uPVC watermain so as to provide a 400mm ID watermain in its place. This is to be undertaken by Irish Water under their exempted development provisions and these works do not form part of this planning application as a result.
- **Future Development** - The planning application includes an 470m length of distributor road linking to that part of the distributor road already built as part of the Castle Farm Meadows development which ultimately connects with Station Road. This proposed road forms part of the overall Dunboyne Distributor Road; an objective of the Meath County Development Plan 2021-2027. It is intended as part of that Development Plan objective that in the future that distributor road would be extended southwards and then eastwards over the railway line. The design for this future extension to the distributor road and bridge has been included in this application as evidence that it provides a viable workable solution, however permission for that extension is not being sought at this time as it is not required to cater for this development.
- **Residential Development Meath County Council Reg. Reg. 22675** - On 24 May 2022, Darcon Properties Ltd. applied for permission for 8 no. two storey semi-detached houses with habitable attic accommodation, 2 no. two storey end-terrace houses with habitable attic accommodation, 2 no. two storey mid terrace houses, a three storey apartment building accommodating 9 no. apartments and all ancillary and associated site development works. Further information was sent to Meath County Council on the 17 April 2023. This application was granted on the 24th May 2023.
- **Dart + West**– A railway order was submitted to An Bord Pleanála for a Railway Order for DART+ West Project on 29th July 2022. This project has completed its public consultation and is now currently undergoing detailed design and beginning the procurement process.

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.

8.7.2.1 Construction Phase

Contractors for the Proposed Development will be contractually required to operate in compliance with the CEMP which includes the mitigation measures outlined in this EIA report. Other developments will also have to incorporate measures to protect surface water quality in compliance with legislative standards for receiving water quality (European Communities Environmental Objectives (Surface Water) Regulations (S.I. 272 of 2009 and S.I. 77 of 2019 amendments). As a result, there will be minimal cumulative potential for change in surface water quality or the natural hydrological regime. The cumulative impact is considered to be ***neutral*** and ***imperceptible***.

8.7.2.2 Operational Phase

There are no other large projects proposed within this area of the aquifer so no cumulative impact on recharge to the aquifer. All developments are required to manage groundwater discharges in accordance with S.I. 272 of 2009 and S.I. 77 of 2019. As such there will be no cumulative impact to groundwater quality and therefore there will be no cumulative impact on the Surface Waterbody Status. The cumulative impact is considered to be ***neutral*** and ***imperceptible***.

8.8 Monitoring

8.8.1 Proposed Development

8.8.1.1 Construction Stage

Daily visual inspection will be undertaken by the contractor at the silt trap/ settlement tank to ensure adequate internal settlement is occurring. Where the visual assessment highlights elevated suspended sediments higher than expected, the water will be re-circulated for further settlement.

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. Regular inspection of surface water run-off and any sediment control measures (will be carried out during the construction phase.

Regular auditing of construction / mitigation measures will be undertaken, e.g. concrete pouring, refuelling in designated areas, etc. A log the regular 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 occur.

8.8.1.2 Operational Stage

No monitoring of the water environment will be required by the Developer during the operational stage.

8.9 Reinstatement

This section is not applicable to this chapter.

8.10 Difficulties Encountered

There were no difficulties encountered in compiling and assessing the data for this section of the EIAR.

9 MICROCLIMATE (WIND)

9.1 Introduction

B-Fluid Limited have undertaken a Wind Microclimate Study for the Oakfield Dunboyne Development in Dunboyne, Co. Meath. Figure 9.1 shows a view of the proposed development (coloured blocks) in the existing urban context.

Figure 9.1: Proposed Oakfield Dunboyne Development

This report is completed by Dr. Cristina Paduano, Dr. Patrick Okolo and Dr. Arman Safdari. Dr. Cristina Paduano is a Chartered Engineer (CEng) and member of Engineers Ireland who specialises in computational fluid dynamics applications for urban environment and the construction industry with over 17 years' experience. She holds a PhD in Mechanical Engineering from Trinity College Dublin, with M.Eng and B.Eng in Aerospace Engineering.

Dr. Patrick Okolo is a Chartered Engineer (CEng) and member of Engineers Ireland who specialises in computational fluid dynamics applications for the urban environment and in wind tunnel measurements for the aerospace industry. He holds a PhD in Aeroacoustics from Trinity College Dublin, a M.Sc. and B.Sc. in Mechanical Engineering.

Dr. Arman Safdari is a CFD Modelling Engineer who specialises in computational fluid dynamics applications. He is an expert in airflow modelling, heat and mass transfer and multi-phase flow simulations. He holds a PhD in Mechanical Engineering from Pusan National University, a M.Sc. and B.Sc. in Mechanical Engineering.

A wind microclimate study considers the possible wind patterns formed under both mean and peak wind conditions typically occurring on the site area, accounting for a scenario where the proposed development is inserted in the existing environment (potential impact) and, for a scenario where the proposed development is analysed together with the existing environment and any permitted development (not constructed yet) that can be influenced by the wind patterns generated by the proposed one (cumulative impact).

The potential receptors include those areas, in the surrounding of the development, which can be exposed to potential risks generated by the elevated wind speed or building massing wind effects. In particular:

- Amenity areas (pedestrian level), areas likely to be utilised for leisure purposes and as such should be comfortable surroundings.

- Pedestrian routes and seating areas – to determine if locations are comfortable for leisure activities.
- Entrance to the buildings – to determine if there is potential for pressure related issues for entrances or lobbies.
- Landscaped areas – where there are sheltered areas.
- Impact to existing or adjoining developments – where the proposed buildings will cause discomfort conditions through proximity related issues.

The acceptance criteria which define the acceptable wind velocities in relation to the perception of comfort level experienced while carrying out a specific pedestrian activity is known as the "Lawson Criteria for Pedestrian Comfort and Distress". A wind microclimate study analyses the wind flow in an urban context (considering the wind conditions typically occurring on the site during a typical year) to develop the so called "Lawson Comfort and Distress Map"; the map identifies where a specific pedestrian activity can be carried out comfortably during most of the time.

The assessment can be performed by physical testing in wind tunnels or by performing "virtual wind tunnel testing" through numerical simulation using Computational Fluid Dynamics (CFD), as done for this project. The scope of the numerical study is to simulate the wind around the development this to predicting under which wind speeds pedestrians will be exposed and what level of comfort pedestrian will experience when carrying out a specific activity (i.e. walking, strolling, sitting).

The following sections details the methodology, acceptance criteria, CFD wind simulations and the impact of the proposed development on the local wind microclimate against best practice guidelines for pedestrian comfort and safety.

9.1.1 Guidance and legislation

According to the 'Urban Development and Building Heights, Guidelines for Planning Authorities (Government of Ireland, December 2020)' document, specific wind impact assessment of the microclimatic effects should be performed for 'buildings taller than prevailing building heights in urban areas'. In the same guidance, standard buildings height is considered 6-8 storeys. Above this height, buildings are considered 'taller' for Dublin standards.

The recommended approach to wind microclimate studies is outlined in the "Wind Microclimate Guidelines for Developments in the City of London '(August 2019) and in the guidelines and recommendations contained in BRE Digest (DG) 520, "Wind Microclimate Around Buildings" (BRE, 2011). The Lawson Criteria of Comfort and Distress is used to benchmark the pedestrian wind microclimate.

The document also indicates how to use Computational fluid dynamics (CFD) to assess wind microclimate conditions and how to generate high quality outputs to provide a good understanding of the fundamental flow features around an urban context. Usually, the recommended approach to wind microclimate studies is based on the building height, as presented in Figure 9.2.

Building Height	Recommended Approach to Wind Microclimate Studies
Similar or lower than the average height of surrounding buildings **Up to 25m**	Wind studies are not required, unless sensitive pedestrian activities are intended (e.g. around hospitals, transport hubs, etc.) or the project is located on an exposed location
Up to double the average height of surrounding buildings **25m to 50m**	Computational Fluid Dynamics (CFD) Simulations **OR** Wind Tunnel Testing
Up to 4 times the average height of surrounding buildings **50m to 100m**	Computational Fluid Dynamics (CFD) Simulations **AND** Wind Tunnel Testing
High Rise **Above 100m**	Early-Stage Massing Optimization: Wind Tunnel Testing **OR** Computational Fluid Dynamics (CFD) Simulations Detailed Design: Wind Tunnel Testing **AND** Computational Fluid Dynamics (CFD) Simulations

Figure 9.2: Recommended Approach to Wind Microclimate Studies based on Building Height, as prescribed by the Wind Microclimate Guidelines for Developments in the City of London (August 2019)

9.1.2 Urban Wind Effects

Buildings and topography affect the speed and direction of wind flows. Wind speed increases with increasing height above the ground, assuming a parabolic profile.

Flow near the ground level encounters obstacles represented by terrain roughness/buildings that reduce the wind speed and introduce random vertical and horizontal velocity components.

This turbulence causes vertical mixing between the air moving horizontally at one level, and the air at those levels immediately above and below it. For this reason, the wind velocity profile is given by a fluctuating velocity along a mean velocity value. Figure 9.3 shows the wind velocity profile, as described above.

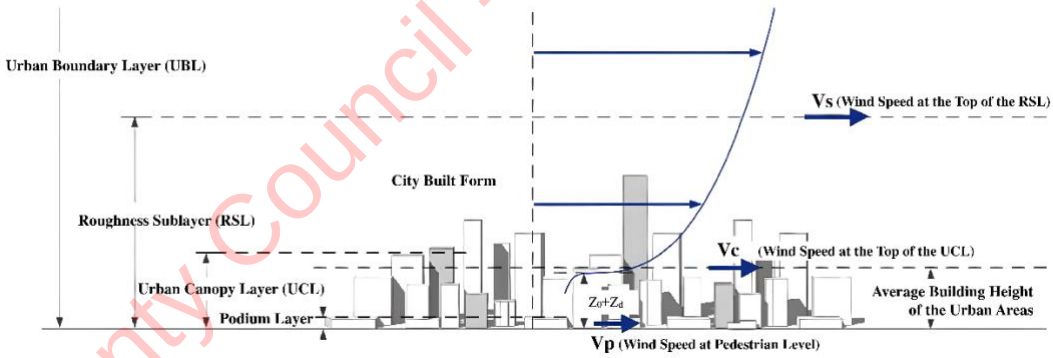


Figure 9.3: Wind Velocity Profile

In an urban context, wind speeds at pedestrian level are generally low compared with upper-level wind speeds, however, the wind can create adverse patterns when flowing in between buildings which can cause local wind accelerations or re-circulations. This wind patterns effect pedestrian safety and comfort. In general, the wind effects to be avoided/mitigated in an urban context include the following:

- **Funnelling Effects:** The wind can accelerate significantly when flowing through a narrow passage between building structures. The highest speeds are experienced at the point where the restriction of the area is the greatest.
- **Downwash Effects:** The air stream when striking a tall building can flow around it, over it and a part can deflected towards the ground. This downward component is

called downwash effect and its intensity depends on the pressure difference driving the wind. The higher the building, the higher this pressure difference can be.

- **Corner Effects:** Wind can accelerate around the corners of the buildings. Pedestrians can experience higher wind speeds as well as more sudden changes in wind speeds. The reason for this is that there are narrow transition zones between the accelerated flows and the adjacent quiescent regions. This effect is linked to the downwash effect as the downward stream component subsequently flows around the corners towards the leeward side of the building.
- **Wake Effect:** Excessive turbulence can occur in the leeward side of the building. This can cause sudden changes in wind velocity and can raise dust or lead to accumulation of debris. This effect is also dependent on the height of the building.

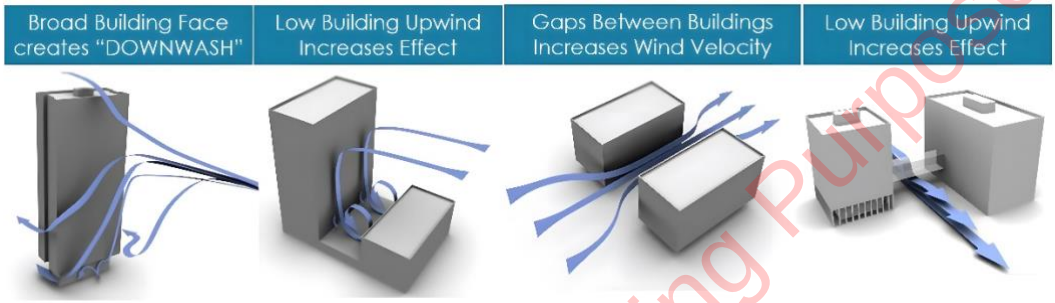


Figure 9.4: Parameters to know for Wind Conditions Assessment

The anticipation of the likely wind conditions resulting from new developments are important considerations in the context of pedestrian comfort and the safe use of the public realm. While it is not always practical to design out all the risks associated with the wind environment, it is possible to provide local mitigation to minimise risk or discomfort where required.

9.2 Assessment Methodology

The method for the study of wind microclimate combines the use of Computational Fluid Dynamics (CFD) to predict wind velocities and wind flow patterns, with the use of wind data from suitable meteorological station and the recommended comfort and safety standards (Lawson Criteria). The effect of the geometry, height and massing of the proposed development and existing surroundings including topography, ground roughness and landscaping of the site, on local wind speed and direction is considered as well as the pedestrian activity to be expected (sitting, standing, strolling and fast walking). The results of the assessment are presented in the form of contours of the Lawson criteria at pedestrian level. The assessment has comprised the following scenarios:

- **Baseline Existing Scenario:** this consist of the existing wind microclimate at the site.
- **Proposed Development in the Existing Scenario**: this consist of the assessment of the wind microclimate of the site with the proposed development surrounded by existing buildings.
- **Cumulative Scenario:** this consist of the assessment of the wind microclimate of the site with the proposed development surrounded by existing, potential and permitted buildings.

In accordance with the guideline cited in section 9.1.1, the wind microclimate study should consider the effect of the proposed development together with buildings (existing and/or permitted) that are within 400m from the proposed site. Other taller buildings outside of this zone that could have an

influence on wind conditions within the project site should be included for wind directions where they are upwind of the project site.

Figure 9.5: Area of interest to be modelled(please note the roundabouts along the R147 and L2228 also form part of this application but do not form part of the modelling).

In particular, the following has been undertaken:

- Topography of the site with buildings (proposed and adjacent existing/permitted developments massing, depending on the scenario assessed "baseline, proposed or cumulative") have been modelled using OpenFOAM Software.
- Suitable wind conditions have been determined based on historic wind data. Criteria and selected wind scenarios included means and peaks wind conditions that need to be assessed in relation to the Lawson Criteria.
- Computational Fluid Dynamics (CFD) has been used to simulate the local wind environment for the required scenarios ('baseline, proposed, cumulative").
- The impact of the proposed development massing on the local wind environment has been determined (showing the wind flows obtained at pedestrian level).
- Potential receptors (pedestrian areas) have been assessed through review of external amenity/public areas (generating the Lawson Comfort and Distress Map).

- Potential mitigation strategies for any building related discomfort conditions (where necessary) have been explored and their effect introduced in the CFD model produced.

9.2.1 Acceptance Criteria for Pedestrian Comfort and Distress

Pedestrian Wind Comfort is measured in function of the frequency of wind speed threshold exceeded based on the pedestrian activity. The assessment of pedestrian level wind conditions requires a standard against which measured or expected wind velocities can be compared.

Only gust winds are considered in the safety criterion. These are usually rare events but deserve special attention in city planning and building design due to their potential impact on pedestrian safety. Gusts cause the majority of cases of annoyance and distress and are assessed in addition to average wind speeds. Gust speeds should be divided by 1.85 and these "gust equivalent mean" (GEM) speeds are compared to the same criteria as for the mean hourly wind speeds. This avoids the need for different criteria for mean and gust wind speeds.

The following criteria are widely accepted by municipal authorities as well as the international building design and city planning community:

- DISCOMFORT CRITERIA: Relates to the activity of the individual. Onset of discomfort:
  - Depends on the activity in which the individual is engaged and is defined in terms of a mean hourly wind speed (or GEM) which is exceeded for 5% of the time.
- DISTRESS CRITERIA: Relates to the physical well-being of the individual. Onset of distress:
  - 'Frail Person Or Cyclist': equivalent to an hourly mean speed of 15 m/s and a gust speed of 28 m/s (62 mph) to be exceeded less often than once a year. This is intended to identify wind conditions which less able individuals or cyclists may find physically difficult. Conditions in excess of this limit may be acceptable for optional routes and routes which less physically able individuals are unlikely to use.
  - 'General Public': A mean speed of 20 m/s and a gust speed of 37 m/s (83 mph) to be exceeded less often than once a year. Beyond this gust speed, aerodynamic forces approach body weight and it rapidly becomes impossible for anyone to remain standing. Where wind speeds exceed these values, pedestrian access should be discouraged.

The above criteria set out six pedestrian activities and reflect the fact that calm activity requires calm wind conditions, which are summarised by the Lawson scale, shown in Figure 9.6. Lawson scale assesses pedestrian wind comfort in absolute terms and defines the reaction of an average person to the wind. Each wind type is associated to a number, corresponding to the Beaufort scale. Beaufort scale is an empirical measure that relates wind speed to observed conditions at sea or on land. A 20% exceedance is used in these criteria to determine the comfort category, which suggests that wind speeds would be comfortable for the corresponding activity at least 80% of the time or four out of five days.

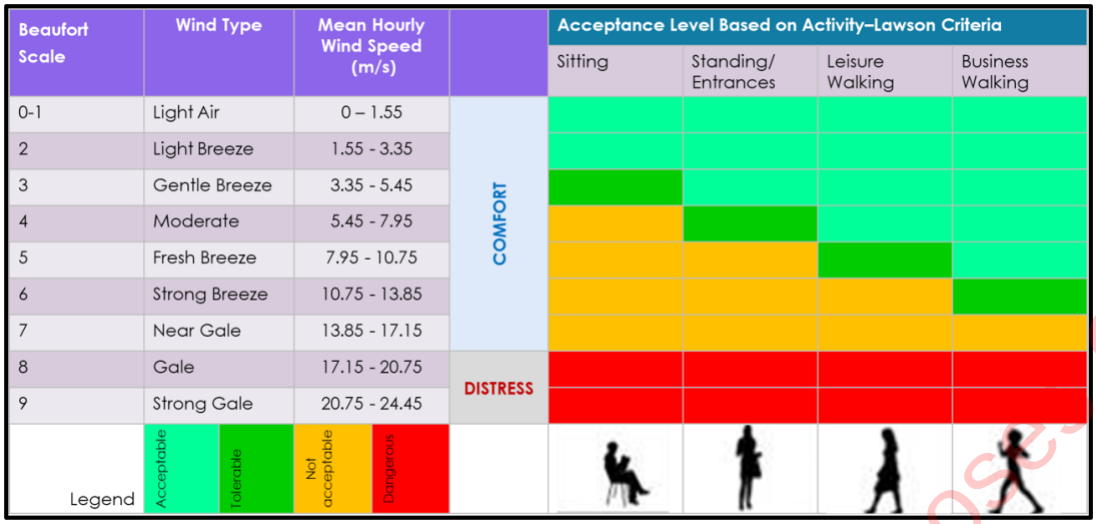


Figure 9.6: Lawson Scale

These criteria for wind forces represent average wind tolerances. They are subjective and variable depending on thermal conditions, age, health, clothing, etc. which can all affect a person's perception of a local microclimate. Moreover, pedestrian activity alters between winter and summer months. The criteria assume that people will be suitably dressed for the time of year and individual activity. It is reasonable to assume, for instance, that areas designated for outdoor seating will not be used on the windiest days of the year. Weather data measured are used to calculate how often a given wind speed will occur each year over a specified area.

Pedestrian comfort criteria are assessed at 1.5m above ground level. Unless in extremely unusual circumstances, velocities at pedestrian level increase as you go higher from ground level.

A breach of the distress criteria requires a consideration of:

- whether the location is on a major route through the complex,
- whether there are suitable alternate routes which are not distressful.

If the predicted wind conditions exceed the threshold, then conditions are unacceptable for the type of pedestrian activity and mitigation measure should be implemented into the design. If the predicted wind conditions exceed the threshold, then condition are unacceptable for the type of pedestrian activity and mitigation measures should be implemented into the design.

Pedestrian Comfort Category (Lawson Scale)	Mean and Gem wind speed not to be exceeded more than 5% of the time	Description
Sitting	4m/s	Acceptable for frequent outdoor sitting use, i.e., restaurant /café
Standing	6m/s	Acceptable for occasional outdoor sitting use, i.e., public outdoor spaces
Walking/Strolling	8m/s	Acceptable for entrances/bus stops /covered walkaways
Business Walking	10m/s	Acceptable for external pavements, walkways
Uncomfortable	>10m/s	Start of not comfortable/distress level for pedestrian access

Figure 9.7: Lawson Categories Scale - Comfort

Pedestrian Safety Category (Lawson Scale)	Mean and Gem wind speed not to be exceeded more than 0.0022% of the time	Description
Unsafe for public	>20m/s	Distress/safety concern for pedestrian
Unsafe for cyclists or frail person	>15m/s	Distress/safety concern for cyclist/frail person

Figure 9.8: Lawson Categories Scale - Distress/Safety

The significance of on-site measurement locations are defined by comparing the wind comfort/safety levels with the intended pedestrian activity at each location, using the table provided by the Lawson Comfort and Distress Criteria.

The significance of off-site measurement locations are defined by comparing the wind comfort/safety levels with the intended pedestrian activity at each location, prior and after the introduction of the proposed development.

Significance	Trigger	Mitigation required?
Major Adverse	Conditions are "unsafe"	Yes
Moderate Adverse	Conditions are "unsuitable" (in terms of comfort) for the intended pedestrian use.	Yes
Negligible	Conditions are "suitable" for the intended pedestrian use.	No
Moderate Beneficial	Conditions are calmer than required for the intended pedestrian use (by at least one comfort category).	No

Figure 9.9: Significance Criteria for On-site Receptors

Significance	Trigger	Mitigation required?
Major Adverse	Conditions that were "safe" in the baseline scenario became "unsafe" as a result of the Proposed Development. *OR* Conditions that were "suitable" in terms of comfort in the baseline scenario became "unsuitable" as a result of the Proposed Development. *OR* Conditions that were "unsafe" in the baseline scenario are made worse as a result of the Proposed Development.	Yes
Moderate Adverse	Conditions that were "suitable" in terms of comfort in the baseline scenario are made windier (by at least one comfort category) as a result of the Proposed Development but remain "suitable" for the intended pedestrian activity.	No
Negligible	Conditions remain the same as in the baseline scenario.	No
Major Beneficial	Conditions that were "unsafe" in the baseline scenario became "safe" as a result of the Proposed Development.	No
Moderate BeneficialPotetial REceptors	Conditions that were "unsuitable" in terms of comfort in the baseline scenario became "suitable" as a result of the Proposed Development. *OR* Conditions that were "unsafe" in the baseline scenario are made better as a result of the Proposed Development (but not so as to make them "safe".	No

Figure 9.10: Significance Criteria for Off-site Receptors

9.3 Introduction of CFD Technique

Computational Fluid Dynamics (CFD) is a numerical technique to simulate fluid flow, heat and mass transfer, chemical reaction and combustion, multiphase flow, and other phenomena related to fluid flows. CFD modelling includes three main stage: pre-processing, simulation and post-processing as described in Figure 9.11. The Navier-Stokes equations, used within CFD analysis, are based entirely on the application of fundamental laws of physics and therefore produce extremely accurate results providing that the scenario modelled is a good representation of reality.

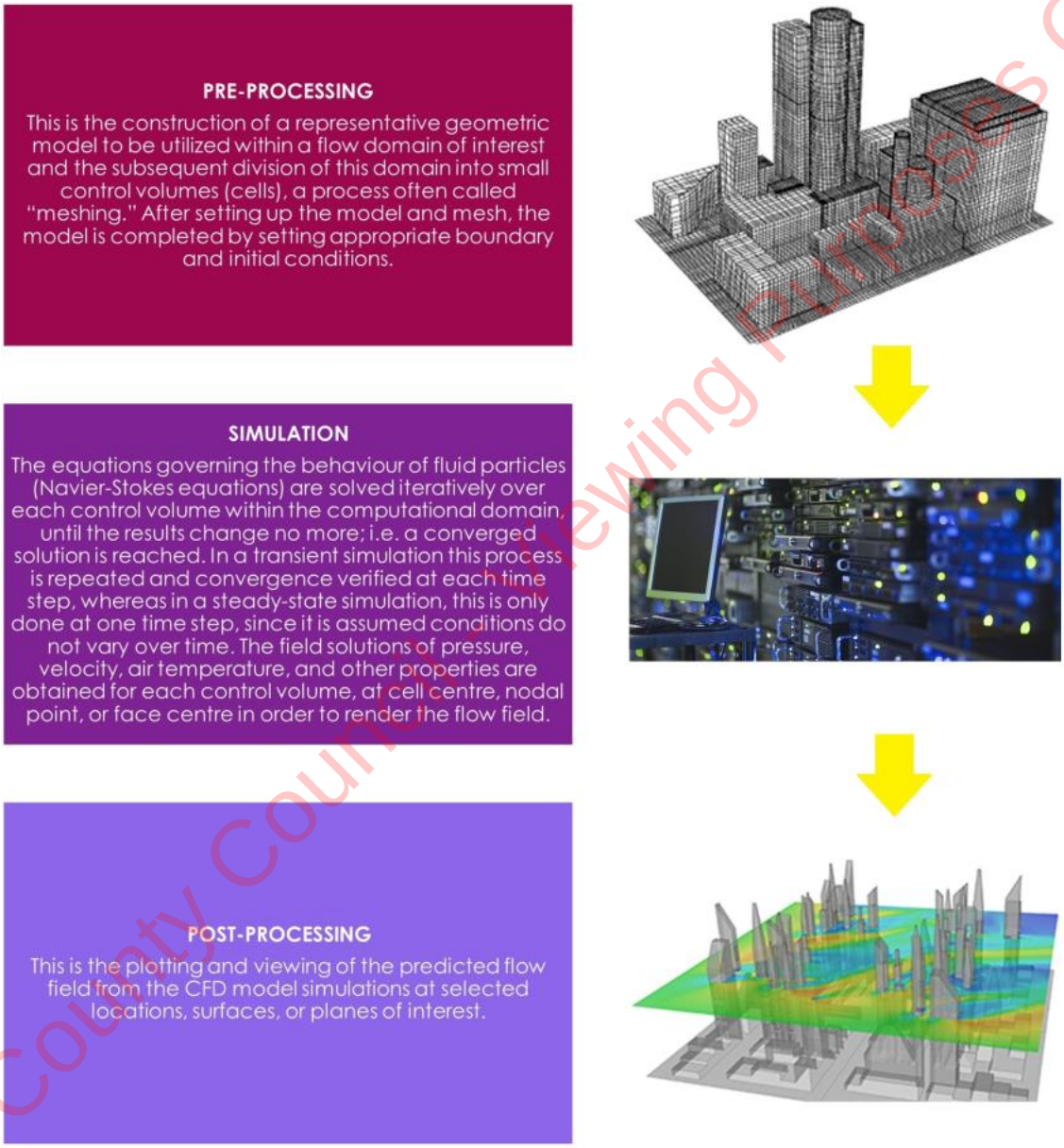


Figure 9.11: CFD Modelling Process Explanation

9.3.1 CFD Software Details

This study employs OpenFoam Code, which is based on a volume averaging method of discretization and uses the post-processing visualisation toolkit Paraview version 5.11. OpenFoam is a CFD software code released and developed primarily by OpenCFD Ltd, since 2004. It has a large user base across most areas of engineering and science, from both commercial and academic organisations.

OpenFOAM CFD code has capabilities of utilizing a Reynolds Averaged Navier-Stokes (RANS) approach, Unsteady Reynolds Averaged Navier-Stokes (URANS) approach, Detached Eddy Simulation (DES) approach, Large Eddy Simulation (LES) approach or the Direct Numerical Simulation (DNS) approach, which are all used to solve anything from complex fluid flows involving chemical reactions, turbulence and heat transfer, to acoustics, solid mechanics and electromagnetics.

The OpenFOAM solver algorithm directly solves the mass and momentum equations for the large eddies that comprise most of the fluid's energy. By solving the large eddies directly no error is introduced into the calculation.

To reduce computational time and associated costs the small eddies within the flow have been solved using the widely used and recognised Smagorinsky Sub-Grid Scale (SGS) model. The small eddies only comprise a small proportion of the fluids energy therefore the errors introduced through the modelling of this component are minimal. The error introduced by modelling the small eddies can be considered of an acceptable level. Computational time will be reduced by modelling the small eddies (compared to directly solving).

9.3.2 Computational Mesh

The level of accuracy of the CFD results are determined by the level of refinement of the computational mesh. Details of parameters used to calculate the computational mesh are presented in Table 9.1. Figure 9.12 shows the mesh utilised in the simulations.

The grid follows the principles of the 'Finite Volume Method', which implies that the solution of the model equations is calculated at discrete points (nodes) on a three-dimensional grid, which includes all the flow volume of interest. The mathematical solution for the flow is calculated at the center of each of these cells and then an interpolation function is used by the software to provide the results in the entire domain.

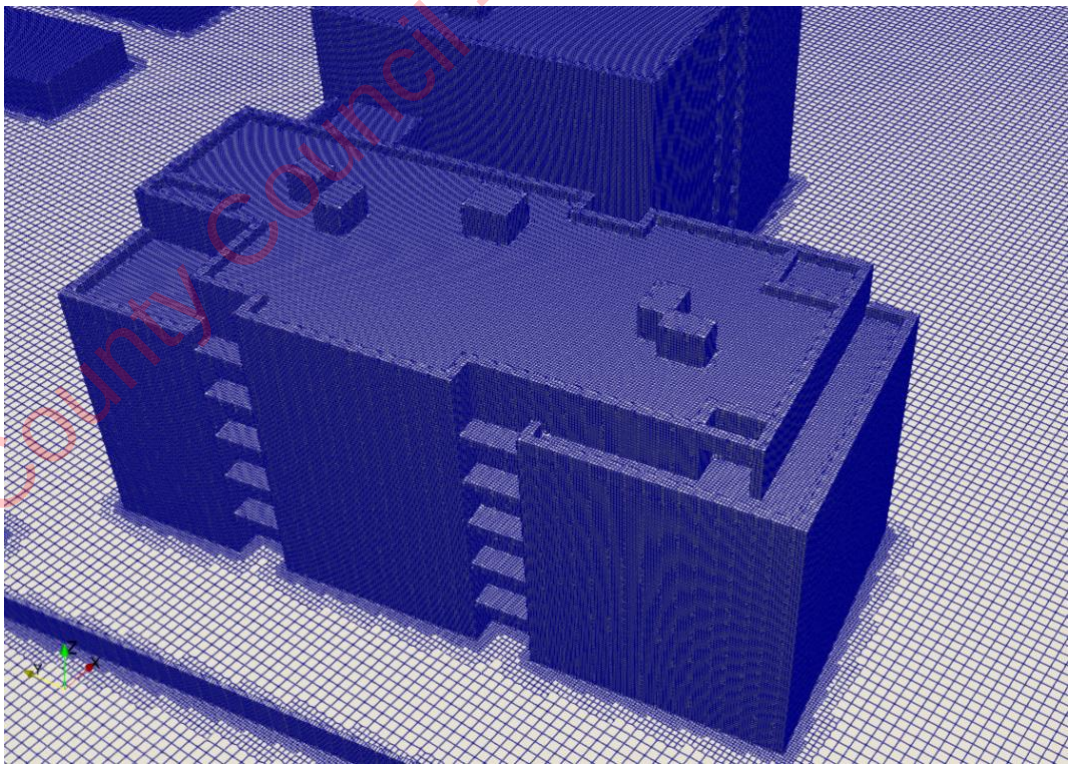


Figure 9.12: Computational Mesh of Oakfield Dunboyne

9.3.3 Boundary Conditions

For each wind directions, an initial wind velocity was set based on logarithmic wind profile. Surfaces within the model were specified as having 'no slip' condition. This boundary condition, ensures that flow moving parallel to a surface is brought to rest at the point where it meets the surface. All the other domain boundaries are set as "Open Boundaries".

The wind velocity data provided by the historical data collection and by the local data measuring are used in the formula below for the logarithmic wind profile to specify the wind velocity profile (wind velocity at different heights) to be applied within the CFD model:

$$u_{(z)} = \frac{u^*}{K} . ln\left(\frac{z + z_0}{z_0}\right)$$

Where:

$u_{(z)}$ = wind speed measured at the reference height z

z = height to measure u(z)

z_0= roughness length (selected from standard Eurocode)

u^* = friction velocity

K = Karman constant

9.3.4 Numerical Configuration

In this study, all simulations employ the SIMPLE algorithm to perform the pressure–velocity coupling (simpleFoam solver in OpenFOAM). All terms in the RANS equations are discretized using the nominally second-order cell-centred finite volume method, where gradient and Laplacian terms are discretized using Gaussian integration with linear interpolation. Convection/advection terms are discretized using a second-order accurate linear-upwind scheme.

9.3.5 Parallel Configuration

The computational mesh was decomposed using the SCOTCH algorithm. All simulations in this study are performed in parallel on an in-house HPC cluster. Key parameters of the CFD model used in this wind microclimate study are summarised in Table 9.1.

KEY PARAMETERS OF THE CFD MODEL	
Air Density (ρ)	1.2 kg/m^3
Ambient Temperature (T)	288 K (Approx. 15 °C)
Gravity Acceleration (g)	9.8 m/s^2
Cell Size	Approx. 0.15 m at the development Approx. 0.3 m in the surroundings 5 m elsewhere
Background Mesh Ratio	ratio 1:1
Total Mesh Size	Approx. cell count = 90 million

Table 9.1: Parameters To Calculate Computational Mesh

9.4 Receiving Environment

In this chapter, wind impact has been assessed on the existing receiving environment considered the existing buildings and the topography of the site prior of the construction of the proposed development. A statistical analysis of 30 years historical weather wind data has been carried out to assess the most critical wind speeds, directions and frequency of occurrence of the same. The aim of this assessment has been to identify the wind microclimate of the area that may cause critical conditions for pedestrian's comfort criteria.

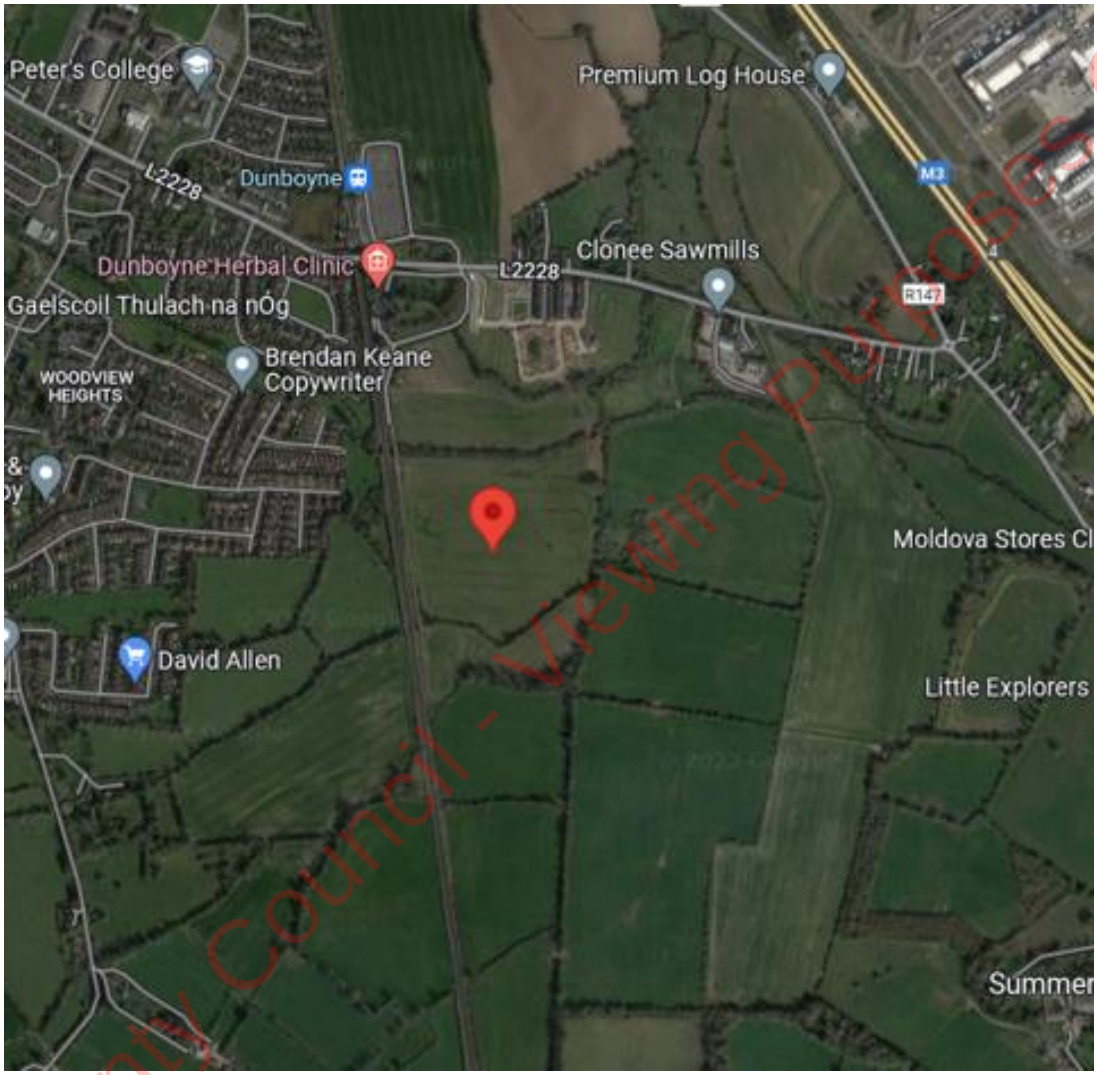


Figure 9.13: Existing Receiving Environment (Baseline Situation)

Oakfield Dunboyne Development will be situated in Dunboyne, Co. Meath. The Existing Environment site is shown in Figure 9.14. The area considered for the existing environment and proposed development assessment comprises a 1.5 km² area around the Oakfield Dunboyne Development as represented in Figure 9.15.

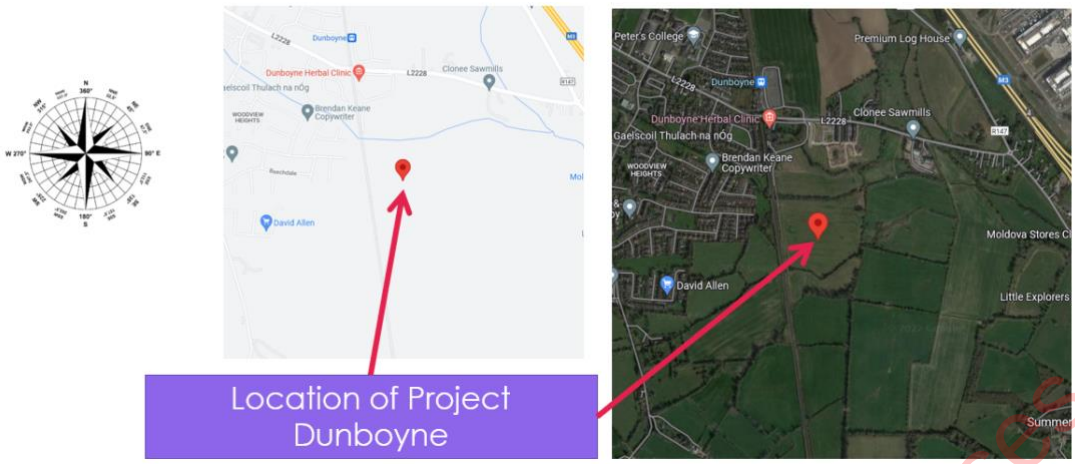


Figure 9.14: Oakfield Dunboyne Development Site Location and Existing Environment

Figure 9.15: Extents of Analysed Existing Environment Around Oakfield Dunboyne Development

9.4.1.1 Local Wind Conditions

This analysis considers the whole development being exposed to the typical wind condition of the site. The building is oriented as shown in the previous sections. The wind profile is built using the annual average of meteorology data collected at Dublin Airport Weather Station. Figure 9.16 shows on the map the position of Oakfield Dunboyne Development and the position of Dublin Airport.

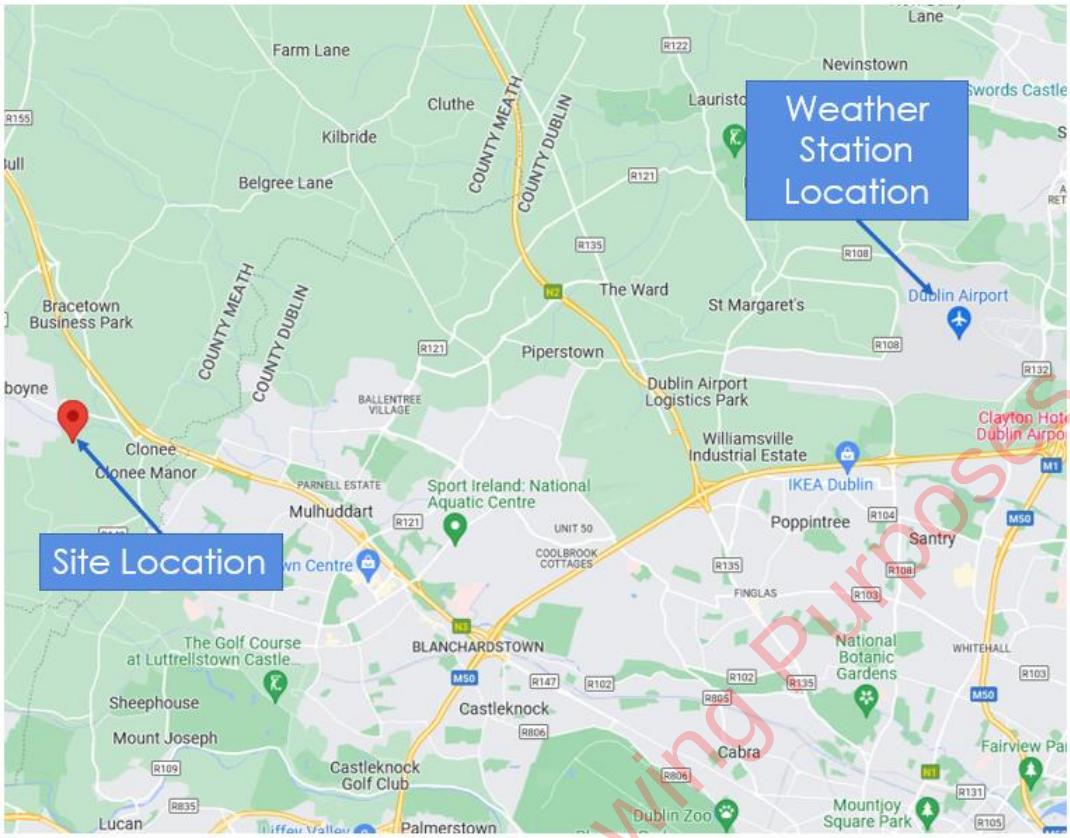


Figure 9.16: Map showing the position of Oakfield Dunboyne Development and Dublin Airport

Regarding the transferability of the available wind climate data following considerations have been made:

- *Terrain*: The meteorological station is located on the flat open terrain of the airport, whereas the development site is in an urban area with dense built-in structure with buildings of 10 m height in average.
- *Mean Wind Speeds*: Due to the different terrain environment, the ground-near wind speeds (at pedestrian level) will be lower at the construction site compared to the meteorological station at the airport.
- *Wind Directions*: The landscape around the development site can in principle be characterized as flat terrain. Isolated elevations in the near area of the development should have no influence on the wind speed and wind directions. With respect to the general wind climate no significant influence is expected. Based on the above considerations it can be concluded that the data from the meteorological station at Dublin Airport are applicable for the desktop assessment of the wind comfort at the development site.

The assessment of the wind comfort conditions at the new development will be based on a discrete set of wind data throughout a year (annual wind statistic) provided by Meteoblue for Dublin airport meteological wind station. In this study, a 12-discrete set of wind direction is used in order to evaluate the probability of exceedance at any given threshold speed. A Weibull probability distribution is used to fit the given wind data into a continuous one for each wind direction. From Weibull distribution function, the probability, P, can be obtained for each wind direction by:

$$P = \frac{a}{b}\left(\frac{u}{b}\right)^{a-1} e^{-\left(\frac{u}{b}\right)^{a}}$$

Where b is the scale parameter and a is the shape parameter for a wind speed u.

As stated above, the local wind climate is determined from historical meteorological data recorded at Dublin Airport. The data set analyzed for this assessment is based on the meteorological data

associated with the maximum daily wind speeds recorded over a 5-year period between 2018 and 2022 at a weather station at the airport, which is located 10m above ground.

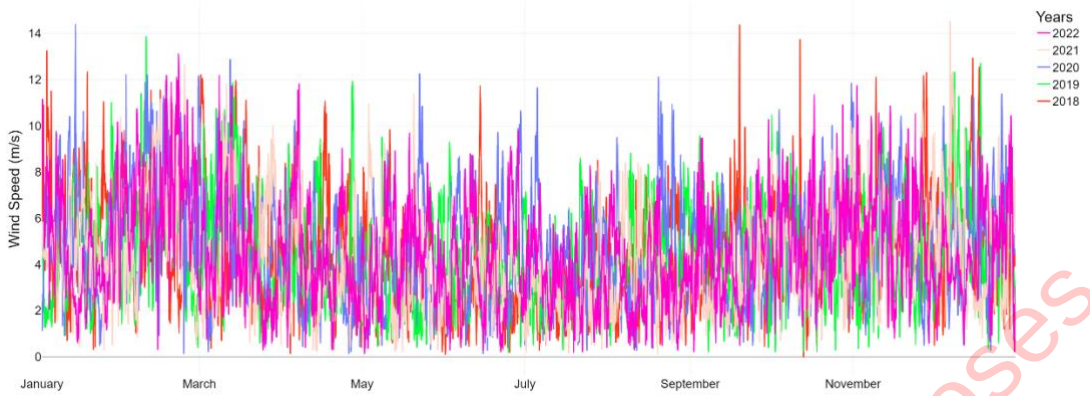


Figure 9.17: Local Wind Conditions - Wind Speed - 2018-2022

Figure 9.18, presenting the wind speed diagram for Dublin, shows the days per month, during which the wind reaches a certain speed. In Figure 9.19, the wind rose for Dublin shows the percentage of wind blows from the indicated direction. As shown in Figure 9.19, west is the prevailing wind direction. This implies that the largest contribution to the discomfort exceedance probability.

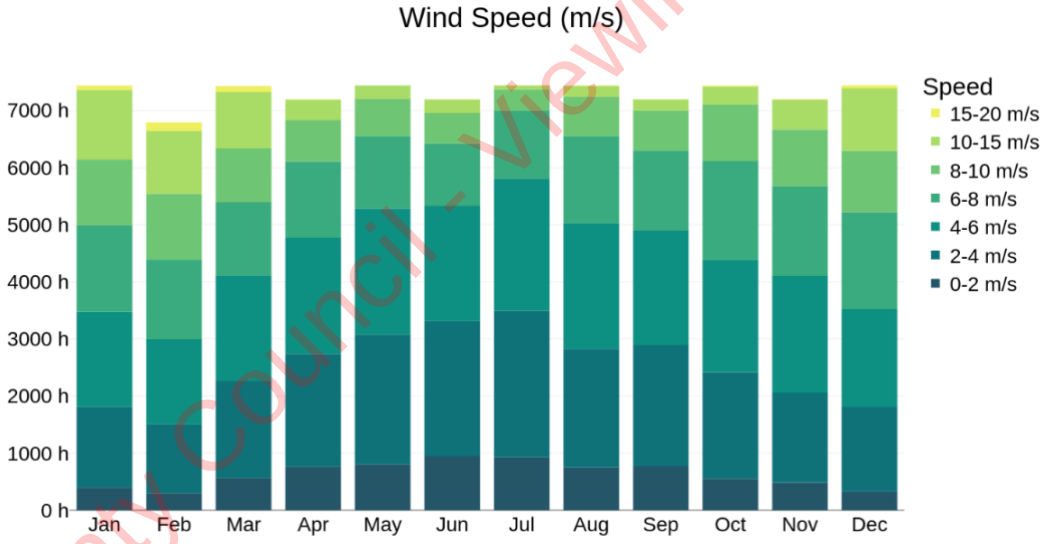


Figure 9.18: Dublin Wind Speed Diagram

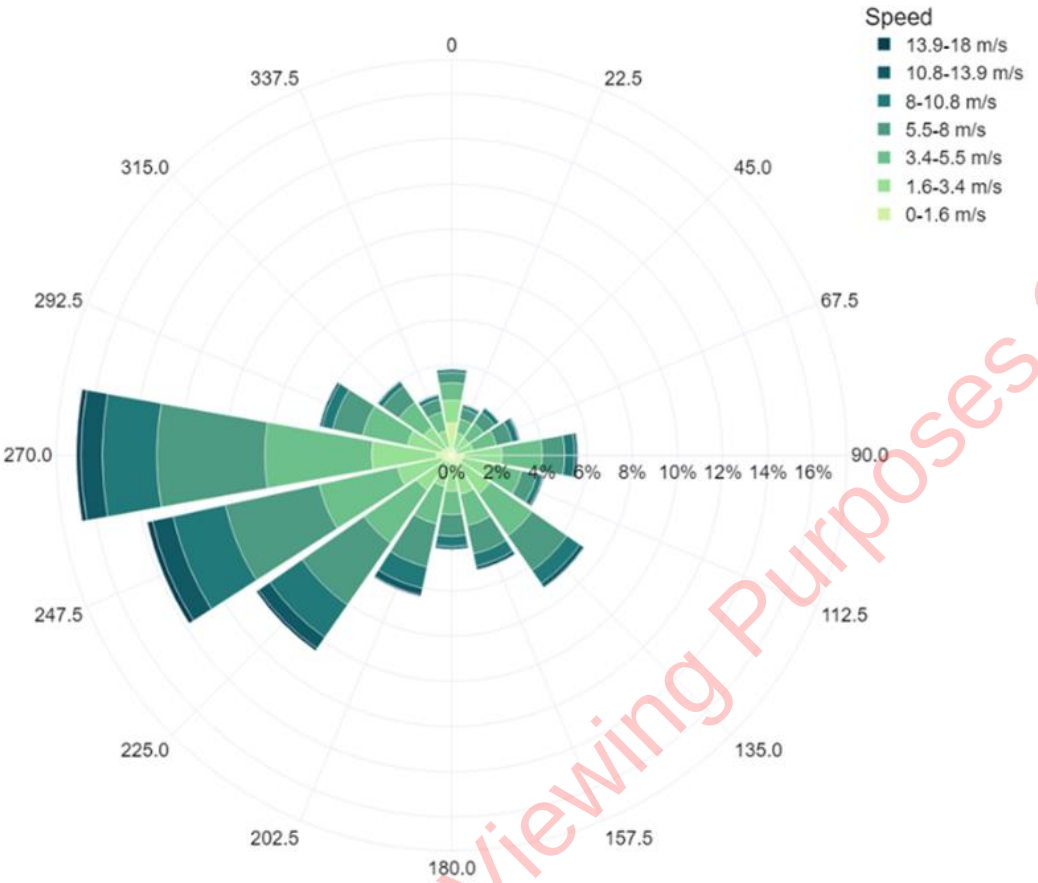


Figure 9.19: Dublin Wind Rose

Statistical analysis of the number of hours and magnitudes of wind is performed in order to indicate the pedestrian comfort and distress analysis as per Lawson Criteria. Each of the wind directions were interpolated to calculate the probability that a velocity threshold will be exceeded.

Based on the criterion of occurrence frequency, if the proposed site is exposed to a wind from a specific direction for more than 5 percent of the time, then the microclimate analysis should consider the impact of this wind (accounting for its direction and most frequent speed) on the local microclimate. In addition, seasonal changes were analysed in order to indicate the prevailing wind directions (Fig 4.9).

Figure 9.20: Wind speeds and wind directions at different seasons

9.5 Characteristics of the Proposed Development

This section assessed the potential impact of the proposed development on the already existing environment, and the suitability of the proposed development to create and maintain a suitable and comfortable environment for different pedestrian activities.

9.5.1 Proposed Development

Permission is sought for a period of 10 Years for a proposed development on a site of approximately 16.9Ha consisting of 716no. residential units in a mix of houses, duplex and apartment buildings ranging in height from 2 to 7 storeys overall; comprising of 155no. 2 storey houses; 517no. apartments accommodated in 8no. buildings ranging in height from 4 to 7 storeys; 44no. duplex units accommodated in 2no. 3 storey terraces; 1no. childcare facility (c.602sqm) located at ground floor level of Block B1; public open space; communal and private open space; public lighting; car parking, including basement car parking under some of the apartments; secure bicycle parking; and all associated and ancillary site development and infrastructural works, hard and soft landscaping and boundary treatment works, provision of c. 470m of new distributor road; provide a 200mm diameter watermain in existing section of southern distributor road adjacent to recently constructed Castle Farm development; upgrade of junction of southern distributor road and L2228 (Station Road) to provide a signalised junction with pedestrian crossings, including ancillary adjustments to road markings on both roads; provision of foul drainage pumping station; provision of a compensatory storage area adjacent to Castle Stream; ESB Sub-Stations; and improvement works to 2 no. roundabouts on the R147 (Old Navan Road).

9.4.1.1 Potential Receptors

Potential receptors for the wind assessment are all pedestrian circulation routes, building entrances and leisure open areas within the site and in neighbouring adjacent areas. The pedestrian level is considered at 1.5m above ground.

Figure 9.21 shows a view of the proposed development and Figure 9.22 shows the pedestrian activity area (green color) which are considered a sensitive potential receptor for the wind microclimate.

Figure 9.21: Proposed Oakfield Dunboyne Development

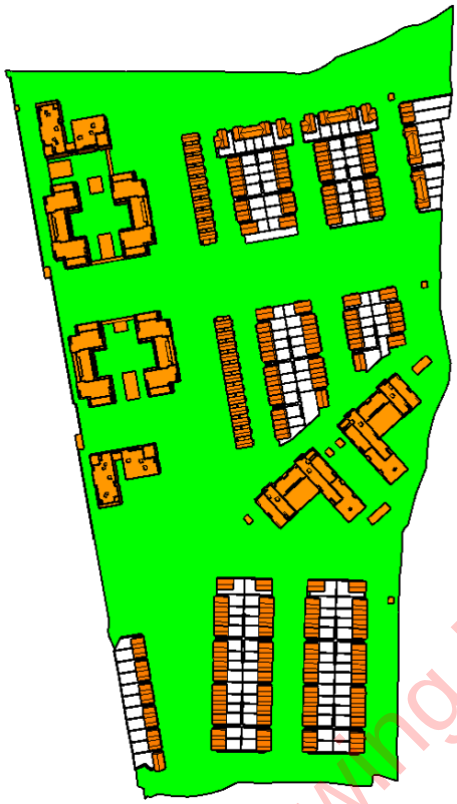


Figure 9.22: Proposed Oakfield Dunboyne Development - Potential Sensitive Receptors (Green colour)

9.6 Potential Impact of the Proposed Development

This section assessed the potential impact of the proposed development on the already existing environment, and the suitability of the proposed development to create and maintain a suitable and comfortable environment for different pedestrian activities.

9.6.1 Proposed Development

9.6.1.1 Construction Stage

As the finalization of the development proceeds, the wind setting at the site would progressively conform to those of the completed development. Since windier conditions are acceptable within a construction area (not accessible to the public), and the proposed development would not be the reason for critical wind conditions on-Site (and are slightly calmer when the development is in site), the impacts evaluated on-Site are considered to be insignificant. Thus, the predicted impacts during construction phase are identified as not significant or negligible.

In summary, as construction of the Oakfield Dunboyne Development progresses, the wind conditions at the site would gradually adjust to those of the completed development. During the construction phase, predicted impacts are classified as negligible.

9.6.1.2 Operational Stage

This section shows CFD results of wind microclimate assessment carried out considering the ”Operational Phase” of Oakfield Dunboyne Development. In this case the assessment has considered the impact of wind on the existing area including the proposed Oakfield Dunboyne Development. Wind simulations have been carried out on all the various directions for which the development could show critical areas in terms of pedestrian comfort and safety.

Results of wind microclimate at pedestrian level (1.5m height - flow speeds) are collected throughout the modelled site (potential receptors). These flow velocities identify if locally, wind speeds at pedestrian-level are accelerated or decelerated in relation to the undisturbed reference wind speed due to the presence of the existing baseline environment.

The impact of these speeds are then combined with their specific frequency of occurrence and presented in the maps that show the area of comfort and distress in accordance with Lawson Criteria, these maps are produced at pedestrian level on the ground and identify the suitability of each areas to its prescribed level of usage and activity.

Figure 9.23: CFD Model of Proposed Scenario

Results of wind speeds and their circulations at pedestrian level of 1.5m above the development ground are presented from Figure 9.24 to Figure 9.35 for different wind directions. These flow velocity values have been normalized to a coloured range from 0 to 1 which identifies if locally, wind speeds at pedestrian-level are accelerated to the maximum value (red = 1) or decelerated to the minimum value (blue = 0) in relation to the undisturbed reference wind speed (approaching wind speed).

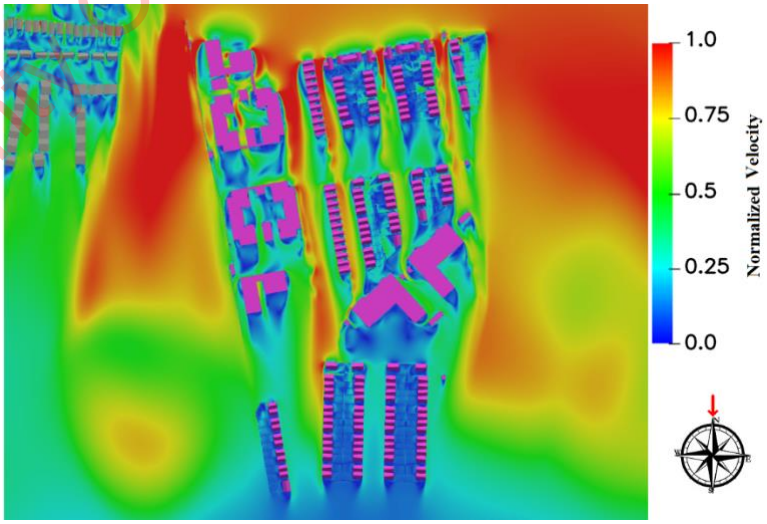


Figure 9.24: Ground Floor Level - Flow Velocity Results at Z=1.5m above the ground - Wind Direction: N

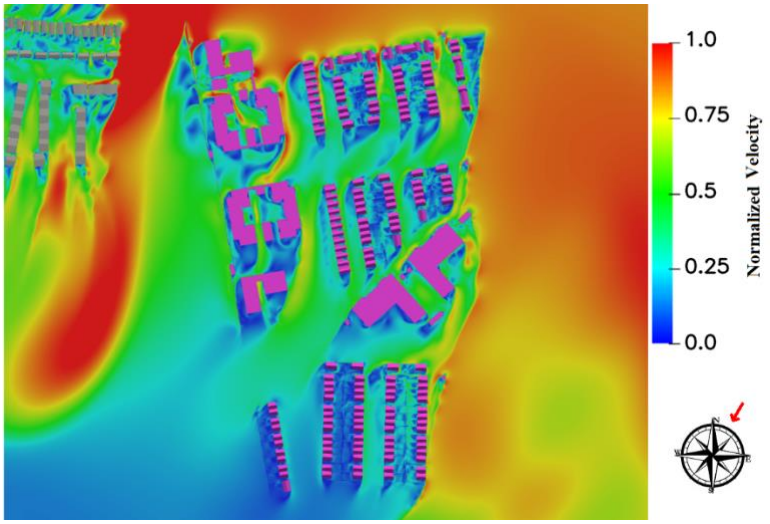


Figure 9.25: Ground Floor Level - Flow Velocity Results at Z=1.5m above the ground - Wind Direction: NNE

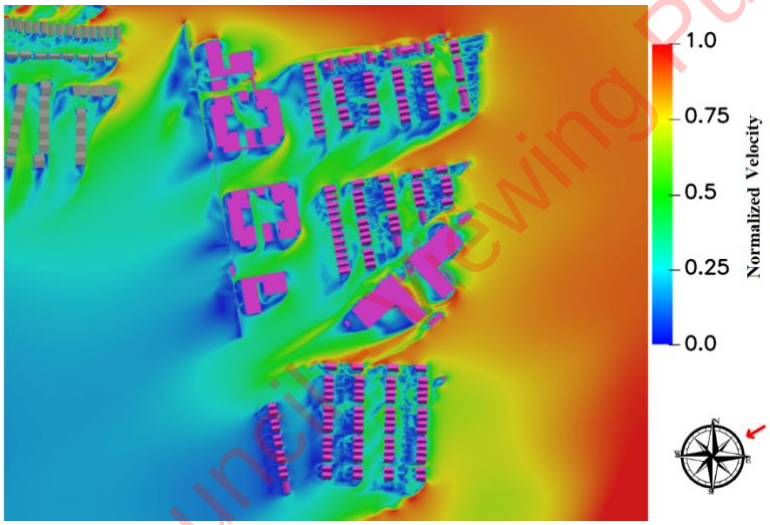


Figure 9.26: Ground Floor Level - Flow Velocity Results at Z=1.5m above the ground - Wind Direction: ENE

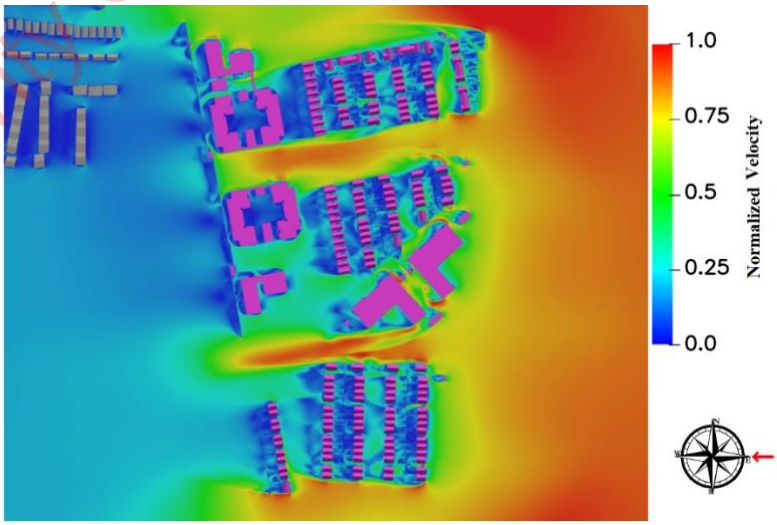


Figure 9.27: Ground Floor Level - Flow Velocity Results at Z=1.5m above the ground - Wind Direction: E

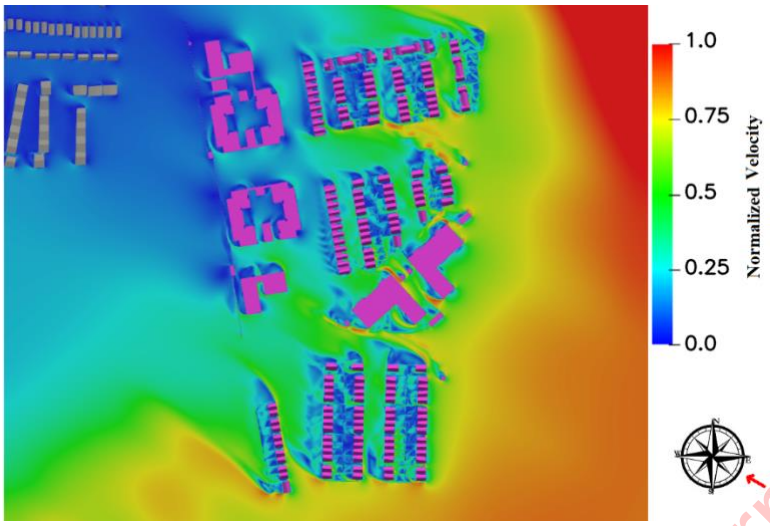


Figure 9.28: Ground Floor Level - Flow Velocity Results at Z=1.5m above the ground - Wind Direction: ESE

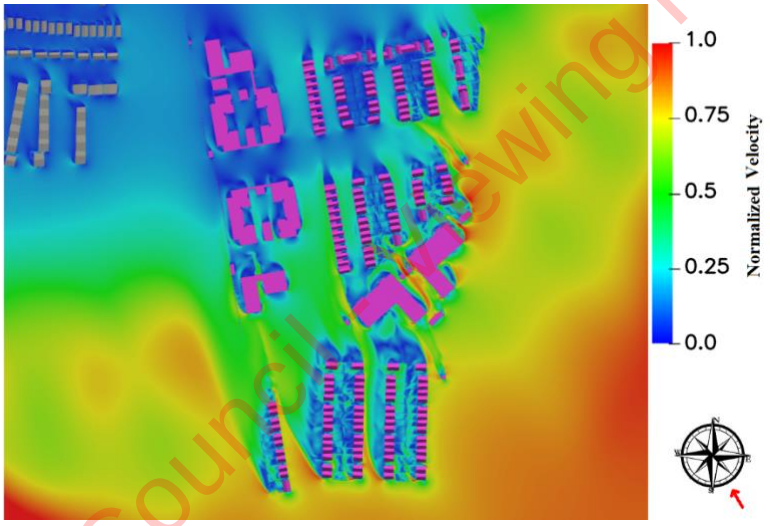


Figure 9.29: Ground Floor Level - Flow Velocity Results at Z=1.5m above the ground - Wind Direction: SSE

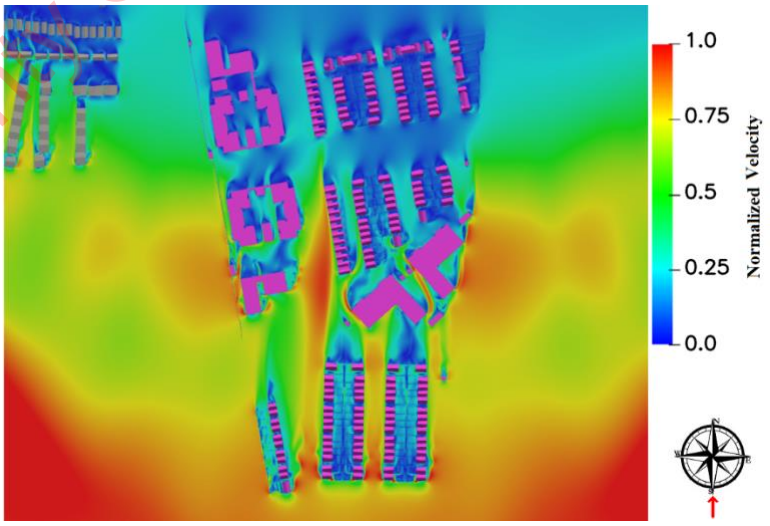


Figure 9.30: Ground Floor Level - Flow Velocity Results at Z=1.5m above the ground - Wind Direction: S

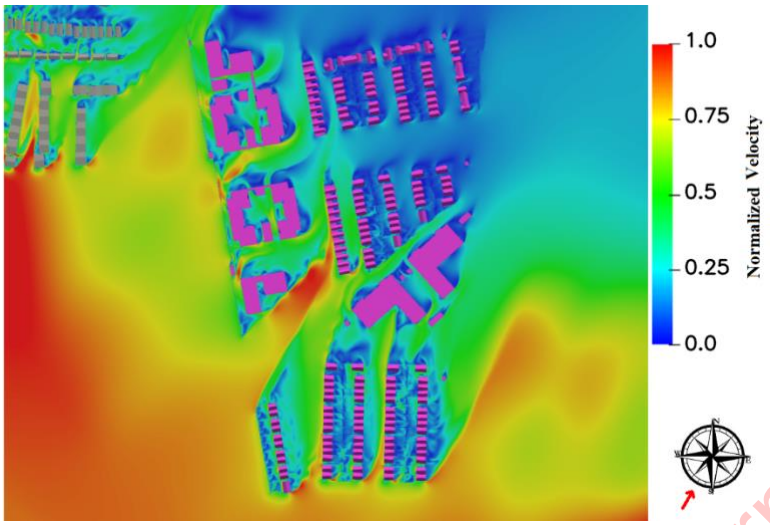


Figure 9.31: Ground Floor Level - Flow Velocity Results at Z=1.5m above the ground - Wind Direction: SSW

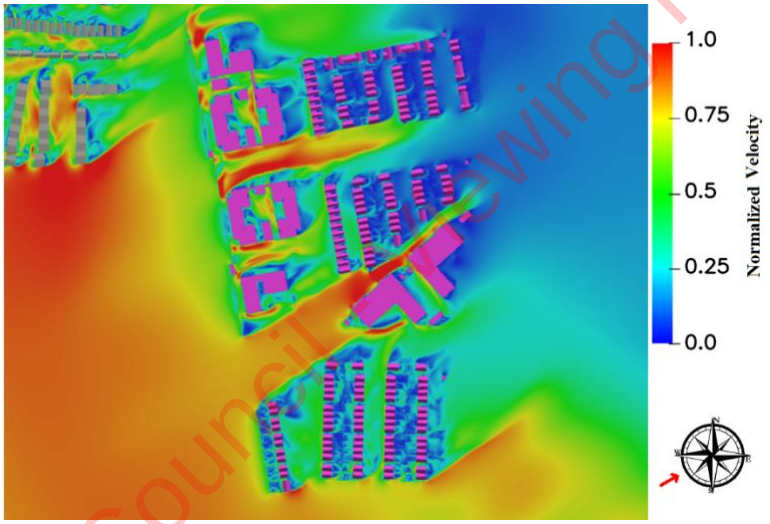


Figure 9.32: Ground Floor Level - Flow Velocity Results at Z=1.5m above the ground - Wind Direction: WSW

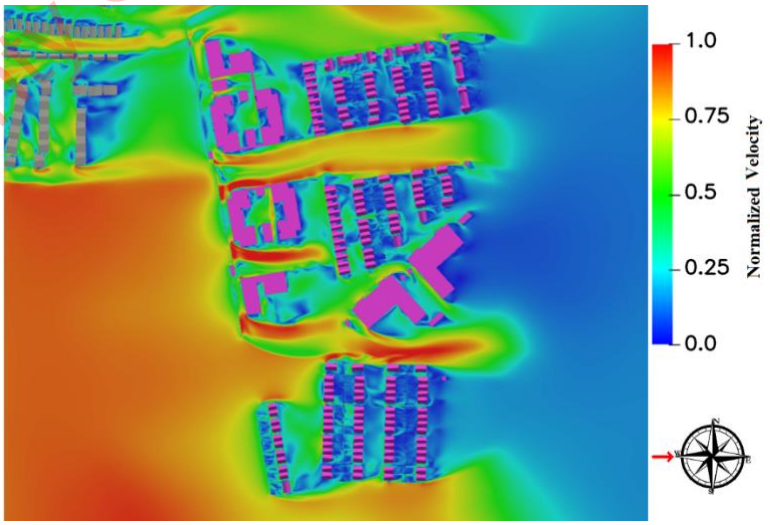


Figure 9.33: Ground Floor Level - Flow Velocity Results at Z=1.5m above the ground - Wind Direction: W

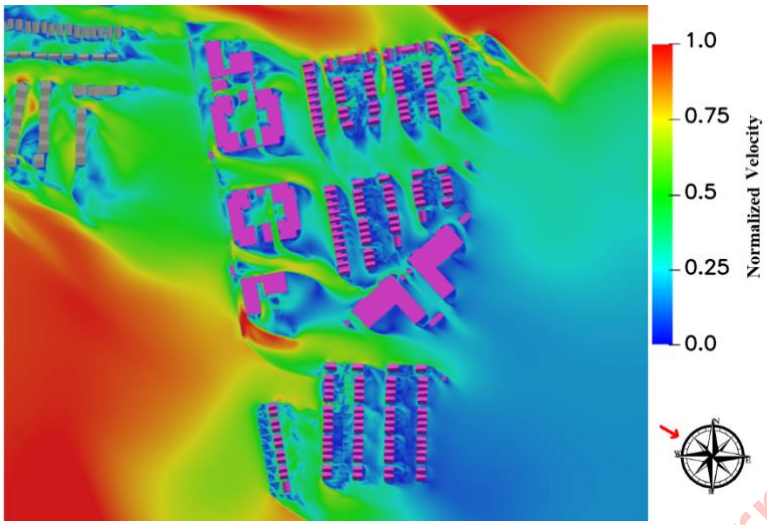


Figure 9.34: Ground Floor Level - Flow Velocity Results at Z=1.5m above the ground - Wind Direction: WNW

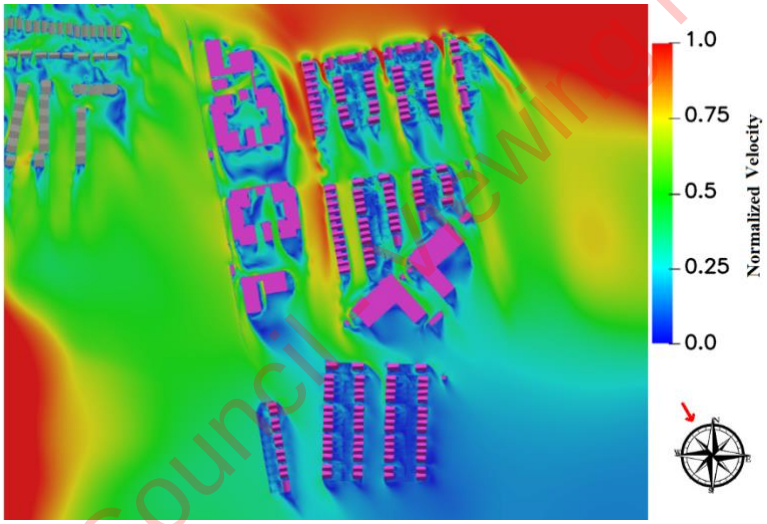


Figure 9.35: Ground Floor Level - Flow Velocity Results at Z=1.5m above the ground - Wind Direction: NNW

9.6.2 Proposed Development Wind Microclimate – Lawson Criteria

The wind flow results obtained simulating the different direction and wind speeds, are combined with wind frequencies of occurrence to obtain comfort ratings at pedestrian level in all areas included within the model. The comparison of comfort ratings with intended pedestrian activities is shown in the Lawson Comfort and Distress Map that follows.

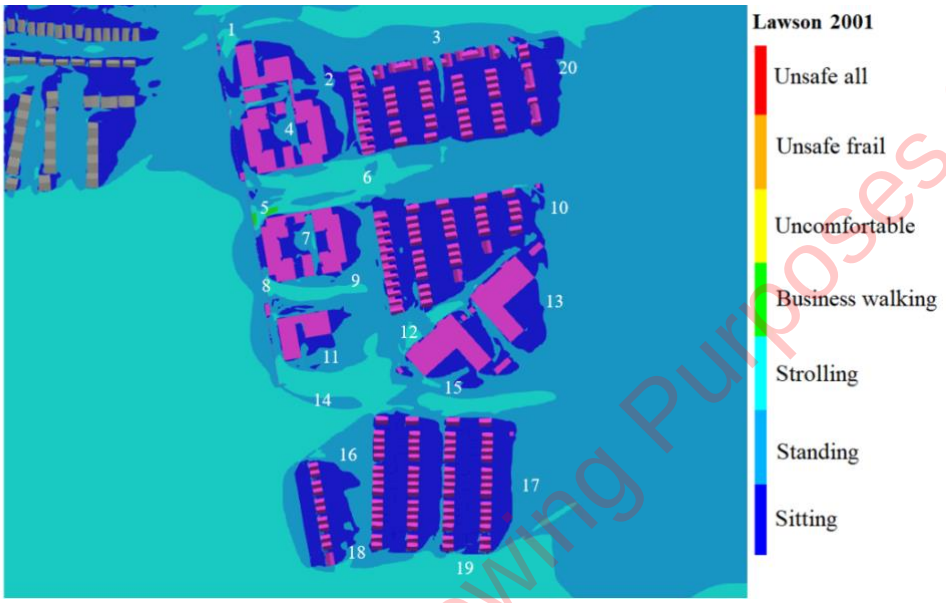
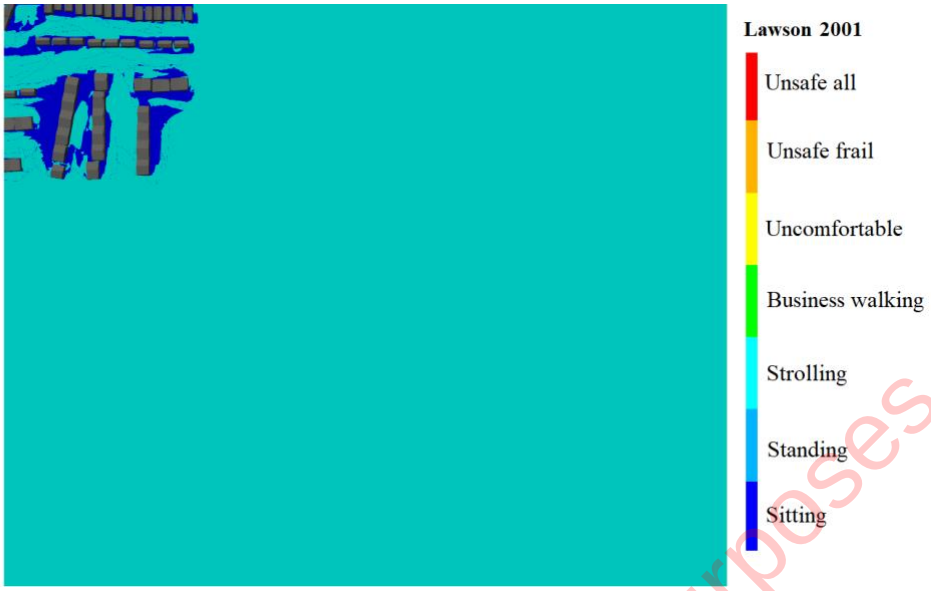


Figure 9.36: Lawson Map at the Potential Sensitive Receptors

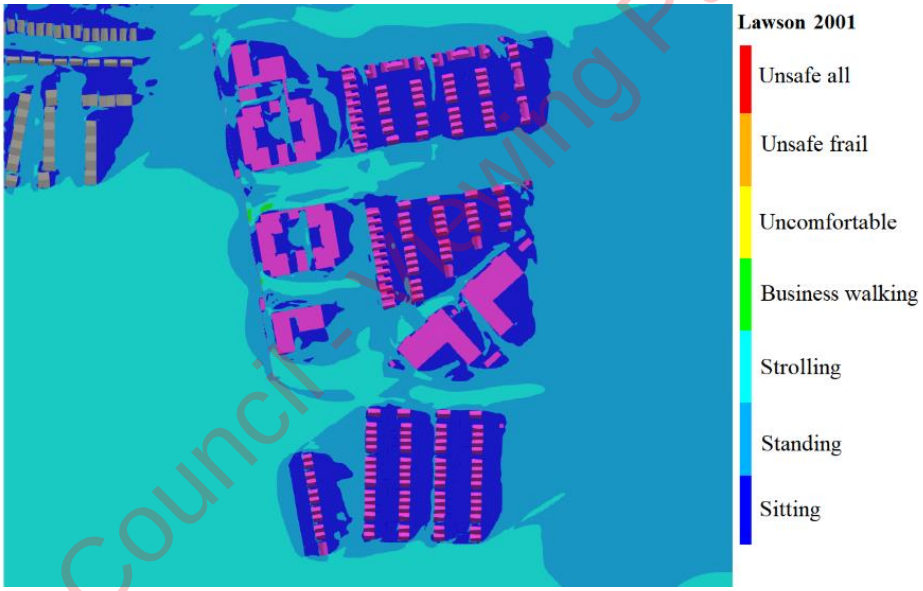
In summary, the following conclusions can be made observing the results of the wind microclimate analysis and comparing the results obtained, under the same wind conditions for the baseline scenario versus the proposed development scenario:

- The assessment of the proposed scenario has shown that no area is unsafe, and no conditions of distress are created by the proposed development.
- All the roads proposed can be used for their intended scope.
- The wind microclimate of the proposed development is comfortable and usable for pedestrians.

As a result of the proposed development construction, the wind on the surrounding urban context remains suitable for the intended use when compared with the baseline situation.



Baseline Scenario



Proposed Development Scenario

Figure 9.37: Comparison Wind Microclimate Conditions (Lawson Comfort/Distress Map)

Tables 9.2 shows the intended baseline and proposed wind conditions. As shown in the table, there are no distress area for pedestrians including frail users and cyclist. furthermore, the site and surrounding urban areas are safe for all users.

Potential Receptors	Baseline Conditions	Proposed Development Conditions	Impact Significance
Amenity area (1)	Suitable for intended pedestrian use (Sitting and strolling)	Conditions remain tenable - Siting/Standing/Strolling (Safe / No distress)	Negligible
Amenity area (2)	Suitable for intended pedestrian use (Sitting and strolling)	Conditions remain tenable - Siting/Standing/Strolling (Safe / No distress)	Negligible
Amenity area (3)	Suitable for intended pedestrian use (Sitting and strolling)	Conditions remain tenable - Siting/Standing/Strolling (Safe / No distress)	Negligible
Amenity area (4)	Suitable for intended pedestrian use (Sitting and strolling)	Conditions remain tenable - Siting/Standing/Strolling (Safe / No distress)	Negligible
Amenity area (5)	Suitable for intended pedestrian use (Sitting and strolling)	Conditions remain tenable - Standing/Strolling/Walking (Safe / No distress)	Negligible
Amenity area (6)	Suitable for intended pedestrian use (Sitting and strolling)	Conditions remain tenable - Siting/Standing/Strolling (Safe / No distress)	Negligible
Amenity area (7)	Suitable for intended pedestrian use (Sitting and strolling)	Conditions remain tenable - Siting/Standing/Strolling (Safe / No distress)	Negligible
Amenity area (8)	Suitable for intended pedestrian use (Sitting and strolling)	Conditions remain tenable - Standing/Strolling/Walking (Safe / No distress)	Negligible
Amenity area (9)	Suitable for intended pedestrian use (Sitting and strolling)	Conditions remain tenable - Siting/Standing/Strolling (Safe / No distress)	Negligible
Amenity area (10)	Suitable for intended pedestrian use (Sitting and strolling)	Conditions remain tenable - Siting/Standing/Strolling (Safe / No distress)	Negligible
Amenity area (12)	Suitable for intended pedestrian use (Sitting and strolling)	Conditions remain tenable - Siting/Standing/Strolling (Safe / No distress)	Negligible
Amenity area (13)	Suitable for intended pedestrian use (Sitting and strolling)	Conditions remain tenable - Siting/Standing/Strolling (Safe / No distress)	Negligible
Amenity area (14)	Suitable for intended pedestrian use (Sitting and strolling)	Conditions remain tenable - Siting/Standing/Strolling (Safe / No distress)	Negligible
Amenity area (15)	Suitable for intended pedestrian use (Sitting and strolling)	Conditions remain tenable - Siting/Standing/Strolling (Safe / No distress)	Negligible
Amenity area (16)	Suitable for intended pedestrian use (Sitting and strolling)	Conditions remain tenable - Siting/Standing/Strolling (Safe / No distress)	Negligible
Amenity area (17)	Suitable for intended pedestrian use (Sitting and strolling)	Conditions remain tenable - Siting/Standing/Strolling (Safe / No distress)	Negligible
Amenity area (18)	Suitable for intended pedestrian use (Sitting and strolling)	Conditions remain tenable - Siting/Standing/Strolling (Safe / No distress)	Negligible
Amenity area (19)	Suitable for intended pedestrian use (Sitting and strolling)	Conditions remain tenable - Siting/Standing/Strolling (Safe / No distress)	Negligible
Amenity area (20)	Suitable for intended pedestrian use (Sitting and strolling)	Conditions remain tenable - Siting/Standing/Strolling (Safe / No distress)	Negligible

Table 9.2: Significance impact of the proposed development versus baseline

9.6.2.1 Do-Nothing Impact

In case the development will not be constructed, the wind conditions on the site will be in line with the Baseline scenario wind microclimate (Figure **9.37** and Table 9.2).

9.6.3 Conclusions and Comments on Microclimate Study

This report presents the CFD modelling assumptions and results of Wind and Microclimate Modelling of Oakfield Dunboyne Development, Dunboyne, Co. Meath.

This study has been carried out to identify the possible wind patterns around the area proposed, under mean and peak wind conditions typically occurring near Dublin, and to assess impacts of the wind on pedestrian levels of comfort/distress.

The results of this wind microclimate study are utilized by Comer Group Ireland to configure the optimal layout for Oakfield Dunboyne Development for the aim of achieving a high-quality environment for the scope of use intended of each areas/building (i.e. comfortable and pleasant for potential pedestrian) and not to introduce any critical wind impact on the surrounding areas and on the existing buildings.

- The wind profile was built using the annual average of meteorology data collected at Dublin Airport Weather Station purchased from Meteoblue. The local wind speed was determined from CFD simulations with combination of the parameters inside Weibull probability distribution function, which obtained from historical meteorological data recorded 10m above ground level at Dublin Airport.
- A 12-discrete set of wind direction is used in order to evaluate the probability of exceedance at any given threshold speed. It is found that the prevailing wind direction in the West has the largest contribution of the discomfort exceedance probability.
- Microclimate Assessment of Oakfield Dunboyne Development and its environment was performed utilizing a CFD (Computational Fluid Dynamics) methodology.
- The proposed Oakfield Dunboyne Development has been designed in order to produce a high-quality environment that is attractive and comfortable for pedestrians of all categories. To achieve this objective, throughout the design process, the impact of wind has been considered and analysed, in the areas where critical patterns were found, the appropriate mitigation measures were introduced.
- As a result of the final proposed and mitigated design, wind flow speeds at ground floor are shown to be within tenable conditions. The areas can be utilised for the intended use (sitting and walking).
- The proposed development does not give rise to negative impact or critical wind speed profiles at the nearby adjacent area of open space, or nearby buildings. Moreover, in terms of distress, no critical conditions were found for “Frail persons or cyclists” and for members of the ”General Public” in the surroundings of the development.
- The wind condition at the future development (future bridge/road over the existing railway) will be suitable for intended use (standing/strolling/walking) and there will be no unsafe or uncomfortable area for pedestrians.
- In relation to the cumulative assessment, the residential development (Reg. 22675) and Dunboyne train station are considered in this assessment. As the proposed development is located more than 450m away from the cumulative developments mentioned above, the impact of wind on these cumulative developments is negligible and the wind conditions on the site will be in line with the Proposed scenario wind microclimate.

Therefore, the CFD study carried out has shown that under the assumed wind conditions typically occurring within Dublin for the past 30 years:

- The development is designed to be a high-quality environment for the scope of use intended of each areas/building (i.e. comfortable and pleasant for potential pedestrians), and,
- The development does not introduce any critical impact on the surrounding buildings, or nearby adjacent area of open space.

9.7 Mitigation Measures (Ameliorative, Remedial or Reductive Measures)

9.7.1 Proposed Development

9.7.1.1 Construction Stage

No mitigation measures are required.

9.7.1.2 Operational Stage

The landscaping proposed for the development has been considered within the wind analysis carried out and its effect has been beneficial in reducing the wind speed around the development and creating calmer wind condition in areas such the parks and landscaped areas where pedestrian can be comfortable for sitting.

9.8 Residual Impact of the Proposed Development

9.8.1 Proposed Development

Wind cannot be eliminated or totally mitigated as it depends on weather conditions which could vary. The data of the historical wind conditions collected and reported in the previous sections, show that the wind speeds likely to occur on the site are below critical values and that pleasant and comfortable microclimate can be maintained for most of the time and under the most frequent wind scenarios.

Having considered the above, no further changes to the development design and further increasing of the landscaping is suggested, as safety and pedestrian comfort is maintained in accordance with Lawson Comfort and Distress Criteria.

9.8.2 Cumulative Impacts

9.8.2.1 Construction Stage

Exempted Development

As the works to be undertaken by Uisce Eireann involve below ground works, these can be disregarded for the purposes of this assessment as there will be a negligible/neutral impact on the wind environment.

No residual wind impact arising from these exempted development works. No monitoring required.

Future Development

The wind conditions at the site would gradually adjust to those of the completed development during the construction phase and no significant wind impact arising during the construction phase.

No residual wind impact arising from these future development works. No monitoring required.

Residential Development Meath County Council Reg. Reg. 22675

The wind conditions at the site would gradually adjust to those of the completed development during the construction phase and no significant wind impact arising during the construction phase.

No residual wind impact arising from these Residential development works. No monitoring required.

Dart + West

The wind conditions at the site would gradually adjust to those of the completed development during the construction phase and no significant wind impact arising during the construction phase.

9.8.2.2 Operational Stage

Exempted Development

As the works to be undertaken by Uisce Eireann involve below ground works, these can be disregarded for the purposes of this assessment as there will be a negligible/neutral impact on the wind environment.

No residual wind impact arising from these Residential development works. No monitoring required.

Future Development

According to Lawson map shown in Figure 9.1, the wind condition at the future development (future bridge/road over the existing railway) will be suitable for intended use (standing/strolling/walking) and there will be no unsafe or uncomfortable area for pedestrians.

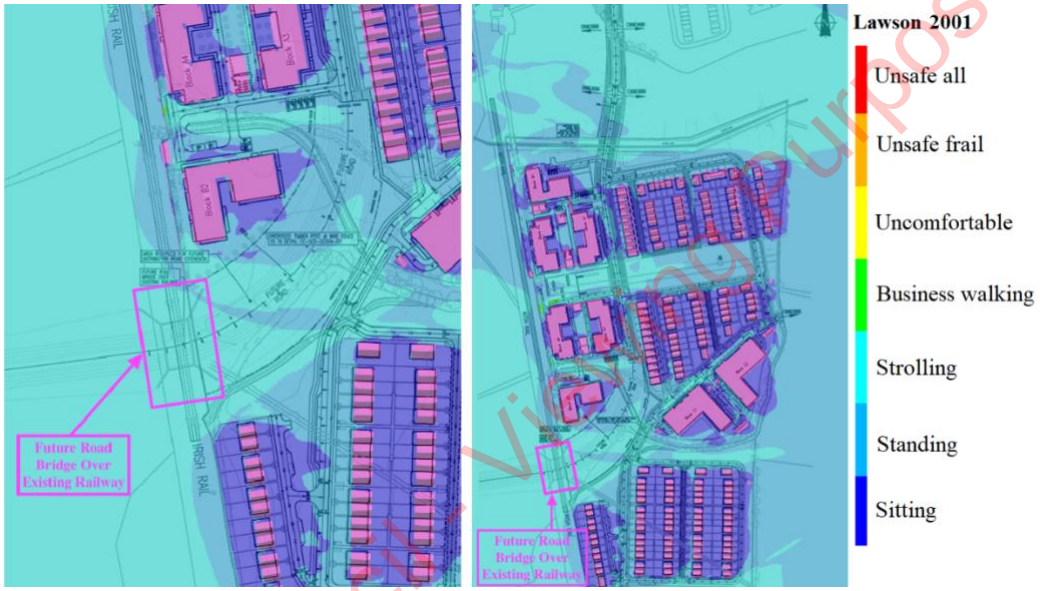


Figure 9.38: Wind Microclimate Conditions at future development (Lawson Comfort/Distress Map)

No residual wind impact arising from these Residential development works. No monitoring required.

Residential Development Meath County Council Reg. Reg. 22675

In accordance with the guideline cited in section 9.2, the wind microclimate study should consider the effect of the proposed development together with buildings (existing and/or permitted) that are within 400m from the centre of the site. As the proposed buildings are located at least 450m far from the residential development (Reg. 22675), the impact of wind on this cumulative development is negligible and the wind conditions on the site will be in line with the Proposed scenario wind microclimate.

No residual wind impact arising from these Residential development works. No monitoring required.

Dart + West

In accordance with the guideline cited in section 9.2, the wind microclimate study should consider the effect of the proposed development together with buildings (existing and/or permitted) that are within 400m from the centre of the site. As the proposed buildings are located at least 450m far from Dunboyne train station, the impact of wind on this cumulative development is negligible and the wind conditions on the site will be in line with the Proposed scenario wind microclimate.

No residual wind impact arising from these Residential development works. No monitoring required.

9.9 Monitoring

9.9.1 Proposed Development

9.9.1.1 Construction Stage

There is no requirement to monitor wind impact during the construction phase for pedestrian comfort and distress as the designated amenity areas will not be in use during this phase of the project and pedestrians are not accessing construction sites.

9.9.1.2 Operational Stage

The development has been designed to conform to acceptable Lawson Criteria for Comfort and Distress following the Wind Beaufort Scale and considering the historical wind conditions of the site, there is no further element to monitor for this scope as far as the design and landscaping is maintained in place as proposed.

9.10 Reinstatement

9.10.1 Proposed Development

9.10.1.1 Construction Stage

No reinstatement required.

9.10.1.2 Operational Stage

No reinstatement required.

9.11 Difficulties Encountered

CFD (Computational Fluid Dynamics) has proven to be a valuable tool for simulating wind behaviour in various applications, including pedestrian wind simulations. However, it is important to acknowledge certain limitations that exist within this approach. Firstly, CFD models rely on simplifications and assumptions regarding the geometry, boundary conditions, and turbulence characteristics, which may not accurately represent the complex and dynamic nature of wind flow. Additionally, the accuracy of CFD simulations is heavily dependent on the quality and resolution of the input data, such as the accuracy of the terrain model, building geometries, and meteorological data. Finally, CFD simulations can be computationally expensive, requiring significant computational resources and time, making it difficult to perform large-scale simulations with a high level of detail.

10 CLIMATE (AIR QUALITY)

10.1 Introduction

This chapter assesses the likely air quality impacts associated with the proposed residential development at Oakfield Dunboyne. A full description of the development is available in Chapter 3 – Description of the Proposed Development.

This chapter was completed by Dr. Avril Challoner. Avril is a Principal Environmental Consultant in the Air Quality and Climate section of AWN Consulting with 10 years' experience in Air Quality Consulting. She holds a BEng (Hons) in Environmental Engineering from the National University of Ireland Galway, HDip in Statistics from Trinity College Dublin and has completed a PhD in Environmental Engineering (Air Quality) in Trinity College Dublin. She is a Chartered Environmentalist (CEnv), Chartered Scientist (CSci), Member of the Institute of Environmental Management and Assessment, Member of the Institute of Air Quality Management and specialises in the fields of air quality, climate assessment, EIA and air dispersion modelling.

10.2 Assessment Methodology

The principal guidance and best practice documents used to inform the assessment of potential impacts on Air Quality is summarised below.

The assessment has made reference to national guidelines where available, in addition to international standards and guidelines relating to the assessment of air quality impacts. These are summarised below:

- PE-ENV-01106: Air Quality Assessment of Specified Infrastructure Projects (Transport Infrastructure Ireland (TII), 2022a);
- Guidance on the Assessment of Dust from Demolition and Construction Version 1.1 (Institute of Air Quality Management (IAQM), 2014) (hereafter referred to as the IAQM Guidelines); and
- A Guide to The Assessment Of Air Quality Impacts On Designated Nature Conservation Sites (Version 1.1) (IAQM, 2020).

In addition to specific air quality guidance documents, the following guidelines were considered and consulted in the preparation of this chapter:

- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (hereafter referred to as the Environmental Protection Agency (EPA) Guidelines) (EPA, 2022b);
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Environment, Community and Local Government, August, 2018); and
- Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017).

10.2.1 Criteria for Rating of Impacts

10.2.1.1 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.

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 2022 (S.I. No. 739 of 2022), 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 (see Table 10-1).

Pollutant	Regulation Note 1	Limit Type	Value
Dust Deposition	TA Luft (German VDI 2002)	Annual average limit for nuisance dust	350 mg/m²/day
NOx	2008/50/EC	Annual limit value for the protection of vegetation	30 µg/m³ NO + NO_2
Nitrogen Dioxide (NO_2)	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	200 µg/m³
		Annual limit for protection of human health	40 µg/m³
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/m³ PM_{10}
		Annual limit for protection of human health	40 µg/m³ PM_{10}
Particulate Matter (as $PM_{2.5}$) Stage 1	2008/50/EC	Annual limit for protection of human health	25 µg/m³ $PM_{2.5}$
Particulate Matter (as $PM_{2.5}$) Stage 2	2008/50/EC	Annual limit for protection of human health	20 µg/m³ $PM_{2.5}$

Table 10-1: Air Quality Standards Regulations 2022

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

In April 2023, the Government of Ireland published the Clean Air Strategy for Ireland (Government of Ireland 2023), which provides a high-level strategic policy framework needed to reduce air pollution. The strategy commits Ireland to achieving the 2021 WHO Air Quality Guidelines Interim Target 3 (IT3) by 2026 (shown in Table 10-2), the IT4 targets by 2030 and the final targets by 2040 (shown in Table 10-2). The strategy notes that a significant number of EPA monitoring stations observed air pollution levels in 2021 above the WHO targets; 80% of these stations would fail to meet the final $PM_{2.5}$ target of 5 µg/m³. The strategy also acknowledges that "meeting the WHO targets will be challenging and will require legislative and societal change, especially with regard to both $PM_{2.5}$ and NO_2". Ireland will revise its air quality legislation in line with the proposed EU revisions to the CAFE Directive, which will set interim 2030 air quality standards and align the EU more closely with the WHO targets.

Pollutant	Regulation	Limit Type	IT3 (2026)	IT4 (2030)	Final Target (2040)
NO_2	WHO Air Quality Guidelines	24-hour limit for protection of human health	50µg/m³ NO_2	50µg/m³ NO_2	25µg/m³ NO_2
		Annual limit for protection of human health	30µg/ m³ NO_2	20µg/ m³ NO_2	10µg/m³ NO_2
PM (as PM_{10})		24-hour limit for protection of human health	75µg/ m³ PM_{10}	50µg/m³ PM_{10}	45µg/m³ PM_{10}
		Annual limit for protection of human health	30µg/ m³ PM_{10}	20µg/m³ PM_{10}	15µg/m³ PM_{10}
PM (as $PM_{2.5}$)		24-hour limit for protection of human health	37.5µg/m³ $PM_{2.5}$	25µg/m³ $PM_{2.5}$	15µg/m³ $PM_{2.5}$
		Annual limit for protection of human health	15µg/m³ $PM_{2.5}$5	10µg/m³ $PM_{2.5}$	5µg/m³ $PM_{2.5}$

Table 10-2: WHO Air Quality Guidelines 2021

10.2.1.2 Dust Deposition Guidelines

The concern from a health perspective is focused on particles of dust that are less than 10 microns (PM_{10}) and less than 2.5 microns ($PM_{2.5}$) and the EU ambient air quality standards outlined in Table 10-1 have set ambient air quality limit values for PM_{10} and $PM_{2.5}$.

With regards to larger dust particles that can give rise to nuisance dust, there are no statutory guidelines regarding the maximum dust deposition levels that may be generated during the construction phase of a development in Ireland. Furthermore, no specific criteria have been stipulated for nuisance dust in respect of this development.

With regard to dust deposition, the German TA-Luft standard for dust deposition (non-hazardous dust) (German VDI, 2002) sets a maximum permissible emission level for dust deposition of 350 mg/m²/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 TA Luft limit of 350 mg/m²/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.

10.2.2 Construction Phase

10.2.2.1 Dust Assessment

The Institute of Air Quality Management in the UK (IAQM) guidance document '*Guidance on the Assessment of Dust from Demolition and Construction*' (2014) outlines an assessment method for predicting the impact of dust emissions from demolition, earthworks, construction and haulage activities based on the scale and nature of the works and the sensitivity of the area to dust impacts. The IAQM methodology has been applied to the construction phase of this development to predict the likely risk of dust impacts in the absence of mitigation measures and to determine the level of site

specific mitigation required. Transport Infrastructure Ireland (TII) recommends the use of the IAQM guidance (2014) in the TII guidance document *Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* (TII, 2022a).

The major dust generating activities are divided into four types within the IAQM guidance (2014) to reflect their different potential impacts. These are:

- Demolition;
- Earthworks;
- Construction; and
- Trackout (movement of heavy vehicles).

It is noted that there is no demolition required as part of this development.

The magnitude of each of the four categories is divided into Large, Medium or Small scale depending on the nature of the activities involved. The magnitude of each activity is combined with the overall sensitivity of the area to determine the risk of dust impacts from site activities. This allows the level of site-specific mitigation to be determined.

10.2.2.2 Traffic Assessment

Construction phase traffic also has the potential to impact air quality. The TII guidance *Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* (TII, 2022a), 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. While the guidance is specific to infrastructure projects, the approach 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;
- Daily average speed change by 10 kph or more;
- Peak hour speed change by 20 kph or more;
- A change in road alignment by 5m or greater.

Waterman Moylan have prepared a Traffic and Transport Impact Assessment for the proposed development enclosed separately and have prepared Chapter 16 Material Assets (Transportation) this EIAR (Traffic and Transportation). A Preliminary Construction Environmental Management Plan has also been prepared by Waterman Moylan which identifies the construction access routes. As per Section 16.5.2.1, it has been determined by Waterman Moylan that the construction stage traffic will not increase by 1,000 AADT, or 200 HDV AADT, or that the development will not result in speed changes or changes in road alignment. Therefore, the traffic does not meet the above scoping criteria. A detailed air quality 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.

10.2.3 Operational Phase

Operational phase traffic has the potential to impact local air quality as a result of increased vehicle movements associated with the proposed development. The TII scoping criteria detailed in Section 10.2.2.2 were used to determine if any road links are affected by the proposed development and require inclusion in a detailed air dispersion modelling assessment. Waterman Moylan have prepared a Traffic and Transport Impact Assessment for the proposed development enclosed separately and have prepared Chapter 16 Material Assets (Transportation). It has been determined by Waterman Moylan that the proposed development will result in the operational phase traffic increasing by more

than 1,000 AADT on a small number of road links. Therefore, in accordance with the TII scoping criteria a detailed air dispersion modelling assessment of operational phase traffic emissions was conducted.

The impact to air quality as a result of changes in traffic is assessed at sensitive receptors in the vicinity of affected roads. The TII guidance (2022a) states that a proportionate number of representative receptors which are located in areas that will experience the highest concentrations or greatest improvements as a result of the proposed development are to be included in the modelling. The TII criteria state that receptors within 200 m of impacted road links should be assessed; roads which are more than 200 m from a receptor will not impact pollutant concentrations at that receptor. The TII guidance (2022a) 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 4 no. high sensitivity residential receptors (R1 – R4) were included in the modelling assessment (see Figure 10.1).

The TII guidance (2022a) states that modelling should be conducted for NO_2, PM_{10} and $PM_{2.5}$ for the Base, Opening and Design Years for both the Do Minimum (Do Nothing) and Do Something scenarios. Modelling of operational NO_2, PM_{10} and $PM_{2.5}$ concentrations has been conducted for the Do Nothing and Do Something scenarios using the TII Road Emissions Model (REM) online calculator tool (TII, 2022b).

The following inputs are required for the REM tool: receptor locations, light duty vehicle (LDV) annual average daily traffic movements (AADT), annual average daily heavy duty vehicles (HDV AADT), annual average traffic speeds, road link lengths, road type, project county location and pollutant background concentrations. The *Default* fleet mix option was selected along with the *Intermediate Case* fleet data base selection, as per TII Guidance (TII, 2022b). The *Intermediate Case* assumes a linear interpolation between the *Business as Usual* case – where current trends in vehicle ownership continue and the *Climate Action Plan (CAP)* case – where adoption of low emission light duty vehicles occurs.

Using this input data the model predicts the road traffic contribution to ambient ground level concentrations at the identified sensitive receptors using generic meteorological data. The TII REM uses county-based Irish fleet composition for different road types, for different European emission standards from pre-Euro to Euro 6/VI with scaling factors to reflect improvements in fuel quality, retrofitting, and technology conversions. The TII REM also includes emission factors for PM_{10} emissions associated with brake and tyre wear (TII, 2022b). The predicted road contributions are then added to the existing background concentrations to give the predicted ambient concentrations. The 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.

10.2.3.1 Traffic Data Used in Modelling Assessment

Traffic flow information detailed in Table 10-3 was obtained from Waterman Moylan for the purposes of this assessment. Data for the Base Year 2023 and the Do Nothing and Do Something scenarios for the Opening Year 2026 and Design Year 2041 were provided. A conservative growth factor has been applied to the traffic data to allow for cumulative development within the area. Specific cumulative developments were also investigated but it was found that there were no specific permitted developments that would lead to cumulative traffic impacts due to their increased distance from the site (see Chapter 16 for further details).

The modelling assessment has been undertaken for road links that were within 200 m of receptors. Background concentrations have been included as per Section 10.3.2 of this chapter based on available EPA background monitoring data (EPA, 2022).

Road Name	Speed (kph)	Base Year	Opening Year		Design Year	
			Do Nothing	Do Something	Do Nothing	Do Something
		LDV AADT (HDV AADT)	LDV AADT (HDV AADT)	LDV AADT (HDV AADT)	LDV AADT (HDV AADT)	LDV AADT (HDV AADT)
Junction 1_arm A	50	3958 (165)	4247 (177)	4406 (184)	4893 (204)	5395 (225)
Junction 1_arm B	50	7796 (241)	8441 (261)	8761 (271)	9714 (300)	10733 (332)
Junction 1_arm C	50	3605 (111)	3829 (118)	3872 (120)	4417 (137)	4556 (141)
Junction 1_arm D	50	4194 (86)	4634 (93)	4659 (95)	5226 (107)	5608 (114)
Junction 2_arm A	50	109 (0)	115 (0)	115 (0)	133 (0)	133 (0)
Junction 2_arm B	50	9482 (194)	10220 (209)	10543 (215)	11768 (240)	12798 (261)
Junction 2_arm C	50	6276 (128)	6610 (135)	6610 (135)	7634 (156)	7634 (156)
Junction 2_arm D	50	9019 (279)	10030 (301)	10049 (311)	11202 (346)	12221 (378)
Junction 3_arm A	50	11704 (239)	12587 (257)	13348 (272)	14498 (296)	16902 (345)
Junction 3_arm B	50	322 (17)	818 (43)	1870 (98)	871 (46)	4199 (221)
Junction 3_arm C	50	11592 (237)	12442 (254)	12765 (261)	14335 (293)	15364 (314)
Junction 4_arm A	60	3436 (143)	3656 (152)	3815 (159)	4218 (176)	4719 (197)
Junction 4_arm B	60	15420 (315)	16798 (0)	17409 (0)	19367 (0)	21298 (0)
Junction 4_arm C	60	15420 (315)	16462 (336)	17061 (348)	18980 (387)	20872 (426)
Junction 4_arm D	60	11728 (239)	12870 (257)	13373 (273)	14527 (296)	16931 (346)
Junction 5_arm A	60	1309 (99)	1379 (104)	1379 (104)	1592 (120)	1592 (120)
Junction 5_arm B	50	10989 (458)	11616 (484)	11727 (489)	13410 (559)	13748 (573)
Junction 5_arm C	60	15889 (324)	16908 (345)	17393 (355)	19502 (398)	21044 (429)
Junction 5_arm D	5	15432 (315)	16806 (336)	16933 (346)	18990 (388)	20882 (426)

Table 10-3: Traffic Data used in Air Modelling Assessment

Figure 10.1: Sensitive Receptors and Indicative Road Links Included in Operational Phase Air Quality Modelling Assessment (approximate red line boundary shown)

There are no ecological sites within 200 m of any impacted road links. As a result, a detailed assessment has been scoped out as there is no potential for significant impacts to designated ecology from traffic emissions.

10.2.4 Air Quality Significance Criteria

The TII document Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106 (TII, 2022a) 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 the percentage change in pollutant concentrations relative to the do-nothing scenario. The TII significance criteria are outlined in Table 4.9 of Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106 (TII, 2022a) and reproduced in Table 10-4 below. These criteria have been adopted for the proposed development to predict the impact of NO_2, PM_{10} and $PM_{2.5}$ emissions as a result of the proposed development.

Long term average concentration at receptor in assessment year	% Change in concentration relative to Air Quality Standard Value (AQLV)			
	1%	2-5%	6-10%	>10%
75% or less of AQLV	Neutral	Neutral	Slight	Moderate
76 – 94% of AQLV	Neutral	Slight	Moderate	Moderate
95 – 102% of AQLV	Slight	Moderate	Moderate	Substantial
103 – 109% of AQLV	Moderate	Moderate	Substantial	Substantial
110% or more of AQLV	Moderate	Substantial	Substantial	Substantial

Table 10-4: Air Quality Significance Criteria

Source: TII (2022a) Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106

10.3 Receiving Environment

10.3.1 Meteorological Data

A key factor in assessing temporal and spatial variations in air quality are 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 15 km east 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 10-2). For data collated during five representative years (2018 – 2022), the predominant wind direction is westerly to south-westerly with a mean wind speed of 5.3 m/s over the 30-year period of 1990 - 2010 (Met Éireann, 2023).

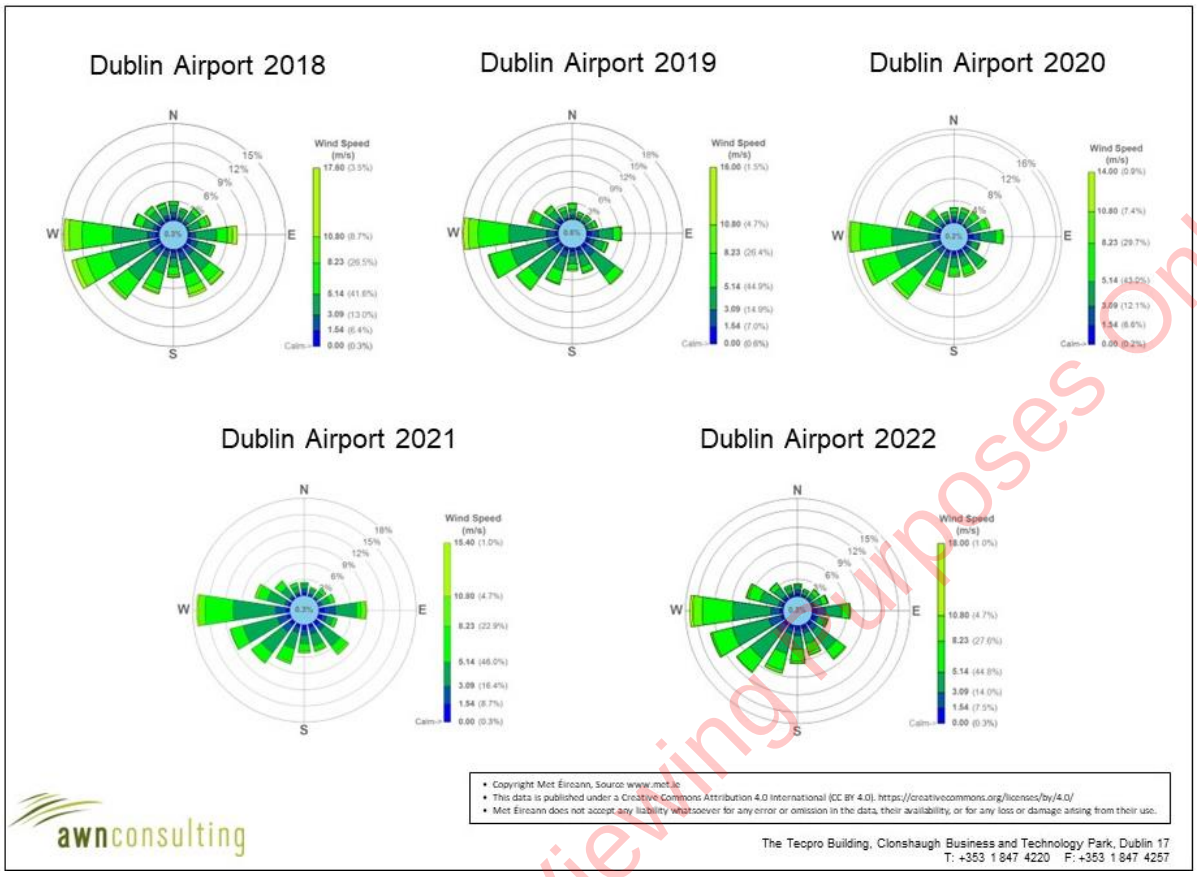


Figure 10-2: Dublin Airport Windrose 2018 – 2022

Source: Met Éireann, 2023

10.3.2 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 2021*" (EPA, 2022a). 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.

As part of the implementation of the Air Quality Standards Regulations 2022 (S.I. No. 739 of 2022) four air quality zones have been defined in Ireland for air quality management and assessment purposes (EPA, 2022b). 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 D (EPA, 2022a) however is just over a kilometre from the Zone A border. The Swords and Dublin Airport monitoring locations provide reasonable approximation of the potential background conditions for boundary Zone A locations. 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, 2022a) that Ireland was compliant with EU legal air quality limits at all location. However, this was largely due to the reduction in traffic due to Covid-19 restrictions. The EPA *Air Quality in Ireland 2020* 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. 2020 concentrations are therefore predicted to be an exceptional year

and not consistent with long-term trends. Therefore, data for 2020 is shown for representative purposes only and has not been used in determining the background levels of pollutants in this assessment.

Long-term NO_2 monitoring was carried out at the Zone D Suburban Background and Suburban Traffic locations of Castlebar, Carrick-on-Shannon and Birr for the period 2017 – 2021 (EPA, 2022a). Swords, a representative Zone A location, was also used as an indicative air quality station as the proposed development is in close proximity to the Zone A and Zone D boundary.

Long term average concentrations are significantly below the annual average limit of 40 µg/m³. Average results range from 7 – 17 µg/m³ for the suburban background and suburban traffic locations. The NO_2 annual average for this five-year period suggests an upper average limit of no more than 14 µg/m³ (Table 10-5) 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 14 µg/m³.

Station	Averaging Period Note 1	Year				
		2017	2018	2019	2020	2021
Castlebar	Annual Mean NO_2 (µg/m³)	7	8	8	6	6
	Max 1-hr NO_2 (µg/m³)	112	92	86	54	48
Carrick-on-Shannon	Annual Mean NO_2 (µg/m³)	-	-	-	17	11
	Max 1-hr NO_2 (µg/m³)	-	-	-	72	57
Birr	Annual Mean NO_2 (µg/m³)	-	-	-	9	13
	Max 1-hr NO_2 (µg/m³)	-	-	-	54	66
Swords	Annual Mean NO_2 (µg/m³)	14	16	15	11	11
	Max 1-hr NO_2 (µg/m³)	107	112	108	84	79

Table 10-5: Trends In Zone A Air Quality - Nitrogen Dioxide (NO_2)

Note 1 Annual average limit value - 40 µg/m³ (EU Council Directive 2008/50/EC & S.I. No. 1739 of 2022). 1-hour limit value - 200 µg/m³ (EU Council Directive 2008/50/EC & S.I. No. 739 of 2022).

Continuous PM_{10} monitoring was carried out at five Zone D locations from 2017 – 2021: Castlebar, Carrick-on-Shannon and Birr. Dublin Airport, which is a representative site, was also included. These showed an upper average limit of no more than 16 µg/m³ (Table 10-6). Levels range from 9 - 16 µg/m³ over the five-year period with at most 2 exceedances (in Castlebar) of the 24-hour limit value of 50 µg/m³ (35 exceedances are permitted per year) (EPA, 2022a). The monitoring site at Dublin Airport is the most representative of the proposed development location however is only in operation for 2 years. Concentrations of PM_{10} at the Dublin airport site ranged from 11 - 13 µg/m³ over the period 2020 – 2021. Based on the EPA data, a conservative estimate of the current background PM_{10} concentration in the region of the proposed development is 16 µg/m³.

Station	Averaging Period Note 1	Year				
		2017	2018	2019	2020	2021
Castlebar	Annual Mean PM_{10} (µg/m^3)	11	11	16	14	14
	24-hr Mean > 50 µg/m^3 (days)	1	0	1	2	1
Carrick-on-Shannon	Annual Mean PM_{10} (µg/m^3)	-	-	-	10	9
	24-hr Mean > 50 µg/m^3 (days)	-	-	-	0	0
Birr	Annual Mean PM_{10} (µg/m^3)	-	-	-	10	12
	24-hr Mean > 50 µg/m^3 (days)	-	-	-	0	2
Dublin Airport	Annual Mean PM_{10} (µg/m^3)	-	-	-	13	11
	24-hr Mean > 50 µg/m^3 (days)	-	-	-	0	0

Table 10-6: Trends In Zone A Air Quality - PM_{10}

Note1 Annual average limit value - 40 µg/m3 (EU Council Directive 2008/50/EC & S.I. No. 739 of 2022). Daily limit value - 50 µg/m3 (EU Council Directive 2008/50/EC & S.I. No. 739 of 2022).

Average $PM_{2.5}$ levels in Carrick-on-Shannon, Birr and Dublin Airport over the period 2017 - 2021 ranged from 6 - 9 µg/m^3, with a $PM_{2.5}/PM_{10}$ ratio ranging from 0.63 – 0.68 (EPA, 2022a). Based on this information, a conservative ratio of 0.68 was used to generate an existing $PM_{2.5}$ concentration in the region of the development of 10.8µg/m^3.

Based on the above information the air quality in the suburban rural area is generally good, with concentrations of the key pollutants generally well below the relevant limit values. However, the EPA have indicated that road transport emissions are contributing to increased levels of NO_2. There is the potential for breaches in the annual NO_2 limit value in future years at locations within urban centres and roadside locations. In addition, burning of solid fuels for home heating is contributing to increased levels of particulate matter (PM_{10} and $PM_{2.5}$). The EPA predict that exceedances in the particulate matter limit values are likely in future years if burning of solid fuels for residential heating continues (EPA, 2022a).

The current estimated background concentrations have been used in the operational phase air quality assessment for both the opening and design year as a conservative approach in order to predict pollutant concentrations in future years. This is in line with the TII methodology (TII, 2022a).

10.3.3 Sensitivity of the Receiving Environment

In line with the UK Institute of Air Quality Management (IAQM) guidance document '*Guidance on the Assessment of Dust from Demolition and Construction'* (2014) prior to assessing the impact of dust from a proposed development, the sensitivity of the area must first be assessed as outlined below. Both receptor sensitivity and proximity to proposed works areas are taken into consideration. For the purposes of this assessment, high sensitivity receptors are regarded as residential properties where people are likely to spend the majority of their time. Commercial properties and places of work are regarded as medium sensitivity while low sensitivity receptors are places where people are present for short periods or do not expect a high level of amenity.

In terms of receptor sensitivity to dust soiling, there are no residential properties with 50m of the proposed main works areas, however there are sensitive receptors in proximity to junction upgrade areas. In addition, there is a newly constructed development (The Meadows, Castle Farm development) with sensitive receptors (about 12 properties) which are within 10 m. In addition, at the time of writing some residential properties are also currently under construction within the 50 m band (Block G and Block F of The Paddocks, Castle Farm) and have the potential to be occupied prior

to the construction of the Proposed Development. Based on the IAQM criteria outlined in Table 10-7, the worst-case sensitivity of the area to dust soiling is considered high.

Receptor Sensitivity	Number of Receptors	Distance from Source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	**High**	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table 10-7: Sensitivity of the Area to Dust Soiling Effects on People and Property

In addition to sensitivity to dust soiling, the IAQM guidelines also outline the assessment criteria for determining the sensitivity of the area to human health impacts. The criteria take into consideration the current annual mean PM_{10} concentration, receptor sensitivity based on type (residential receptors are classified as high sensitivity) and the number of receptors affected within various distance bands from the construction works.

A conservative estimate of the current annual mean PM_{10} concentration in the vicinity of the proposed development is 16 µg/m^3. There are currently no high sensitivity receptors located within 50 m of the proposed development site. However, there are some under construction sensitive receptors located within 20 m of proposed junction works associated with the proposed development. There are some residential properties also currently under construction within the 100 m band. Based on the IAQM criteria outlined in Table 10-8, the worst-case sensitivity of the area to human health is considered low.

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from Source (m)				
			<20	<50	<100	<200	<350
High	< 24 µg/m^3	>100	Medium	Low	Low	Low	Low
		10-100	**Low**	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	< 24 µg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	< 24 µg/m^3	>1	Low	Low	Low	Low	Low

Table 10-8: Sensitivity of the Area to Human Health Impacts

The IAQM guidelines also outline the assessment criteria for determining the sensitivity of the area to dust-related ecological impacts. Dust emissions can coat vegetation leading to a reduction in the photosynthesising ability of the plant, as well as other effects. The guidance states that dust impacts to vegetation can occur up to 50 m from the site and 50 m from site access roads, up to 500 m for the site entrance. There are no sensitive ecological receptors within these criteria. Based on the IAQM criteria outlined ecology impacts are considered to be scoped out with respect to construction phase dust.

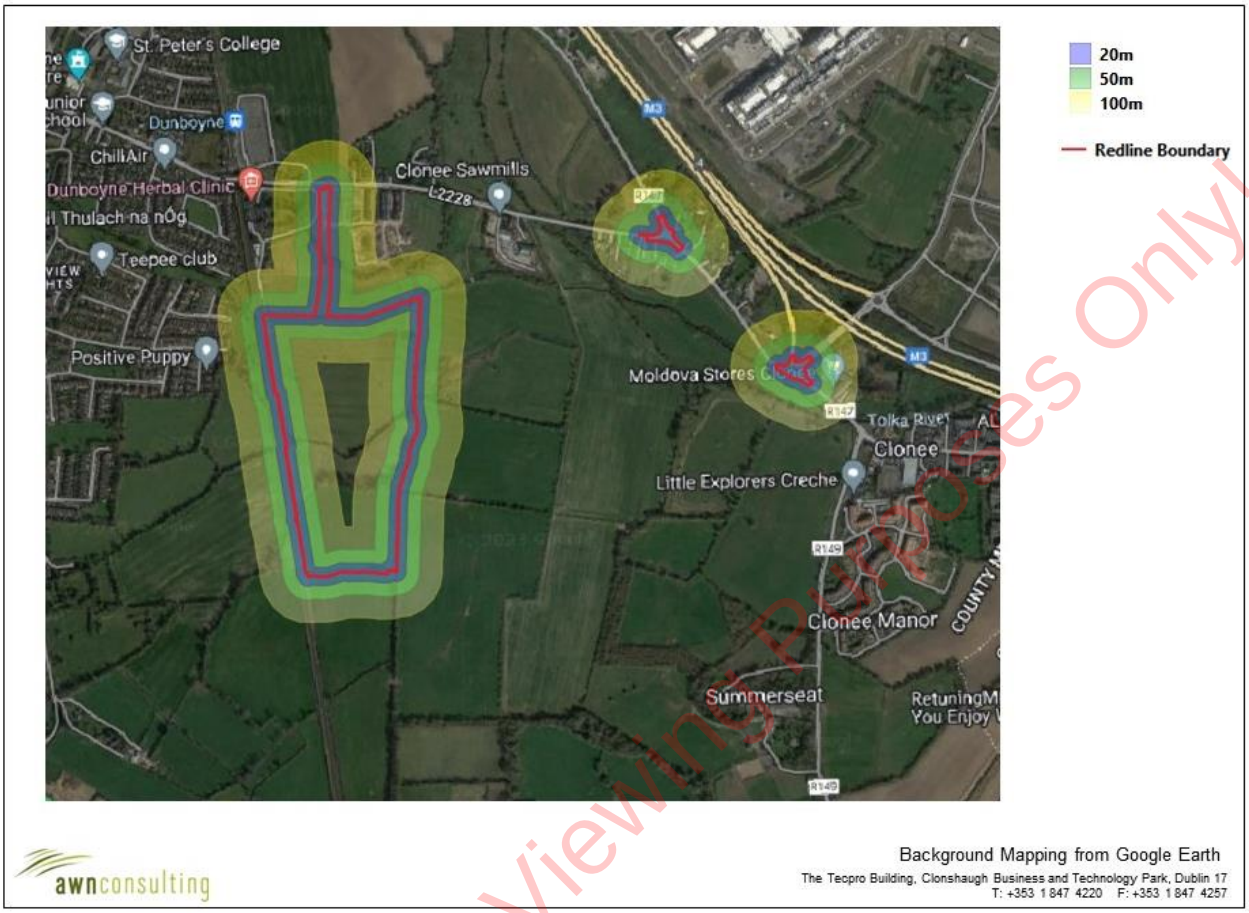


Figure 10.3: Dust Buffers from redline boundary(approximate red line boundary shown)

10.4 Characteristics of the Proposed Development

10.4.1 Proposed Development

The proposed development is a mix of residential units in a mix of houses, duplex and apartment buildings, associated and ancillary site development and infrastructural works, provision of c. 470 m in length of distributor road, compensatory storage measures at Castle Stream and improvement works to two no. roundabouts on the R147 (Old Navan Road). A full description of the development is available in Chapter 3 - Description of Proposed Development.

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

- Construction phase, and;
- Operational phase.

10.4.1.1 Construction Stage

The key elements of construction of the proposed development with potential for air quality impacts are:

- Potential fugitive dust emissions from general site preparation (foundation and basement excavation) and construction activities;
- Potential fugitive dust emissions from trucks associated with construction;

- Engine emissions from construction vehicles and machinery.

10.4.1.2 Operational Stage

The key elements of operation of the proposed development with potential for air quality impacts are:

- A change in traffic flows on road links nearby the proposed development.

10.4.2 Cumulative

10.4.2.1 Construction Stage

According to the IAQM guidance (2014) should the construction phase of the proposed development coincide with the construction phase of any other developments within 350 m then there is the potential for cumulative construction dust related impacts to nearby sensitive receptors.

With mitigation measures (as per Section 10.6.1.1) in place, there are no significant cumulative impacts to air quality predicted for the construction phase.

10.4.2.2 Operational Stage

The traffic data is used to assess the operational stage impacts to air quality including the cumulative traffic associated with the proposed development as well as other existing and permitted developments in the local area.

10.5 Potential Impact of the Proposed Development

10.5.1 Proposed Development

10.5.1.1 Construction Stage

Dust

In order to determine the level of dust mitigation required during the proposed works, the potential dust emission magnitude for each dust generating activity needs to be taken into account, in conjunction with the previously established sensitivity of the area (see Section 10.3.3). The major dust generating activities are divided into four types within the IAQM (2014) guidance to reflect their different potential impacts.

These are:

- Demolition;
- Earthworks;
- Construction; and
- Trackout (movement of heavy vehicles).

Demolition

No demolition is required for the proposed development therefore the assessment is scoped out.

Earthworks

Earthworks primarily involve excavating material, loading and unloading of materials, tipping and stockpiling activities. Activities such as levelling the site and landscaping works are also considered

under this category. The dust emission magnitude from earthworks can be classified as small, medium or large based on the definitions from the IAQM guidance as transcribed below:

- **Large**: Total site area > 10,000 m^2, potentially dusty soil type (e.g. clay which will be prone to suspension when dry due to small particle size), > 10 heavy earth moving vehicles active at any one time, formation of bunds > 8 m in height, total material moved >100,000 tonnes;
- **Medium**: Total site area 2,500 m^2 – 10,000 m^2, moderately dusty soil type (e.g. silt), 5 - 10 heavy earth moving vehicles active at any one time, formation of bunds 4 – 8 m in height, total material moved 20,000 – 100,000 tonnes;
- **Small**: Total site area < 2,500 m^2, soil type with large grain size (e.g. sand), < 5 heavy earth moving vehicles active at any one time, formation of bunds < 4 m in height, total material moved < 20,000 tonnes, earthworks during wetter months.

The total developable site area is approximately significantly greater than 10,000 m^2 (approx. 16.92 Ha), therefore the proposed earthworks can be classified as large. The sensitivity of the area, as determined in Section 10.3.3, is combined with the dust emission magnitude for each dust generating activity to define the risk of dust impacts in the absence of mitigation. As outlined in Table 10-9 and Table 10-10, combining the large dust emission magnitude with a high sensitivity to dust soiling and low sensitivity to human health impacts, results in an overall high risk of dust impacts as a result of the proposed earthworks activities in the absence of mitigation.

Sensitivity of Area	Dust Emission Magnitude – Earthworks		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 10-9: Criteria for Rating Risk of Dust Impacts – Earthworks (IAQM, 2014)

Receptor	Receptor Sensitivity	Dust Emission Magnitude – Earthworks	Risk of Dust-Related Impacts
Dust Soiling	High	Large	High
Human Health	Low		Low

Table 10-10: Risk of Dust Impacts – Earthworks

Construction

Dust emission magnitude from construction can be classified as small, medium or large based on the definitions from the IAQM guidance as transcribed below:

- **Large:** Total building volume > 100,000 m^3, on-site concrete batching, sandblasting;
- **Medium:** Total building volume 25,000 m^3 – 100,000 m^3, potentially dusty construction material (e.g. concrete), on-site concrete batching;
- **Small:** Total building volume < 25,000 m^3, construction material with low potentialfor dust release (e.g. metal cladding or timber).

The dust emission magnitude for the proposed construction activities can be classified as large as a worst-case, as the total building volume will be greater than 100,000 m^3. As outlined in Table 10-11 and Table 10-12, combining the large dust emission magnitude with a high sensitivity to dust soiling and

low sensitivity to human health impacts, results in an overall high risk of dust impacts as a result of the proposed construction activities in the absence of mitigation.

Sensitivity of Area	Dust Emission Magnitude – Construction		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 10-11: Criteria for Rating Risk of Dust Impacts – Construction (IAQM, 2014)

Receptor	Receptor Sensitivity	Dust Emission Magnitude – Construction	Risk of Dust-related Impacts
Dust Soiling	High	Large	High
Human health	Low		Low

Table 10-12: Risk of Dust Impacts – Construction

Trackout

Factors which determine the dust emission magnitude are vehicle size, vehicle speed, number of vehicles, road surface material and duration of movement. Dust emission magnitude from trackout can be classified as small, medium or large based on the definitions from the IAQM guidance as transcribed below:

- **Large:** > 50 HGV (> 3.5 t) outward movements in any one day, potentially dustysurface material (e.g. high clay content), unpaved road length > 100 m;
- **Medium:** 10 - 50 HGV (> 3.5 t) outward movements in any one day, moderately dustysurface material (e.g. high clay content), unpaved road length 50 – 10 0m;
- **Small:** < 10 HGV (> 3.5 t) outward movements in any one day, surface material withlow potential for dust release, unpaved road length < 5 0m.

The dust emission magnitude for the proposed trackout can be classified as medium as there will be less than 50 outward HGV movements per day. Section 16.5.2.1 of the EIAR states that the number of construction heavy goods vehicle movements to and from the application site will be c. 40-45 departures per day. As outlined in Table 10-13 and Table 10-14, combining the large dust emission magnitude with a high sensitivity to dust soiling and low sensitivity to human health impacts, results in an overall medium risk of dust impacts as a result of the proposed trackout activities in the absence of mitigation.

Sensitivity of Area	Dust Emission Magnitude – Trackout		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 10-13: Criteria for Rating Risk of Dust Impacts – Trackout

Receptor	Receptor Sensitivity	Dust Emission Magnitude – Trackout	Risk of Dust-related Impacts
Dust soiling	High	Medium	Medium
Human health	Low		Low

Table 10-14: Risk of Dust Impacts – Trackout

Summary of Dust Emission Risk

The risk of dust impacts as a result of the proposed development are summarised in Table 10-15 for each activity. The magnitude of risk determined is used to prescribe the level of site specific mitigation required for each activity to prevent significant impacts occurring.

Overall, to ensure that no dust nuisance occurs during the earthworks, construction and trackout activities, a range of dust mitigation measures associated with a high risk of dust impacts must be implemented. When the dust mitigation measures detailed in the mitigation section of this chapter (Section 10.6.1.1) and Appendix 10.1 are implemented, fugitive emissions of dust from the site will be insignificant and pose no nuisance at nearby receptors. In the absence of mitigation dust impacts are predicted to be short-term, localised, negative and slight.

Potential Impact	Dust Emission Magnitude			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	N/A	High Risk	High Risk	Medium Risk
Human Health	N/A	Low Risk	Low Risk	Low Risk

Table 10-15: Summary of construction phase dust impact risk used to define site-specific mitigation

Traffic

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 TII assessment criteria in Section 10.2.2.2.

It can therefore be determined that the construction stage traffic will have an imperceptible, neutral and short-term impact on air quality.

Construction Phase 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 section 10.3.3 the surrounding area is of low sensitivity to dust related human health impacts. It was determined that there is an overall low risk of dust related human health impacts as a result of the construction phase of the proposed development (Table 10-15). Therefore, in the absence of mitigation there is the potential for imperceptible, negative, short-term effects to human health as a result of the proposed development.

10.5.1.2 Operational Stage

Traffic

The potential impact of the proposed development has been assessed by modelling emissions from the traffic generated as a result of the development. The traffic data includes the Do Nothing and Do Something scenarios. The impact of NO_2, PM_{10} and $PM_{2.5}$ 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.

The TII guidance PE-ENV-01106 (TII, 2022a) details a methodology for determining air quality impact significance criteria for TII road schemes and infrastructure projects. However, this significance criteria 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, 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 and Design Year 2041 are shown in Table 10-16. The annual average concentration is in compliance with the limit value at the worst-case receptors in 2026 and 2041. Concentrations of NO_2 are at most 45% of the annual limit value in 2026 and 39% of the annual limit value in 2041. There are predicted to be some increases in traffic between the Opening and Design Years. Therefore, any decrease in concentration is due to increased uptake in electric vehicles and lower vehicle exhaust emissions. In addition, the TII guidance (2022a) states that the hourly limit value for NO_2 of 200 µg/m^3 is unlikely to be exceeded at roadside locations unless the annual mean is above 60 µg/m^3. As predicted NO_2 concentrations are significantly below 60 µg/m^3 (Table 10-16) it can be concluded that the short-term NO_2 limit value will be complied with at all receptor locations.

The impact of the proposed development on annual mean NO_2 concentrations can be assessed relative to "Do Nothing (DN)" levels. NO_2 concentrations at the receptors assessed will increase as a result of the proposed development when compared with the Do-Nothing scenario. There will be at most an increase of 0.26 µg/m^3 at receptor R2, this is a 1.5% change from baseline conditions. Where the predicted annual mean concentrations are less than 75% of the air quality standard (see Table 10-1) and there is a less than 5% change in concentrations compared with the Do-Nothing scenario, then, the impact is considered neutral as per the TII significance criteria (see Table 10-4). Therefore, the impact of the proposed development on NO_2 concentrations is neutral.

In relation to changes in PM_{10} concentrations as a result of the proposed development, the results of the assessment can be seen in Table 10-17. for the opening year 2026 and design year 2041. The annual average concentration is in compliance with the limit value at the worst-case receptors in 2026 and 2041. Concentrations of PM_{10} are at most 48% of the annual limit value in 2026 and 49% in 2041. In addition, the proposed development will not result in any exceedances of the daily PM_{10} limit value of 50 µg/m^3. The impact of the proposed development on annual mean PM_{10} concentrations can be assessed relative to "Do Nothing (DN)" levels. PM_{10} concentrations at the receptors assessed will increase as a result of the proposed development when compared with the Do-Nothing scenario. There will be at most an increase of 0.3 µg/m^3 at receptor R2, this is a 1.6% change from baseline conditions. As with NO_2, where the predicted annual mean concentrations are less than 75% of the air quality standard (see Table 10-1) and there is a less than 5% change in concentrations compared with the Do-Nothing scenario then the impact is considered neutral as per the TII significance criteria (see Table 10-4). Therefore, the impact of the proposed development on PM_{10} concentrations is neutral.

In relation to changes in $PM_{2.5}$ concentrations as a result of the proposed development, the results of the assessment can be seen in Table 10-18 for the Opening Year 2026 and Design Year 2041. The annual average concentration is in compliance with the limit value at the worst-case receptors in 2026 and 2041. Concentrations of $PM_{2.5}$ are at most 50% of the annual limit value in 2026 and 51% in 2041. The impact of the proposed development on annual mean $PM_{2.5}$ concentrations can be assessed relative to "Do Nothing (DN)" levels. $PM_{2.5}$ concentrations at the receptors assessed will increase as a

result of the proposed development when compared with the Do-Nothing scenario. There will be at most an increase of 0.16 µg/m^3 at receptor R2, this is a 1.3% change from baseline conditions. As with NO_2, where the predicted annual mean concentrations are less than 75% of the air quality standard (see Table 10-1) and there is a less than 5% change in concentrations compared with the Do-Nothing scenario, then, the impact is considered neutral as per the TII significance criteria (see Table 10-4). Therefore, the impact of the proposed development on PM_{10} concentrations is neutral.

Overall, the potential impact of the proposed development on ambient air quality in the operational stage when compared to the EU limit values is considered long-term, localised, neutral and non-significant.

Receptor	Impact Opening Year				Impact Design Year			
	DN	DS	DS-DN	Description	DN	DS	DS-DN	Description
R1	17.9	17.9	0.01	Neutral	15.6	15.7	0.10	Neutral
R2	17.7	17.9	0.26	Neutral	15.6	15.7	0.16	Neutral
R3	17.8	18.0	0.16	Neutral	15.6	15.7	0.12	Neutral
R4	17.2	17.3	0.10	Neutral	15.3	15.5	0.12	Neutral

Table 10-16: 11 Predicted Annual Mean NO_2 Concentrations (µg/m^3)

Receptor	Impact Opening Year				Impact Design Year			
	DN	DS	DS-DN	Description	DN	DS	DS-DN	Description
R1	18.9	18.9	0.01	Neutral	19.2	19.4	0.21	Neutral
R2	18.7	18.9	0.19	Neutral	19.0	19.3	0.30	Neutral
R3	18.9	19.0	0.12	Neutral	19.2	19.4	0.23	Neutral
R4	18.3	18.4	0.07	Neutral	18.6	18.8	0.23	Neutral

Table 10-17: Predicted Annual Mean PM_{10} Concentrations (µg/m^3)

Receptor	Impact Opening Year				Impact Design Year			
	DN	DS	DS-DN	Description	DN	DS	DS-DN	Description
R1	12.4	12.4	0.00	Neutral	12.5	12.7	0.12	Neutral
R2	12.3	12.4	0.11	Neutral	12.4	12.6	0.16	Neutral
R3	12.4	12.5	0.07	Neutral	12.6	12.7	0.13	Neutral
R4	12.1	12.1	0.01	Neutral	12.2	12.3	0.13	Neutral

Table 10-18: Predicted Annual Mean $PM_{2.5}$ Concentrations (µg/m^3)

Human Health

Traffic related air emissions have the potential to impact air quality which can affect human health. A detailed air dispersion modelling assessment of traffic emissions was conducted and it was determined that emissions of air pollutants are predicted to be significantly below the ambient air quality standards which are based on the protection of human health. Therefore, it can be determined that the impact to human health during the operational stage is long-term, localised, neutral and non-significant.

10.5.1.3 Do-Nothing Impact

Under the Do-Nothing scenario the proposed development will not be constructed. In this scenario, ambient air quality at the site will remain as per the baseline and will change in accordance with trends within the wider area. As the site is zoned for development, in the absence of the proposed development it is likely that a development of a similar nature would be constructed in the future in

line with national policy and the development plan objectives. Therefore, the construction and operational phase impacts outlined in this assessment are likely to occur in the future even in the absence of the proposed development.

10.6 Mitigation Measures (Ameliorative, Remedial or Reductive Measures)

10.6.1 Proposed Development

10.6.1.1 Construction Stage

The proactive 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 monitoringof 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 10.1. These measures will be incorporated into the Construction Environmental Management Plan (CEMP) prepared for the site. An outline CEMP has been prepared and is enclosed separately.

The Dust Management Plan notes the following measures in summary:

- The Principal Contractor or equivalent must monitor the contractors' performance to ensure that the proposed mitigation measures are implemented and that dust impacts and nuisance are minimised;
- 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;
- Drop heights from conveyors, loading shovels, hoppers and other loading equipment will be minimised, if necessary fine water sprays should be employed.

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.

10.6.1.2 Operational Stage

There is no mitigation required for the operational phase of the development as impacts to air quality are predicted to be neutral and imperceptible.

10.7 Residual Impact of the Proposed Development

10.7.1 Proposed Development

10.7.1.1 Construction Stage

In order to minimise dust emissions during construction, a series of mitigation measures have been prepared in the form of a Dust Management Plan (Appendix 10.1). Provided the dust minimisation measures outlined in the plan are adhered to, the predicted residual air quality impacts during the construction phase are short-term, direct, negative, localised and imperceptible.

Best practice mitigation measures are proposed for the construction phase of the proposed development, which will focus on the proactive 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 will ensure that the impact complies with all EU ambient air quality legislative limit values, which are based on the protection of human health (see Table 10-1). Therefore, the predicted residual, dust-related, human health impact of the construction phase of the proposed development is negative, direct, short-term and imperceptible.

10.7.1.2 Operational Stage

Dispersion modelling of traffic emissions at sensitive receptors in proximity to impacted road links during the operational phase indicate pollutant emissions will be in compliance with the relevant air quality standards. Section 10.5.1.2 determined that the impact to air quality as a result of increased traffic volumes during the operational phase of the proposed development will be long-term, localised, neutral and non-significant.

Emissions of air pollutants during the operational phase are predicted to be significantly below the ambient air quality standards, which are based on the protection of human health. Therefore, residual impacts to human health related to air quality will be long-term, localised, neutral and non-significant.

10.7.2 Cumulative

10.7.2.1 Construction Stage

Developments that potentially could overlap during the construction phase:

- **Exempted Development** - In order to accommodate this development and other developments in and around the Dunboyne area, Irish Water will be required to upgrade c. 1,100m of existing 200mm uPVC watermain so as to provide a 400mm ID watermain in its place. This is to be undertaken by Irish Water under their exempted development provisions and these works do not form part of this planning application as a result.
- **Future Development** - The planning application includes an 470m length of distributor road linking to that part of the distributor road already built as part of the Castle Farm Meadows development which ultimately connects with Station Road. This proposed road forms part of the overall Dunboyne Distributor Road; an objective of the Meath County Development Plan 2021-2027. It is intended as part of that Development Plan objective that in the future that distributor road would be extended southwards and then eastwards over the railway line. The design for this future extension to the distributor road and bridge has been included in this application as evidence that it provides a viable workable solution, however permission for that extension is not being sought at this time as it is not required to cater for this development.
- **Residential Development Meath County Council Reg. Reg. 22675** - On 24 May 2022, Darcon Properties Ltd. applied for permission for 8 no. two storey semi-detached houses with habitable attic accommodation, 2 no. two storey end-terrace houses with habitable attic accommodation, 2 no. two storey mid terrace houses, a three-storey apartment building accommodating 9 no. apartments and all ancillary and associated site development works. Further information was sent to Meath County Council on the 17 April 2023. This application was granted on the 24th of May 2023.
- **Dart + West**– A railway order was submitted to An Bord Pleanála for a Railway Order for DART+ West Project on 29th July 2022. This project has completed its public consultation and is now currently undergoing detailed design and beginning the procurement process.

According to the IAQM guidance (2014) should the construction phase of the proposed development coincide with the construction phase of any other developments within 350m then there is the potential for cumulative construction dust related impacts to nearby sensitive receptors. However, provided the mitigation measures outlined in Section 10.6.1.1 and Appendix 10.1, are implemented throughout the construction phase of the proposed development significant cumulative dust impacts are not predicted. The predicted residual cumulative air quality impacts during the construction phase are short-term, direct, negative, localised and imperceptible.

10.7.2.2 Operational Stage

The cumulative impact is included within the operational stage impact for the proposed development. The impact is predicted to be long-term, negative and imperceptible with regards to air quality.

10.8 Monitoring

10.8.1 Proposed Development

10.8.1.1 Construction Stage

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).

10.8.1.2 Operational Stage

No operational phase monitoring is proposed.

10.9 Reinstatement

Reinstatement is not required.

10.10 Difficulties Encountered

There were no difficulties encountered when compiling this assessment.

11 CLIMATE (CLIMATE CHANGE)

11.1 Introduction

This chapter assesses the likely climate impacts associated with the proposed residential development at Oakfield Dunboyne. A full description of the development is available in Chapter 3 – Description of the Proposed Development.

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11.2 Assessment Methodology

The principal guidance and best practice documents used to inform the assessment of potential impacts on Climate are summarised below. In addition to specific climate guidance documents, the following guidelines were considered and consulted in the preparation of this chapter:

- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (hereafter referred to as the Environmental Protection Agency (EPA) Guidelines) (EPA, 2022); and
- Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017).

The assessment has made reference to national guidelines where available, in addition to international standards and guidelines relating to the assessment of climate impacts. These are summarised below:

- Transport Infrastructure Ireland (TII) PE-ENV-01104: Climate Guidance for National Roads, Light Rail and Rural Cycleways (Offline & Greenways) – Overarching Technical Document (TII, 2022a);
- Transport Infrastructure Ireland (TII) PE-ENV-01105: Climate Assessment Standard for Proposed National Roads (TII, 2022b);
- Transport Infrastructure Ireland (TII) GE-ENV-01106: TII Carbon Assessment Tool for Road and Light Rail Projects and User Guidance Document (TII, 2022c);
- Institute of Environmental Management & Assessment (IEMA) Environmental Impact Assessment Guide to: Assessing GHG Emissions and Evaluating their Significance (hereafter referred to as the IEMA 2022 GHG Guidance) (IEMA, 2022);
- IEMA Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (hereafter referred to as the IEMA 2020 EIA Guide) (IEMA, 2020a);
- IEMA GHG Management Hierarchy (hereafter referred to as the IEMA 2020 GHG Management Hierarchy) (IEMA, 2020b);
- IEMA Principles Series: Climate Change Mitigation & EIA (IEMA, 2010);
- Publicly Available Specification (PAS) 2080:2016 on Carbon Management in Infrastructure (BSI, 2016); and
- Technical guidance on the Climate Proofing of Infrastructure in the Period 2021-2027 (European Commission, 2021a).

11.2.1 Climate Agreements

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 a national mitigation plan, and 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, 2019). 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) and a third update in December 2022 (Government of Ireland, 2022) with an Annex of Action published in March 2023.

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 in December 2019, followed by the publication of the Climate Action and Low Carbon Development (Amendment) Act 2021 (hereafter referred to as the 2021 Climate Act) in March 2021. The Climate Act was signed into Law on the 23rd July 2021, giving statutory effect to the core objectives stated within the CAP.

The purpose of the 2021 Climate Act (Government of Ireland, 2021b) 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".

In relation to carbon budgets, the 2021 Climate Action and Low Carbon Development (Amendment) Act states that 'a carbon budget, consistent with furthering the achievement of the national climate objective, shall be proposed by the Climate Change Advisory Council, finalised by the Minister and approved by the Government for the period of 5 years commencing on the 1 January 2021 and ending on 31 December 2025 and for each subsequent period of 5 years (in this Act referred to as a 'budget period')'. The carbon budget is to be produced for 3 sequential budget periods, as shown in Table 11-1. The carbon budget can be revised where new obligations are imposed under the law of the European Union or international agreements or where there are significant developments in scientific knowledge in relation to climate change. In relation to the sectoral emissions ceiling, the Minister for the Environment, Climate and Communications (the Minister for the Environment) shall prepare and submit to government the maximum amount of Greenhouse Gas (GHG) emissions that are permitted in different sectors of the economy during a budget period and different ceilings may apply to different sectors. The sectorial emission ceilings for 2030 were published in July 2022 and are shown in Table 11-2. Buildings (Residential) have a 40% reduction requirement and a 2030 emission ceiling of 4 $MtCO_2eq$[1].

[1] Mt CO_2eq denotes million tonnes carbon dioxide equivalent

Sector	Reduction Required	2018 Emissions ($MtCO_2eq$)
2021-2025	295 Mt CO_2eq	Reduction in emissions of 4.8% per annum for the first budget period.
2026-2030	200 Mt CO_2eq	Reduction in emissions of 8.3% per annum for the second budget period.
2031-2035	151 Mt CO_2eq	Reduction in emissions of 3.5% per annum for the third provisional budget.

Table 11-1: 5-Year Carbon Budgets 2021-2025, 2026-2030 and 2031-2025

Sector	Reduction Required	2018 Emissions ($MtCO_2eq$)	2030 Emission Ceiling ($MtCO_2eq$)
Electricity	75%	10.5	3
Transport	50%	12	6
Buildings (Commercial and Public)	45%	2	1
Buildings (Residential)	40%	7	4
Industry	35%	7	4
Agriculture	25%	23	17.25
Other (F-Gases, Waste and Petroleum refining)	50%	2	1

Table 11-2: Sectoral Emission Ceilings 2030

In December 2022, CAP23 was published (Government of Ireland, 2022). This is the first CAP since the publication of the carbon budgets and sectoral emissions ceilings, and it aims to implement the required changes to achieve a 51% reduction in carbon emissions by 2030. The CAP has six vital high impact sectors where the biggest savings can be made: renewable energy, energy efficiency of buildings, transport, sustainable farming, sustainable business and change of land-use. CAP23 states that the decarbonisation of Ireland's manufacturing industry is key for Ireland's economy and future competitiveness. There is a target to reduce the embodied carbon in construction materials by 10% for materials produced and used in Ireland by 2025 and by at least 30% for materials produced and used in Ireland by 2030. CAP23 states that these reductions can be brought about by product substitution for construction materials and reduction of clinker content in cement. Cement and other high embodied carbon construction elements can be reduced by the adoption of the methods set out in the Construction Industry Federation 2021 report Modern Methods of Construction (Construction Industry Federation, 2021). In order to ensure economic growth can continue alongside a reduction in emissions, the IDA Ireland will also seek to attract businesses to invest in decarbonisation technologies.

In April 2023 the Government published a draft Long-term Strategy on Greenhouse Gas Emissions Reductions (Government of Ireland, 2023). This strategy provides a long-term plan on how Ireland will transition towards net carbon zero by 2050, achieving the interim targets set out in the Climate Action Plan. The strategy will be updated on the basis of a second round of public consultation throughout 2023 with an updated strategy published after this is complete.

The Meath County Council (MCC) Climate Action Strategy (Meath County Council, 2018) notes that its vision for climate change action presents a bold, exciting future for the county. The strategy aims to reduce CO_2 emissions of the county by at least 40% by 2030 while increasing the county's resilience by adapting to the impacts of climate change.

11.2.2 Construction Phase

11.2.2.1 Greenhouse Gas Assessment

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 with reference to EPA data on annual GHG emissions (see Section 11.3). The impact of the proposed development on climate is determined in relation to this baseline. As per the IEMA guidance (2022) where expected emissions will not increase by over 1% compared with the baseline scenario then no further assessment is required as there is no potential for significant impacts to climate. However, the construction stage activities and potential for GHG emissions have been reviewed as part of the construction stage climate assessment and a quantitative assessment conducted.

PE-ENV-01104 (TII, 2022a) recommends the calculation of the construction stage embodied carbon using the TII Online Carbon Tool (TII, 2022c). Embodied carbon refers to the sum of the carbon needed to produce a good or service. It incorporates the energy needed in the mining or processing of raw materials, the manufacturing of products and the delivery of these products to site. The TII Online Carbon Tool (TII, 2022c) uses emission factors from recognised sources including the Civil Engineering Standard Method of Measurement (CESSM) Carbon and Price Book database (CESSM, 2013), UK National Highways Carbon Tool v2.4 and UK Government 2021 Greenhouse Gas Reporting Conversion Factors. The tool aligns with PAS 2080. The carbon emissions are calculated by multiplying the emission factor by the quantity of the material that will be used over the entire construction / maintenance phase.

The TII Online Carbon Tool (TII, 2022c) has been commissioned by TII to assess GHG emissions associated with road or rail projects using Ireland-specific emission factors and data. Given the nature of the proposed development, use of the TII carbon tool was not ideal for the building elements at an early design stage. An alternative tool, OneClickLCA Carbon Designer Tool for Ireland[2] from the Green Building Council, with support from the Land Development Agency (LDA) and the Environmental Protection Agency (EPA), has been utilised as an alternative to the TII Carbon Tool for the building elements. OneClickLCA is certified to EN 15978, EN 15978, ISO 21931–1 & ISO 21929, & data requirements of ISO 14040 & EN 15804, and is LEED, BREEAM and PAS 2080 aligned. The carbon designer tool is aimed at providing an early-stage lifecycle estimate the carbon impact of the Proposed Project. The tool includes build ups common in the Irish market, and some alternatives.

11.2.2.2 Traffic Assessment

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 DMRB guidance document in relation to climate impact assessments *LA 114 Climate* (UK Highways Agency, 2019) contains the following scoping criteria to determine whether a detailed climate assessment is required for a proposed project during the operational stage. If any of the road links impacted by the proposed development meet or exceed 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.

PE-ENV-01104 (TII, 2022c) states that road traffic related emissions information should be obtained from an Air Quality Practitioner to show future user emissions during operation without the

[2] https://www.igbc.ie/carbon-designer-for-ireland/

development in place. The Air Quality Practitioner calculated the traffic related emissions through the use of the TII REM tool (TII, 2022b) which includes detailed fleet predictions for age, fuel technology, engine size and weight based on available national forecasts. An air quality construction phase assessment has been scoped out as the change in traffic does not meet the scoping criteria. In addition, transportation emissions have been included with the carbon calculators. As a result a detailed assessment of construction stage traffic related carbon dioxide (CO_2) emissions was scoped out in order to prevent double counting.

11.2.3 Operation Phase

11.2.3.1 Climate Change Vulnerability Assessment

The operational phase assessment involves determining the vulnerability of the proposed development to climate change. This involves an analysis of the sensitivity and exposure of the development to climate hazards which together provide a measure of vulnerability.

PE-ENV-01104 (TII, 2022a) states that the CCRA is guided by the principles set out in the overarching best practice guidance documents:

- EU (2021) Technical Guidance on the Climate Proofing of Infrastructure in the Period 2021-2027 (European Commission, 2021); and
- The Institute of Environmental Management and Assessment, Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (2nd Edition) (IEMA, 2020).

The baseline environment information provided in Section 11.3, future climate change modelling and input from other experts working on the proposed development (i.e. hydrologists) should be used in order to assess the likelihood of a climate risk.

The initial stage of an assessment is to establish a scope and boundary for the assessment taking into account the following criteria:

- Spatial boundary: As per PE-ENV-01104 (TII, 2022a), the study area with respect to the GHGA is Ireland's Climate budget. The study area with respect to the CCRA can be considered the project boundary and its assets. The study area will be influenced by current and future baselines (Section 11.3). This study area is influenced by the input of other experts within the EIAR team;
- Climate hazards: The outcomes of the climate screening i.e. vulnerability assessment and baseline assessment; and
- Project receptors: TII state that the project receptors are the asset categories considered in the climate screening. In addition, any critical connecting infrastructure and significant parts of the surrounding environment e.g. water bodies that should be considered as a part of the indirect, cumulative and in combination impact assessment should also be considered project receptors.

Technical guidance on the climate proofing of infrastructure in the period 2021-2027 (European Commission, 2021a) outlines an approach for undertaking a climate change risk assessment where there is a potentially significant impact on the proposed development due to climate change. The risk assessment assesses the likelihood and consequence of the impact occurring, leading to the evaluation of the significance of the impact. The role of the climate consultant in assessing the likelihood and impact is often to facilitate the climate change risk assessment process with input from the design team or specific specialists such as hydrology.

The climate screening risk assessment or vulnerability assessment is carried out by determining the sensitivity and exposure of the project to climate change. Firstly the project asset categories must be assigned a level of sensitivity to climate hazards irrespective of the project location (example: sea level rise will affect seaport projects regardless of specific location). PE-ENV-01104 (TII, 2022a) provide the below list of asset categories and climate hazards to be considered. The asset categories will vary for project type and need to be determined on a project by project basis.

- **Receptors/Assets categories** - Pavements; drainage; structures; utilities; landscaping; signs, light posts, buildings, and fences.
- **Climate hazards** - Flooding (coastal, pluvial, fluvial); extreme heat; extreme cold; wildfire; drought; extreme wind; lightning and hail; landslides; fog.

The sensitivity is based on a High, Medium or Low rating with a score of 1 to 3 assigned as per the criteria below.

- **High sensitivity:** The climate hazard will or is likely to have a major impact on the asset category. This is a sensitivity score of 3.
- **Medium sensitivity:** It is possible or likely the climate hazard will have a moderate impact on the asset category. This is a sensitivity score of 2.
- **Low sensitivity:** It is possible the climate hazard will have a low or negligible impact on the asset category. This is a sensitivity score of 1.

Once the sensitivities have been identified the exposure analysis is undertaken. The exposure analysis involves determining the level of exposure of each climate hazard at the project location irrespective of the project type for example: flooding could be a risk if the project location is next to a river in a floodplain. Exposure is assigned a level of High, Medium or Low as per the below criteria.

- **High exposure:** It is almost certain or likely this climate hazard will occur at the project location i.e. might arise once to several times per year. This is an exposure score of 3.
- **Medium exposure:** It is possible this climate hazard will occur at the project location i.e. might arise a number of times in a decade. This is an exposure score of 2.
- **Low exposure:** It is unlikely or rare this climate hazard will occur at the project location i.e. might arise a number of times in a generation or in a lifetime. This is an exposure score of 1.

Once the sensitivity and exposure are categorised, a vulnerability analysis is conducted by multiplying the sensitivity and exposure to calculate the vulnerability, as shown in Table 11-4.

11.2.3.2 Climate and Traffic Emissions

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 DMRB guidance document in relation to climate impact assessments *LA 114 Climate* (UK Highways Agency, 2019) contains the following scoping criteria outlined in Section 11.2.2.2 were used to determine whether a detailed climate assessment is required for the operational stage.

There are a small number of road links that will experience a change of over 10% in the AADT during the operational phase as a result of the proposed development. As a result a detailed assessment of traffic related carbon dioxide (CO_2) emissions was conducted.

PE-ENV-01104 (TII, 2022a) states that road traffic related emissions information should be obtained from an Air Quality Practitioner to show future user emissions during operation without the development in place. The Air Quality Practitioner calculated the traffic related emissions through the use of the TII REM tool (TII, 2022d) which includes detailed fleet predictions for age, fuel technology, engine size and weight based on available national forecasts. The output is provided in terms of CO_2eq for the base year 2022, opening year 2026 and design year 2041. Both the Do Nothing and Do Something scenarios are quantified in order to determine the degree of change in emissions as a result of the proposed development. Traffic data was obtained from Waterman Moylan for the purpose of this assessment. Inputs include light duty vehicle (LDV) annual average daily traffic movements (AADT), annual average daily heavy-duty vehicles (HDV AADT), annual average traffic speeds, road link lengths, road type and project county location. The traffic data used in the operational phase modelling assessment is detailed in Chapter 10 Climate (Air Quality) (Table 10-3).

11.2.4 Climate Assessment Criteria

The climate assessment is divided into two distinct sections – a greenhouse gas assessment (GHGA) and a climate change risk assessment (CCRA).

- Greenhouse Gas Emissions Assessment (GHGA) – Quantifies the GHG emissions from a project over its lifetime. The assessment compares these emissions to relevant carbon budgets, targets and policy to contextualise magnitude.
- Climate Change Risk Assessment (CCRA) – Identifies the impact of a changing climate on a project and receiving environment. The assessment considers a projects vulnerability to climate change and identifies adaptation measures to increase project resilience.

The significance criteria for each assessment are described below.

11.2.4.1 Significance Criteria for GHGA

The Transport Infrastructure Ireland (TII) guidance document entitled PE-ENV-01104 Climate Guidance for National Roads, Light Rail and Rural Cycleways (Offline & Greenways) – Overarching Technical Document (TII, 2022a) outlines a recommended approach for determining the significance of both the construction and operational phases of a development. The approach is based on comparing the 'Do Something' scenario and the net project GHG emissions (i.e. Do Something – Do Minimum) to the relevant carbon budgets (Department of the Taoiseach 2022). With the publication of the Climate Action Act in 2021, sectoral carbon budgets have been published for comparison with the Net CO_2 project GHG emissions from the proposed development. The Residential Buildings sector emitted approximately 7 $MtCO_2eq$ in 2018 and has a ceiling of 4 $MtCO_2eq$ in 2030 which is a 45% reduction over this period (see Table 11-3).

The significance of GHG effects set out in PE-ENV-01104 (TII, 2022a) is based on IEMA guidance (IEMA, 2022) which is consistent with the terminology contained within Figure 3.4 of the EPA's (2022) 'Guidelines on the information to be contained in Environmental Impact Assessment Reports'.

The 2022 IEMA Guidance (IEMA, 2022) sets out the following principles for significance:

- When evaluating significance, all new GHG emissions contribute to a negative environmental impact; however, some projects will replace existing development or baseline activity that has a higher GHG profile. The significance of a project's emissions should therefore be based on its net impact over its lifetime, which may be positive, negative or negligible;
- Where GHG emissions cannot be avoided, the goal of the EIA process should be to reduce the project's residual emissions at all stages; and
- Where GHG emissions remain significant, but cannot be further reduced, approaches to compensate the project's remaining emissions should be considered.

TII (TII 2022a) states that professional judgement must be taken into account when contextualising and assessing the significance of a project's GHG impact. In line with IEMA Guidance (IEMA, 2022), TII state that the crux of assessing significance 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*".

Significance is determined using the criteria outlined in Table 11-3 (derived from Table 6.7 of PE-ENV-01104 (TII 2022a)) along with consideration of the following two factors:

- The extent to which the trajectory of GHG emissions from the project aligns with Ireland's GHG trajectory to net zero by 2050; and
- The level of mitigation taking place.

Effects	Significance level Description	Description
Significant adverse	Major adverse	The project's GHG impacts are not mitigated. The project has not complied with do-minimum standards set through regulation, nor provided reductions required by local or national policies; and No meaningful absolute contribution to Ireland's trajectory towards net zero.
	Moderate adverse	The project's GHG impacts are partially mitigated. The project has partially complied with do-minimum standards set through regulation, and have not fully complied with local or national policies; and Falls short of full contribution to Ireland's trajectory towards net zero.
Not significant	Minor adverse	The project's GHG impacts are mitigated through 'good practice' measures. The project has complied with existing and emerging policy requirements; and Fully in line to achieve Ireland's trajectory towards net zero.
	Negligible	The project's GHG impacts are mitigated beyond design standards. The project has gone well beyond existing and emerging policy requirements; and Well 'ahead of the curve' for Ireland's trajectory towards net zero.
Beneficial	Beneficial	The project's net GHG impacts are below zero and it causes a reduction in atmosphere GHG concentration. The project has gone well beyond existing and emerging policy requirements; and Well 'ahead of the curve' for Ireland's trajectory towards net zero, provides a positive climate impact.

Table 11-3: GHGA Significance Criteria for GHGA

11.2.4.1 Significance Criteria for CCRA

The CCRA involves an initial screening assessment to determine the vulnerability of the proposed development to various climate hazards. The vulnerability is determined by combining the sensitivity and the exposure of the proposed development to various climate hazards.

Vulnerability = Sensitivity x Exposure

The vulnerability assessment takes any proposed mitigation into account. Table 11-4 details the vulnerability matrix; vulnerabilities are scored on a high, medium and low scale. Where residual medium or high vulnerabilities exist the assessment may need to be progressed to a detailed climate change risk assessment and further mitigation implemented to reduce risks.

		Exposure		
		High (3)	**Medium (2)**	**Low (1)**
Sensitivity	High (3)	9 - High	6 – High	3 - Medium
	Medium (2)	6 - High	4 - Medium	2 - Low
	Low (1)	3 - Medium	2 – Low	1 - Low

Table 11-4: Vulnerability Matrix

11.3 Receiving Environment

11.3.1 Current Baseline

PE-ENV-01104 (TII, 2022a) states that a baseline climate scenario should identify, consistent with the study area for the project, GHG emissions without the project for both the current and future baseline.

Ireland declared a climate and biodiversity emergency in May 2019 and in November 2019 there was European Parliament approval of a resolution declaring a climate and environment emergency in Europe. This, in addition to Ireland's current failure to meet its EU binding targets under Regulation 2018/842 (European Union, 2018) results in changes in GHG emissions either beneficial or adverse being of more significance than previously considered prior to these declarations.

Data published in 2022 (EPA, 2023) predicts that Ireland exceeded (without the use of flexibilities) its 2021 annual limit set under EU's Effort Sharing Decision (ESD) (EU 2018/842) by 3.29 Mt CO_2eq as shown in Table 11-5. The sector with the highest emissions in 2021 (of total excluding LULUCF) was agriculture at 38% of the total, followed by transport at 17.7%. For 2021 total national emissions (excluding LULUCF) were estimated to be 62.11 Mt CO_2eq as shown in Table 11-5 (EPA, 2023).

The future baseline with respect to the GHGA can be considered in relation to the future climate targets which the assessment results will be compared against. In line with TII (TII, 2022a) and IEMA Guidance (IEMA, 2022) the future baseline is a trajectory towards net zero by 2050, "*whether it* [the project] *contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050*".

The future baseline will be determined by Ireland meeting its targets set out in the CAP23, and future CAPs, alongside binding 2030 EU targets. In order to meet the commitments under the Paris Agreement, the European Union (EU) enacted '*Regulation (EU) 2018/842 on binding annual GHG 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'* (hereafter referred to as the Regulation) (European Union, 2018). 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. The ETS is an EU-wide scheme which regulates the GHG emissions of larger industrial emitters including electricity generation, cement manufacturing and heavy industry. The non-ETS sector includes all domestic GHG emitters which do not fall under the ETS scheme and thus includes GHG emissions from transport, residential and commercial buildings and agriculture.

Category	2021 Kilotonnes CO_2eq	% of Total GHG Emissions Excluding LULUCF	% of Total GHG Emissions Including LULUCF
Waste	943	1.5%	1.4%
Energy Industries	10,272	16.5%	14.8%
Residential	6,917	11.1%	10.0%
Manufacturing Combustion	4,624	7.4%	6.7%
Commercial Services	836	1.3%	1.2%
Public Services	659	1.1%	0.9%
Transport	10,989	17.7%	15.8%
Industrial Processes	2,477	4.0%	3.6%
F-gases	766	1.2%	1.1%
Agriculture	23,626	38.0%	34.0%
Total excluding LULUCF	**62,109**	**100%**	**89%**
Land use, land-use change and forestry (LULUCF)	7,338	N/A	10.6%
Total including LULUCF	**69,448**	**N/A**	**100%**

Table 11-5: Total National GHG Emissions in 2021

11.3.2 Future Baseline

Impacts as a result of climate change will evolve with a changing future baseline, changes have the potential to include increases in global temperatures and increases in the number of rainfall days per year. Therefore, it is expected that the baseline climate will evolve over time and consideration is needed with respect to this within the design of the proposed development.

Ireland has seen increases in the annual rainfall in the north and west of the country, with small increases or decreases in the south and east including in the region where the proposed development will be located (EPA, 2021b). The EPA have compiled a list of potential adverse impacts as a result of climate change including the following which may be of relevance to the proposed development (EPA, 2021a):

- More intense storms and rainfall events;
- Increased likelihood and magnitude of river and coastal flooding;
- Water shortages in summer in the east;
- Adverse impacts on water quality; and
- Changes in distribution of plant and animal species.

The EPA's State of the Irish Environment Report (Chapter 2: Climate Change) (EPA, 2020b) notes that projections show that full implementation of additional policies and measures, outlined in the 2019 Climate Action Plan, will result in a reduction in Ireland's total GHG emissions by up to 25% by 2030 compared with 2020 levels. Climate change is not only a future issue in Ireland, as a warming of approximately 0.8°C since 1900 has already occurred. The EPA state that it is critically important for the public sector to show leadership and decarbonise all public transport across bus and rail networks to the lowest carbon alternatives. The report (EPA, 2020b) underlines that the next decade needs to be one of major developments and advances in relation to Ireland's response to climate change in order to achieve these targets. Ireland must accelerate the rate at which it implements GHG emission reductions. The report states that mid-century mean annual temperatures in Ireland are projected to increase by between 1.0°C and 1.6°C (subject to the emissions trajectory). In addition, heat events are expected to increase by mid-century (EPA,

2020b). While individual storms are predicted to have more severe winds, the average wind speed has the potential to decrease (EPA, 2020b).

TII's Guidance document PE-ENV-01104 (TII, 2022a) states that for future climate change a moderate to high Representative Concentration Pathways (RCP) should be adopted. RPC4.5 is considered moderate while RPC8.5 is considered high. Representative Concentration Pathways (RCPs) describe different 21st century pathways of GHG emissions depending on the level of climate mitigation action undertaken.

Future climate predictions undertaken by the EPA have been published in 'Research 339: High-resolution Climate Projections for Ireland – A Multi-model Ensemble Approach (EPA, 2020a). The future climate was simulated under both Representative Concentration Pathway 4.5 (RCP4.5) (medium-low) and RCP8.5 (high) scenarios. This study indicates that by the middle of this century (2041–2060), mid-century mean annual temperatures are projected to increase by 1 to 1.2°C and 1.3 to 1.6°C for the RCP4.5 and RCP8.5 scenarios, respectively, with the largest increases in the east. Warming will be enhanced at the extremes (i.e. hot days and cold nights), with summer daytime and winter night-time temperatures projected to increase by 1 to 2.4°C. There is a projected substantial decrease of approximately 50%, for the number of frost and ice days. Summer heatwave events are expected to occur more frequently, with the largest increases in the south. In addition, precipitation is expected to become more variable, with substantial projected increases in the occurrence of both dry periods and heavy precipitation events. Climate change also has the potential to impact future energy supply which will rely on renewables such as wind and hydroelectric power. More frequent storms have the potential to damage the communication networks requiring additional investment to create resilience within the network.

The EPA's Critical Infrastructure Vulnerability to Climate Change report (EPA, 2021b) assesses the future performance of Irelands critical infrastructure when climate is considered. With respect to road infrastructure, fluvial flooding and coastal inundation/coastal flooding are considered the key climate change risks with snowstorm and landslides being medium risks. Extreme winds and heatwaves/droughts are considered low risk to road infrastructure. One of the key outputs of the research was a framework that will provide quantitative risk-based decision support for climate change impacts and climate change adaptation analysis for infrastructure.

11.4 Characteristics of the Proposed Development

11.4.1 Proposed Development

The proposed development is a mix of residential units in a mix of houses, duplex and apartment buildings, associated and ancillary site development and infrastructural works, provision of c. 470 m in length of distributor road, compensatory storage measures at Castle Stream and improvement works to two no. roundabouts on the R147 (Old Navan Road). A full description of the development is available in Chapter 3 - Description of Proposed Development.

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

- Construction phase, and;
- Operational phase.

11.4.1.1 Construction Stage

The key elements of construction of the proposed development with potential for air quality impacts are:

- the release of greenhouse gas emissions to atmosphere during the construction of the proposed development due to construction activities, materials, transport of materials and waste;

- Potential impacts of hazards associated with climate change.

11.4.1.2 Operational Stage

The key elements of operation of the proposed development with potential for air quality impacts are:

- A change in traffic flows on road links nearby the proposed development;
- Maintenance of materials i.e. road resurfacing;
- Potential impacts of hazards associated with future climate change.

11.5 Potential Impact of the Proposed Development

11.5.1 Construction Phase

11.5.1.1 Greenhouse Gas Assessment

There is the potential for release of a number of greenhouse gas emissions to atmosphere during the construction of the proposed development.

The embodied carbon within the site clearance, construction materials (including maintenance), waste, and transport has been calculated. This calculation was based on OneClickLCA Carbon Designer Tool for Ireland for structural elements. Non-structural elements (civils i.e. drainage, road surfaces) were added via the TII online carbon tool, and the breakdown of the activities between the different phases of the proposed development were assessed. As shown in Table 11-6, the assessment indicates that the key sources of GHG emissions are associated with the embodied carbon of the construction materials and construction waste.

The proposed development is estimated to result in total construction phase GHG emissions of 31,988 tonnes embodied CO_2eq for the product and construction processes. This is equivalent to an annualised total of 0.8% of the 2030 Buildings (Residential) or Industrial sector budgets (both have same 2030 budget) when annualised over the lifespan.

Activity	Tonnes CO_2eq
Pre-Construction	7.2
Embodied Civil Carbon (Civils - Roads, Drainage etc)	2,605
Embodied Carbon (Structures)	29,213
Construction Civil Activities	32
Construction Waste	131
Total	31,988
As % of 2030 Residential Sectoral Budget	0.800%
As % of 2030 Industrial Sectoral Budget	0.800%

Table 11-6: Construction Stage Greenhouse Gas Emissions

11.5.1.2 Climate Change Risk Assessment

Examples of potential climate impacts during operation are included in Annex D (Climate Proofing and Environmental Impact Assessment) of the Technical Guidance on the Climate Proofing of Infrastructure (European Commission, 2021a). Potential impacts of climate change on the proposed development include:

- Flood risk due to increased precipitation, and intense periods of rainfall. This includes fluvial and pluvial flooding;
- Increased temperatures potentially causing drought, wildfires and prolonged periods of hot weather;

- Reduced temperatures resulting in ice or snow;
- Geotechnical impacts; and
- Major storm damage – including wind damage.

Each of these potential risks are considered with respect to the operational phase of the proposed development as detailed in Section 11.5.2. During the construction phase no assessment is required, however, consideration will be given to the project's vulnerability to climate impacts. During construction, the Contractor will be required to mitigate against the effects of extreme rainfall / flooding through site risk assessments and method statements. The Contractor will also be required to mitigate against the effects of extreme wind / storms, temperature extremes through site risk assessments and method statements. All materials used during construction will be accompanied by certified datasheets which will set out the limiting operating temperatures. Temperatures can affect the performance of some materials, this will require consideration during construction.

During construction, the Contractor will be required to mitigate against the effects of fog, lighting and hail through site risk assessments and method statements.

11.5.2 Operational Phase

11.5.2.1 Greenhouse Gas Assessment

There is the potential for increased traffic volumes to impact climate. The change in traffic was reviewed against the PE-ENV-01104 screening criteria outlined in Section 12.1.2.2 (TII, 2022a) and a detailed climate assessment of traffic emissions was conducted.

The predicted concentrations of CO_2 for the future years of 2026 and 2041 are detailed in Table 11-7. These are significantly less than the 2026 and 2041 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 0.00009% of the EU 2026 target. Similarly low increases in CO_2 emissions are predicted to occur in 2041 with emissions increasing by 0.00006% of the EU 2030 target.

Year	Scenario	CO_2eq (tonnes/annum)
2026	Do Nothing	602
	Do Something	634
2041	Do Nothing	499
	Do Something	520
Increment in 2026		32
Increment in 2041		21
Emission Ceiling (Tonnes) 2026		37,869,352
Emission Ceiling (Tonnes) 2030		33,381,312
Impact in 2026 (%)		0.00009%
Impact in 2041 (%)		0.00006%

Table 11-7: Climate Traffic Impact Assessment

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

During the operational phase the energy requirements from the buildings will be low. They will be constructed as Nearly Zero Energy Buildings (NZEB) which means a building that has a very high energy performance. The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby.

11.5.2.2 Climate Change Vulnerability Assessment

To determine the vulnerability of the proposed development to climate change, the sensitivity and exposure of the development to various climate hazards must first be determined. The following climate hazards have been considered in the context of the proposed development: flooding (coastal, pluvial, fluvial); extreme heat; extreme cold; wildfire; drought; extreme wind; lightning, hail, landslides and fog.

The sensitivity of the proposed development to the above climate hazards is assessed irrespective of the project location. Table 11-7 details the sensitivity of the proposed development on a scale of high (3), medium (2) and low (1). Once the sensitivity has been established the exposure of the proposed development to each of the climate hazards is determined. This is the likelihood of the climate hazard occurring at the project location and is also scored on a scale of high (3), medium (2) and low (1). The product of the sensitivity and exposure is then used to determine the overall vulnerability of the proposed development to each of the climate hazards as per Table 11-4. The results of the vulnerability assessment are detailed in Table 11-7.

Climate Hazard	Sensitivity	Exposure	Vulnerability
Flood (coastal, pluvial or fluvial)	2 (Medium)	2 (Medium)	4 (Medium Risk)
Extreme Heat	1 (Low)	2 (Medium)	2 (Low Risk)
Extreme Cold	1 (Low)	2 (Medium)	2 (Low Risk)
Drought	1 (Low)	2 (Medium)	2 (Low Risk)
Wind	1 (Low)	2 (Medium)	2 (Low Risk)
Wildfire	1 (Low)	1 (Low)	1 (Low Risk)
Fog	1 (Low)	1 (Low)	1 (Low Risk)
Lightning & Hail	1 (Low)	1 (Low)	1 (Low Risk)
Landslides	1 (Low)	1 (Low)	1 (Low Risk)

Table 11-8: Climate Change Vulnerability Assessment

The proposed development has a worst-case medium vulnerability to flooding, extreme heat and extreme cold. The Site-Specific Flood Risk Assessment (SSFRA) carried out by JBA Consulting and submitted with this planning application states that the site is located in Flood Zone C with an annual probability of flooding (fluvial) and coastal of less than 0.1% AEP. The access road however is within Flood Zone A/B. The areas within Flood Zone A/B includes part of the channel of the Castle Stream which has the potential for fluvial flooding and has a history of flooding. In order to inform the risk a full and detailed hydraulic model will therefore be developed to expand upon the existing level of detail for the area and include the local watercourses that flow through the site. This modelling was completed for both the Mid-End Future Scenario (additional 20%) and High-End Future Climate Scenarios (additional 30%). The final attenuation storage has been designed to cater for the 1% AEP flood events plus an allowance for an additional 20 % climate change factor.

The recommended minimum finished floor level for the proposed development is set 500 mm above the fluvial 1% AEP plus MRFS climate change water level. It is noted that a 10 m riparian strip is alongside the Castle Stream between the river channel and the proposed development. The development levels have also been raised and essentially act as a defence; this includes the road level running parallel to the Castle Stream which has levels a minimum of 300 mm above the 1% AEP plus MRFS climate change levels. The design has also been tested against the HEFS climate change event and minimum freeboard remains well above the 500 mm minimum value. Further details are provided in the Flood Risk Assessment submitted with the planning application.

In addition, the landscape design has been done with cognisance of future climate change risk. Within this project the extensive planting and retention of open spaces will have benefits in terms of carbon storage and reducing surface run-off.

The landscaping for the proposed development has been designed for the long term and takes account of the need for climate resilience. As noted within the Landscape Institute UK publication "*Landscape architecture and the challenge of climate change*", sustainable landscape planning, design and management are essential in order to adapt out environments to a changing climate and

to mitigate future change. Within this project the extensive planting and retention of open spaces will have benefits in terms of carbon storage and reducing surface run-off. The Planting proposed will not require irrigation post-establishment and the species chosen have include those in the discussed in the All-Ireland Pollinator Plan 2021 – 2025.

Extreme temperatures, both extreme heat and extreme cold, have the potential to impact the building materials and some related infrastructure. However, high quality, durable building materials will be selected for the proposed development. The building detailed design will be finalised with potential future climate hazards in mind. Where applicable the following guidance will be used in design, including any updates such as second generation of Eurocodes, which are to include impacts of future climate change, which become available prior to detailed design:

- IS EN 1991-1-4 Windloading;
- IS EN 1991-1-7 Accidental loading;
- IS EN 1991-1- 5 Temperature loads;
- IS EN 1991-1-3 Snow loading;
- IS EN 1992 Concrete;
- IS EN 1993 Steel;
- IS EN 1996 Masonry;
- IS EN 1995 Timber.

With respect to increased wind events. A wind assessment has been undertaken for the development, identifying vulnerable positions on site where prevailing winds interact with new building volumes. The design has evolved to 'design out' instances of pedestrian discomfort. Buildings are designed to be robustly assembled, using solid building techniques, with reduced vulnerability to building elements becoming detached from facades in extreme wind events.

Therefore, overall the proposed development has a worst-case medium vulnerability due to potential future flooding, as a 30% allowance for climate change has not been considered across the full site to align with high-risk future scenarios (RCP8.5). All other vulnerabilities have been identified as low and therefore are not a risk. With future climate change increased heat, cold, drought or wind events are likely to occur and therefore the exposure is classed as medium.

In addition, the proposed development has been designed to reduce the impact on climate where possible (see the project Energy Analysis Report for full details).

11.5.3 Do-Nothing Impact

In the Do-Nothing scenario, the site will remain as per the baseline and will change in accordance with trends within the wider area (including influences from potential new developments in the surrounding area, changes in road traffic, etc). The Do-Nothing scenario is considered neutral in terms of the climate assessment.

11.6 Mitigation Measures (Ameliorative, Remedial or Reductive Measures)

11.6.1 Construction Phase

Embodied carbon of materials and construction activities will be the primary source of climate impacts during the construction phase. Measures to reduce the embodied carbon of the construction works include:

- Creating a construction program which allows for sufficient time to determine reuse and recycling opportunities for demolition wastes;
- Appointing a suitably competent contractor who will undertake waste audits detailing resource recovery best practice and identify materials can be reused/recycled;
- Materials will be reused on site within the new build areas where possible;
- 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; and
- Sourcing materials locally where possible to reduce transport related CO_2 emissions.

11.6.2 Operational Phase

A number of measures have been incorporated into the design of the development to mitigate against the impacts of future climate change. For example, adequate attenuation and drainage have been incorporated into the design of the development to avoid potential flooding impacts as a result of increased rainfall events in future years. These measures have been considered when assessing the vulnerability of the proposed development to climate change (see Section 11.5.1.2).

The proposed development has been designed to reduce the impact on climate as a result of energy usage during operation. The Energy Analysis Report prepared by IN2 Engineering Design Partnership and submitted under separate cover with this planning application details a number of incorporated design mitigation measures that have been incorporated into the design of the development to reduce the impact on climate wherever possible. Such measures included in the proposed development to reduce the impact to climate from energy usage are:

- A2/A3 BER rating;
- Compliance for the Apartments to Part L 2021/ NZEB;
- Energy Performance Coefficient (EPC) < 0.30 for apartments;
- Carbon Performance Coefficient (CPC) < 0.35 for apartments;
- Achieve air tightness standards of 3 $m^3/m^2/hr$;
- Ensure thermal bridging details are designed to achieve thermal bridging factors of 0.15W/m^2K (Apartments) or less;
- Building fabric u-value and g-value calculations will be completed to at least meet the requirements of NZEB in relation to thermal performance;
- The proposed development is designed with a high percentage of dual aspect units, to achieve cross ventilation. This along with the building fabric, assists with the thermal control of temperatures;
- Exceed the minimum U-Value standards identified in *Part L 2022 Dwellings;*
- Provide an appropriate combination of technologies to ensure energy consumption is in line with *Part L 2022 Dwellings* requirements (Renewable Energy Ratio (RER) > 0.20);

- All in-curtilage parking spaces will be capable of being fitted with EV charging points. All off-curtilage spaces will be ducted for EV charging, with 20% fitted out from the outset; and
- The project architects and landscape architects worked together to produce a plan that includes for green infrastructure (links) across the site for pedestrian and cycle use and minimised the requirement for removal or import of any soils off this site necessitating additional traffic and transport.

These above identified measures will aid in reducing the impact to climate during the operational phase of the proposed development in line with the goals, relevant policies and objectives of the Meath Development Plan 2021-2027, including climate mitigation measures.

11.7 Residual Impact of the Proposed Development

11.7.1 Proposed Development

11.7.2 Construction Phase

The proposed development will result in some impacts to climate through the release of GHGs. TII state that the crux of assessing significance 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".* The proposed development is committing to reducing climate impacts, where feasible, and the development will comply with the Do-Minimum standards set through regulation. As per the assessment criteria in Table 11-3 the impact of the proposed development in relation to GHG emissions is considered long-term, minor adverse and not significant in EIA terms provided the final design and construction phase take account of GHG mitigation measures set out in local and National Climate Action Plans.

11.7.3 Operational Phase

The proposed development will result in some impacts to climate through the release of GHGs, however the projects Energy Analysis Report aims to minimise operational phase energy requirements. TII state that the crux of assessing significance 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"*. As per the assessment criteria in Table 11-3 the impact of the proposed development in relation to GHG emissions is considered long-term, minor adverse and not significant in EIA terms provided the final design and operational phase emissions take account of GHG mitigation measures set out in Fingal and National Climate Action Plans.

In relation to climate change vulnerability, it has been assessed that there is a low risk as a result of future climate change hazards with the exception of flood risk which has a medium risk. This risk will be mitigated where possible to reduce the vulnerability of the site. Design mitigation measures have been put in place to ensure buildings on the site have added resilience to potential flooding. These measures include a minimum finished floor level for the proposed development is set 500 mm above the fluvial 1% AEP plus MRFS climate change water level.

11.7.4 Cumulative

With respect to the requirement for a cumulative assessment PE-ENV-01104 (TII, 2022c) states that *"for GHG Assessment is the global climate and impacts on the receptor from a project are not geographically constrained, the normal approach for cumulative assessment in EIA is not considered applicable."*

However, by presenting the GHG impact of a project in the context of its alignment to Ireland's trajectory of net zero and any sectoral carbon budgets, this assessment will demonstrate the

potential for the project to affect Ireland's ability to meet its national carbon reduction target. Therefore, the assessment approach is considered to be inherently cumulative.

While the assessment is inherently cumulative the progression of the Dart+ West project, regarding which a railway order was submitted to An Bord Pleanála on 29th July 2022, has the potential to improve the availability of public transport for the residents of the proposed development. Therefore reducing a reliance on private vehicles for transport which have high GHG emissions.

11.8 Monitoring

There is no monitoring required for the construction or operational phases.

11.9 Reinstatement

Reinstatement is not required.

11.10 Difficulties Encountered

There were no significant difficulties encountered when compiling this assessment.

12 CLIMATE (DAYLIGHT)

12.1 Introduction

Digital Dimensions have been commissioned to assess any potential effect on the Daylight (see Chapter 12) and Sunlight (see Chapter 13) of neighbouring properties. This section has been prepared by John Healy - Diploma Architectural Technology, M.Sc Environmental Design of Buildings, PG Dip Digital Media. John has experience of working as a Daylight and Sunlight consultant for in excess of 10 years.

A model was produced based on the drawings of Plus Architecture Ltd and Waterman Moylan Engineering Consultants.

12.2 Assessment Methodology

12.2.1 Standards and Guidelines

The following documents have been used in preparation of this chapter of the report.

- Building Research Establishment (BRE) BR209: 2022 "Site Layout Planning for Daylight and Sunlight" (Third Edition), also referred to as the BRE guidelines.
- Guidelines on the information to be contained in Environmental Impact Assessment Reports. Environmental Protection Agency 2022
- Environmental Impact Assessment of Projects European Commission 2017

12.2.2 Defining a baseline

Preliminary assessment of the site and its environs is undertaken through mapping software, like Google maps and Bing, topographical survey, architectural models and drawings, photographic studies and the Local Authority planning portal. The project is examined in plan form to establish which sites and buildings would have the possibility to experience an impact on their Daylight as a result of the proposed development.

Establishing if a building or land may be impacted through proximity.
A proposed development could potentially have a negative effect on the level of Daylight that a neighbouring property receives, if the obstructing building is large in relation to its distance from the existing property.

BR209:2022 states that: *"Loss of light to existing windows need not be assessed if the distance of each part of* the new development from the existing window is three or more times its height above the centre of the existing window. In these cases, the loss of light will be small."

In this chapter we refer to this area as the 'Zone of Influence'.

This preliminary assessment records the building and land use, height, mass, window position, in the sites and structures within and around the zone of influence. This information is added to the digital model.

12.2.3 BRE Guidelines (2022) Appendix H: Environmental Impact Assessment

The BRE guidelines sets out criteria for classification for assessment of impact where a new development affects a number of existing buildings or open spaces in relation to an Environmental Impact Assessment. The guide does not give a specific range or percentages but sets out parameters set out below.

"Where the loss of skylight or sunlight fully meets the guidelines in this book, the impact is assessed as negligible or minor adverse. Where the loss of light is well within the guidelines, or only a small number of windows or limited area of open space lose light (within the guidelines), a classification of negligible impact is more appropriate. Where the loss of light is only just within the guidelines, and a larger number of windows or open space area are affected, a minor adverse impact would be more appropriate, especially if there is a particularly strong requirement for daylight and sunlight in the affected building or open space.

Where the loss of skylight or sunlight does not meet the guidelines in this book, the impact is assessed as minor, moderate or major adverse. Factors tending towards a minor adverse impact include:

- *only a small number of windows or limited area of open space are affected*
- *the loss of light is only marginally outside the guidelines*
- *an affected room has other sources of skylight or sunlight*
- *the affected building or open space only has a low level requirement for skylight or sunlight*
- *there are particular reasons why an alternative, less stringent, guideline should be applied.*

Factors tending towards a major adverse impact include:

- *a large number of windows or large area of open space are affected*
- *the loss of light is substantially outside the guidelines*
- *all the windows in a particular property are affected*
- *the affected indoor or outdoor spaces have a particularly strong requirement for skylight or sunlight, eg a living room in a dwelling or a children's playground.*

Beneficial impacts occur when there is a significant increase in the amount of skylight and sunlight reaching an existing building where it is required, or in the amount of sunlight reaching an open space. Beneficial impacts should be worked out using the same principles as adverse impacts. Thus a tiny increase in light would be classified as a negligible impact, not a minor beneficial impact."

12.3 Receiving Environment

12.3.1 Proposed Development

The site of the proposed development is located approximately 1Km to the east of Dunboyne, in the townlands of Castle Farm, Ruskin and Clonee. It is bounded by an Iarnród Éireann rail line to the west, by agricultural lands to the south and east. North of the site, to the east of the distributor road is 'Castle Farm Meadows' a recently constructed residential development and to the west of the distributor road is a residence and business 'Edenmore'.

The site is a greenfield and its gradient is predominantly flat. There are 2no. ESB corridors located on site with 1no. stretching west to east across the mid-section of the site, including a pylon on the site which is to be maintained as part of the proposed scheme. The other, less significant overhead lines/corridor is located to the southern portion of the subject site. These are to be relocated underground and diverted as part of the proposed development.

12.4 Characteristics of the Proposed Development

This section assessed the potential impact of the proposed development on the already existing environment, and the suitability of the proposed development to create and maintain a suitable and comfortable environment for different pedestrian activities.

12.4.1 Proposed Development

Permission is sought for a period of 10 Years for a proposed development on a site of approximately 16.92 Ha consisting of 716no. residential units in a mix of houses, duplex and apartment buildings ranging in height from 2 to 7 storeys overall; comprising of 155no. 2 storey houses; 517no. apartments accommodated in 8no. buildings ranging in height from 4 to 7 storeys; 44no. duplex units

accommodated in 2no. 3 storey terraces; 1no. childcare facility (c.602sqm) located at ground floor level of Block B1; public open space; communal and private open space; public lighting; car parking, including basement car parking under some of the apartments; secure bicycle parking; and all associated and ancillary site development and infrastructural works, hard and soft landscaping and boundary treatment works, provision of c. 470m of new distributor road; provide a 200mm diameter watermain in existing section of southern distributor road adjacent to recently constructed Castle Farm development; upgrade of junction of southern distributor road and L2228 (Station Road) to provide a signalised junction with pedestrian crossings, including ancillary adjustments to road markings on both roads; provision of foul drainage pumping station; provision of a compensatory storage area adjacent to Castle Stream; ESB Sub-Stations; and improvement works to 2 no. roundabouts on the R147 (Old Navan Road).

12.5 Potential Impact of the Proposed Development

12.5.1 Proposed Development

As stated in 12.4.1 above the proposed development is comprised of three reasonably distinct elements. The majority of the works proposed is within the area of the residential development. These built elements have been assessed for a potential effect on the daylight of adjacent buildings. When complete the proposed construction of the distributor road and the upgrade of the 2 no. roundabouts on the R147 will have a neutral effect on daylight.

The residential development was subject to preliminary assessment as recommended in the BRE guidelines. It states that loss of light to existing windows need not be assessed if the distance of each part of the new development from the existing window is three or more times its height above the centre of the existing window. This 'Zone of Influence', 3 times the height of the proposal, is plotted in yellow, as shown in Figure 12.1 below.

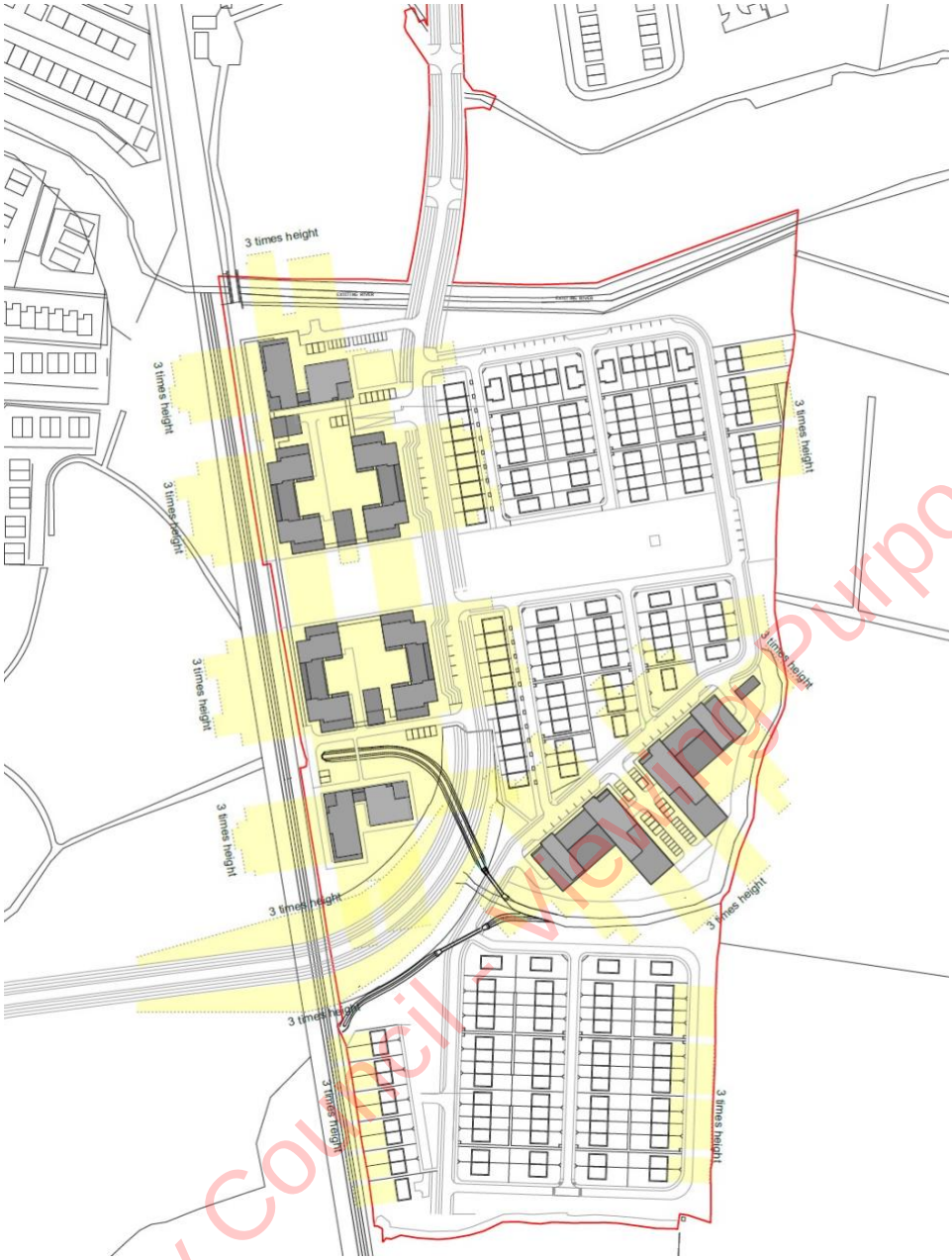


Figure 12.1: Proposed site plan showing the Zone of Influence from the apartment buildings and houses near the boundary, on adjacent properties. It also shows the Zone of Influence from the Future development of the railway bridge. Please note the site boundary extends to the north beyond the image shown. The roundabouts along the R147 and L2228 also form part of this application but are not shown in the red line above.

The 'Zone of Influence' does not reach any building in the adjacent properties. The effect of the proposed residential development on the daylight of adjacent buildings will be neutral.

12.5.1.1 Construction Stage

Residential development

The construction of the residential development is planned in phases. The site will evolve from the baseline scenario to the completed massing, which represents the greatest level of obstruction. The likely effects on daylight of adjacent properties would steadily increase over the construction phase to meet that of the completed development.

The presence of a crane or bore equipment would be considered imperceptible due to their slender size and temporary nature. The effects during construction will be less than the completed development.

Road works and roundabout upgrade

The boundary of the distributor road is more than 65m from the houses which face it on Castlefarm. During construction the erection of site hoarding would have a neutral effect on the daylight to the houses.

The southern roundabout on the R147 is bounded by greenfield sites on each road excepting one. To the east is an apartment scheme, Ard Cluain, Clonee, Co. Meath. These apartments have a ground floor parking, with amenity and residential accommodation on the first floor and above. The upgrade works would have a neutral effect on the daylight of the apartments.

The northern roundabout is bounded by 4 no. detached dwellings; the closest house is circa 21m from the red line boundary. The upgrade works would have a neutral effect on the daylight of the dwellings.

12.5.1.2 Operational Stage

The effect on daylight from the complete structures represents the greatest mass on site, and this is not projected to change over the operational stage of the development.

12.5.1.3 Do-Noting Impact

If the proposed development was not constructed there would be no daylight effects.

12.6 Mitigation Measures (Ameliorative, Remedial or Reductive Measures)

12.6.1 Proposed Development

No significant adverse effects will be experienced from the completion of the proposed development. No mitigation measures will be required.

12.6.1.1 Construction Stage

No significant adverse effects will be experienced during the construction of the proposed development. No mitigation measures will be required.

12.6.1.2 Operational Stage

The effect on daylight to neighbouring buildings is not projected to change over the operational phase of the development. No mitigation measures will be required.

12.7 Residual Effect of the Proposed Development

12.7.1 Proposed Development

During the design process the position and mass of the buildings, the finished floor level, and the height of parapets were technically assessed to reduce any potential effect on the daylight of adjacent properties. This informed the final design. Any residual effect on the daylight of the adjacent properties is neutral.

12.7.1.1 Construction Stage

During the construction phase all scaffolding, hoarding and cranes will only be in use for as long as necessary to facilitate the construction of the proposed development. The effect of these is considered temporary and imperceptible.

12.7.1.2 Operational Stage

The effect on daylight to neighbouring buildings is not projected to change over the operational phase of the development.

12.7.1.3 Worst Case Impact

There are no 'Worst Case' effects projected from completion of this proposed development.

12.7.2 Cumulative

Any residual effect on the daylight of the adjacent buildings from the related and cumulative developments is neutral. No significant adverse effects will be experienced from the completion of the proposed development and the related and cumulative developments. No mitigation measures will be required.

12.7.2.1 Construction Stage

The effect of any hoarding or construction equipment, on the related and cumulative development sites, is considered temporary and imperceptible. During the construction of the irish Water exempted development the effect of construction work would be temporary and imperceptible. Works that are underground have a neutral effect on the daylight of adjacent properties. During the construction of the future distributor road bridge the effect of construction work would be temporary and imperceptible. No mitigation measures will be required.

12.7.2.2 Operational Stage

The effect on daylight to neighbouring buildings is not projected to change over the operational phase of the related and cumulative developments. During the operational stage, the effect of the proposed road bridge on the daylight of adjacent buildings will be neutral. No mitigation measures will be required.

12.8 Monitoring

This is not relevant to this chapter of the EIAR. No monitoring measures are required.

12.9 Reinstatement

This is not relevant to this chapter of the EIAR.

12.10 Difficulties Encountered

There were no difficulties encountered in reducing the residual effect of the proposed development.

13 CLIMATE (SUNLIGHT)

13.1 Introduction

Digital Dimensions have been commissioned to assess any potential effect on the Daylight (see Chapter 12) and Sunlight (see Chapter 13) of neighbouring properties. This section has been prepared by John Healy - Diploma Architectural Technology, M.Sc Environmental Design of Buildings, PG Dip Digital Media. John has experience of working as a daylight and sunlight consultant for in excess of 10 years.

A model was produced based on the drawings of Plus Architecture Ltd and Waterman Moylan Engineering Consultants.

13.2 Assessment Methodology

13.2.1 Standards and Guidelines

The following documents have been used in preparation of this chapter of the report.

- Building Research Establishment (BRE) BR209: 2022 "Site Layout Planning for Daylight and Sunlight" (Third Edition), also referred to as the BRE guidelines.
- Guidelines on the information to be contained in Environmental Impact Assessment Reports. Environmental Protection Agency 2022
- Environmental Impact Assessment of Projects European Commission 2017

13.2.2 Defining a baseline

Preliminary assessment of the site and its environs is undertaken through mapping software, like Google maps and Bing, topographical survey, architectural models and drawings, photographic studies and the Local Authority planning portal. The project is examined in plan form to establish which sites and buildings would have the possibility to experience an impact on their sunlight as a result of the proposed development.

Establishing if a building or land may be impacted through proximity.
A proposed development could potentially have a negative effect on the level of sunlight that a neighbouring property receives, if the obstructing building is large in relation to its distance from the existing property.

13.2.3 Shadow Study

Shadow diagrams are a visual aid to understand where possible shading may occur. The use of shadow diagrams as an assessment method should be taken over the course of the day and not a specific time due to the transient nature of the sun and the shade caused by obstructions. The BRE guidelines does not specify criteria for quantifying the effect of additional shadowing. It states that is illustrative to prepare a shadow plan at different times of the day or year.

BR209:2022 states that: "*Where there are existing buildings as well as the proposed one, 'before' and 'after' shadow plots showing the difference that the proposed building makes may be helpful. In interpreting the impact of such differences, it must be borne in mind that nearly all structures will create areas of new shadow, and some degree of transient overshadowing of a space is to be expected.*

If a space is used all year round, the equinox (21 March) is the best date for which to prepare shadow plots as it gives an average level of shadowing. Lengths of shadows at the autumn equinox (21 September) will be the same as those for 21 March, so a separate set of plots for September is not required.

Shadow plots should state clearly whether the time of the plot is in Greenwich Mean Time (GMT) or BST. If a local clock time is used outside the UK, this should also be stated.

As an optional addition, plots for summertime (for example 21 June) may be helpful as they will show the reduced shadowing then, although it should be borne in mind that 21 June represents the best case of minimum shadow, and that shadows for the rest of the year will be longer. Conversely if winter shadows (e.g. 21 December) are plotted, even low buildings will cast long shadows. In a built-up area, it is common for large areas of the ground to be in shadow in December."

13.2.4 BRE Guidelines (2022) Appendix H: Environmental Impact Assessment

The BRE guidelines sets out criteria for classification for assessment of impact where a new development affects a number of existing buildings or open spaces in relation to an Environmental Impact Assessment. The guide does not give a specific range or percentages but sets out parameters set out below.

"Where the loss of skylight or sunlight fully meets the guidelines in this book, the impact is assessed as negligible or minor adverse. Where the loss of light is well within the guidelines, or only a small number of windows or limited area of open space lose light (within the guidelines), a classification of negligible impact is more appropriate. Where the loss of light is only just within the guidelines, and a larger number of windows or open space area are affected, a minor adverse impact would be more appropriate, especially if there is a particularly strong requirement for daylight and sunlight in the affected building or open space.

Where the loss of skylight or sunlight does not meet the guidelines in this book, the impact is assessed as minor, moderate or major adverse. Factors tending towards a minor adverse impact include:

- *only a small number of windows or limited area of open space are affected*
- *the loss of light is only marginally outside the guidelines*
- *an affected room has other sources of skylight or sunlight*
- *the affected building or open space only has a low level requirement for skylight or sunlight*
- *there are particular reasons why an alternative, less stringent, guideline should be applied.*

Factors tending towards a major adverse impact include:

- *a large number of windows or large area of open space are affected*
- *the loss of light is substantially outside the guidelines*
- *all the windows in a particular property are affected*
- *the affected indoor or outdoor spaces have a particularly strong requirement for skylight or sunlight, eg a living room in a dwelling or a children's playground.*

Beneficial impacts occur when there is a significant increase in the amount of skylight and sunlight reaching an existing building where it is required, or in the amount of sunlight reaching an open space. Beneficial impacts should be worked out using the same principles as adverse impacts. Thus a tiny increase in light would be classified as a negligible impact, not a minor beneficial impact."

13.3 Receiving Environment

13.3.1 Proposed Development

The site of the proposed development is located approximately 1Km to the east of Dunboyne, in the townlands of Castle Farm, Ruskin and Clonee. It is bounded by an Iarnród Éireann rail line to the west, by agricultural lands to the south and east. North of the site, to the east of the distributor road is 'Castle Farm Meadows' a recently constructed residential development and to the west of the distributor road is a residence and business 'Edenmore'.

The site is a greenfield and its gradient is predominantly flat. There are 2no. ESB corridors located on site with 1no. stretching west to east across the mid-section of the site, including a pylon on the site which is to be maintained as part of the proposed scheme. The other,

less significant overhead lines/corridor is located to the southern portion of the subject site. These are to be relocated underground and diverted as part of the proposed development.

13.4 Characteristics of the Proposed Development

This section assessed the potential impact of the proposed development on the already existing environment, and the suitability of the proposed development to create and maintain a suitable and comfortable environment for different pedestrian activities.

13.4.1 Proposed Development

Permission is sought for a period of 10 Years for a proposed development on a site of approximately 16.9Ha consisting of 716no. residential units in a mix of houses, duplex and apartment buildings ranging in height from 2 to 7 storeys overall; comprising of 155no. 2 storey houses; 517no. apartments accommodated in 8no. buildings ranging in height from 4 to 7 storeys; 44no. duplex units accommodated in 2no. 3 storey terraces; 1no. childcare facility (c.602sqm) located at ground floor level of Block B1; public open space; communal and private open space; public lighting; car parking, including basement car parking under some of the apartments; secure bicycle parking; and all associated and ancillary site development and infrastructural works, hard and soft landscaping and boundary treatment works, provision of c. 470m of new distributor road; provide a 200mm diameter watermain in existing section of southern distributor road adjacent to recently constructed Castle Farm development; upgrade of junction of southern distributor road and L2228 (Station Road) to provide a signalised junction with pedestrian crossings, including ancillary adjustments to road markings on both roads; provision of foul drainage pumping station; provision of a compensatory storage area adjacent to Castle Stream; ESB Sub-Stations; and improvement works to 2 no. roundabouts on the R147 (Old Navan Road).

13.5 Potential Impact of the Proposed Development

13.5.1 Proposed Development

As stated in 13.4.1 above the proposed development is comprised of three reasonably distinct elements. The majority of the works proposed is within the area of the residential development. When completed these buildings and boundaries will create shadow. When complete the proposed construction of the distributor road and the upgrade of the 2 no. roundabouts on the R147 will have a neutral effect on sunlight.

A shadow study was conducted of the residential development, this is attached in Appendix 13 of this document. This appendix shows the baseline scenario, the proposed residential development and a cumulative development study.

The BRE guidelines recommends that March 21st is the best date to prepare shadow plots as it gives an average level of shadowing. June 21st and December 21st shadow plots are provided for information, but it should be noted that the summer solstice is the best-case scenario with shadows at their shortest. Conversely in winter even low buildings will cast long shadows.

On March 21st there is no additional shading on any of the adjacent building or residential amenity area from the proposed development. At an average level of shadow over the course of the year, the effects from shadows of the proposed development are brief and not significant.

The BRE guidelines gives guidance on quantifying the potential effect on internal sunlight and sunlight to amenity areas. The shadow study shows that there is no additional shadow on any building or amenity area. The effect from the proposed development on the internal

sunlight or the sunlight to amenity areas in adjacent properties is neutral.

13.5.1.1 Construction Stage

Residential development

The construction of the residential development is planned in phases. The site will evolve from the baseline scenario to the completed massing, which represents the greatest level of obstruction. The likely effects on sunlight and overshadowing of adjacent properties would steadily increase over the construction phase to meet that of the completed development.

The presence of a crane or bore equipment would be considered imperceptible due to their slender size and temporary nature. The effects during construction will be less than the completed development.

Road works and roundabout upgrade

The boundary of the distributor road is more than 65m from the houses which face it on The Meadows, Castle Farm. During construction the erection of site hoarding would have a neutral effect on the sunlight to the houses or amenity of these houses.

The southern roundabout on the R147 is bounded by greenfield sites on each road excepting one. To the east is an apartment scheme, Ard Cluain, Clonee, Co. Meath. These apartments have a ground floor parking, with amenity and residential accommodation on the first floor and above. The upgrade works would have a neutral effect on the sunlight to the apartments or amenity space of the complex.

The northern roundabout is bounded by 4 no. detached dwellings; the closest house is circa 21m from the red line boundary. The upgrade works would have a neutral effect on the sunlight of the dwellings or their private amenity space.

13.5.1.2 Operational Stage

The effect on sunlight and overshadowing from the complete structures represents the greatest mass on site, and this is not projected to change over the operational stage of the development.

13.5.1.3 Do-Noting Impact

If the proposed development was not constructed there would be no sunlight or overshadowing effects.

13.6 Mitigation Measures (Ameliorative, Remedial or Reductive Measures)

13.6.1 Proposed Development

No significant adverse effects will be experienced from the completion of the proposed development. No mitigation measures will be required.

13.6.1.1 Construction Stage

No significant adverse effects will be experienced during the construction of the proposed development. No mitigation measures will be required.

13.6.1.2 Operational Stage

The effect on sunlight and overshadowing to neighbouring sites and buildings is not

projected to change over the operational phase of the development. No mitigation measures will be required.

13.7 Residual Effect of the Proposed Development

13.7.1 Proposed Development

During the design process the position and mass of the buildings, the finished floor level, and the height of parapets were technically assessed to reduce any potential effect on the sunlight and overshadowing of adjacent properties. This informed the final design. Any residual impact on the sunlight and overshadowing of the adjacent properties is brief and not significant.

13.7.1.1 Construction Stage

During the construction phase all scaffolding, hoarding and cranes will only be in use for as long as necessary to facilitate the construction of the proposed development. The effect of these is considered temporary and imperceptible.

13.7.1.2 Operational Stage

The effect on sunlight and overshadowing to neighbouring sites and buildings is not projected to change over the operational phase of the development.

13.7.1.3 Worst Case Impact

There are no 'Worst Case' effects projected from completion of this proposed development.

13.7.2 Cumulative

Exempted Development

Works that are underground have a neutral effect on the sunlight of adjacent properties. No mitigation measures will be required.

Construction Stage

During the construction phase all hoarding and machinery will only be in use for as long as necessary to facilitate the underground works. The effect of these is considered temporary and imperceptible.

Operational Stage

The effect from the exempted development is not projected to change over the operational phase of the development. As the works are underground the residual effect on the sunlight of the adjacent properties is neutral.

Future Development

The shadow study on 21 March shows some additional shadow cast from the road embankment and bridge. The ground where this shadow falls is mainly on the railway line and on open space within the subject site. This effect of this additional shading will brief and not significant. No mitigation measures will be required.

Construction Stage

During the construction of the future development the effect of construction work would be temporary and imperceptible.

Operational Stage

The residual effect on the sunlight of the adjacent properties is neutral.

Cumulative Development

Residential Development on Station Road, Dunboyne Co. Meath - This proposed development at Station Road, Dunboyne is at a distance to the north of the subject site. It is in excess of 350m for the closest structure on the subject site. The shadow study shows that shadows from the subject site would not have the possibility to cross or interact with the Station Road development.

Dart + West - On the length of railway bordering this subject site, the relevant element of the Dart+ West project is the columns which provide electricity supply to the trains. These are modelled in the shadow study. Due to their slender nature the effect of this additional shading will be momentary and imperceptible.

Any residual effect on the sunlight and overshadowing of the adjacent properties from the related and cumulative developments is brief and not significant. No mitigation measures will be required.

Construction Stage

The effect of any hoarding or construction equipment, on the related and cumulative development sites, is considered temporary and imperceptible.

Operational Stage

The effect on sunlight and overshadowing to neighbouring sites and buildings is not projected to change over the operational phase of the related and cumulative developments.

13.8 Monitoring

This is not relevant to this chapter of the EIAR. No monitoring measures are required.

13.9 Reinstatement

This is not relevant to this chapter of the EIAR.

13.10 Difficulties Encountered

There were no difficulties encountered in reducing the residual effect of the proposed development.

14 AIR (NOISE AND VIBRATION)

14.1 Introduction

This chapter presents an assessment of the effects of the proposed development located in the in the Townlands of Castle Farm, Ruskin, Loughsallagh and Clonee, Dunboyne, County Meath, in terms of noise and vibration in the local environment. The assessment for noise and vibration is based on the most up to date applicable guidance and assessment documents available both nationally and internationally.

The noise and vibration assessment has been prepared by Jennifer Harmon (Associate) who holds a BSc (Hons) in Environmental Science, a Diploma in Acoustics and Noise Control, and is a member of the Institute of Acoustics (MIOA). She has worked in the field of environmental noise impact assessment since 2001 and has extensive knowledge in the field of occupational noise risk assessments, environmental noise and vibration impact assessment and inward impact assessments for a wide range of project types including transport, industrial, commercial and residential.

Noise and vibration will be considered in terms of two aspects. The first is the outward effect of the proposed development on its surrounding environment, and the second is the inward effect of existing noise sources in the surrounding environment on the development itself. A full project description is included in Chapter 3: Description of Proposed Development of this Environmental Impact Assessment Report (EIAR).

14.2 Assessment Methodology

The study has been undertaken using the following methodology:

- 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;
- A baseline noise survey within and surrounding the development site has been undertaken to establish the prevailing noise environment across the site and at the nearest noise sensitive locations (NSLs). A desk-top assessment of the published noise mapping from rail and road noise has been carried out to supplement the noise surveys;
- Predictive calculations have been performed to estimate the likely noise emissions during the construction phase of the proposed development at the nearest NSLs to the site;
- Predictive calculations have been performed to assess the potential effects associated with the operation of the proposed development at NSLs surrounding the site;
- An assessment has been completed of potential cumulative effects that may arise as a result of the proposed development and other existing or proposed plans and projects;
- 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 effect of noise from the surrounding environment into the proposed residential buildings has also been assessed to determine the requirements, for additional noise mitigation to ensure a suitable internal noise environment for residential amenity.

14.2.1 Assessment Criteria and Guidelines – Construction Phase

There are no statutory standards in Ireland relating to noise and vibration limit values for construction works or for environmental noise relating to the operational phase. In the absence of specific statutory Irish guidelines, the assessment has made reference to non-statutory national guidelines, where available, in addition to international standards and guidelines relating to noise and / or vibration impact for environmental sources.

Local Authorities typically control construction activities by imposing limits on the hours of construction and consider noise limits at their discretion. Construction noise sources include construction plant and machinery and construction related traffic on surrounding roads. Reference is made to the following guidelines and standards to inform the most appropriate construction noise and vibration significance thresholds and assessment methodologies:

- British Standard Institute (BSI) British Standard (BS) 5228-1:2009 +A1 2014 Code of Practice for noise and vibration control of construction and open sites - Part 1: Noise (hereafter referred to as BS 5228–1) (BSI 2014a);
- BS 5228-2:2009+A1:2014 Code of Practice for noise and vibration control of construction and open sites - Part 2: Vibration (hereafter referred to as BS 5228 – 2) (BSI 2014b);
- BS 7385: 1993 Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration (hereafter referred to as BS 7385–2). (BSI 1993);
- BS 6472-1: 2008 Guide to evaluation of human exposure to vibration in buildings, Part 1 Vibration sources other than blasting (hereafter referred to as BS 6472–1) (BSI 2008);
- UK Highways Agency (UKHA) Design Manual for Roads and Bridges (DMRB) LA 111 Sustainability and Environmental Appraisal LA 111 Noise and Vibration Revision 2 (hereafter referred to as DMRB Noise and Vibration) (UKHA 2020); and
- International Organization for Standardization (ISO) 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors - Part 2: General method of calculation (hereafter referred to as ISO 9613 – 2) (ISO 1996).

14.2.1.1 Construction Noise

The British Standard BS 5228–1 (BSI 2014a) 'ABC' method is referenced here for the purposes of setting appropriate construction noise limits for the development. This is the most widely accepted standard for this purpose in Ireland.

The ABC approach designates a noise sensitive residential 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 potential significant noise effect is associated with the construction activities, depending on context. This is set as a construction noise threshold (CNT). Table 11.1 sets out the CNTs at the facades of residential receptors as recommended by BS 5228-1 (BSI 2014a); for the different baseline categories.

Assessment Category and Threshold Value, per Period	**Construction Noise Threshold (CNT) Value (dB)**		
	Category A Note A)	**Category B** Note B)	**Category C** Note C)
Daytime (07:00 – 19:00) Saturdays (07:00 – 13:00)	65	70	75
Evening and Weekends Note D)	55	60	65
Night-time (23:00 – 07:00)	45	50	55

Table 11.1: Construction noise thresholds for dwellings

A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.

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.

C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.

D) 19:00–23:00 weekdays, 13:00–23:00 Saturdays and 07:00–23:00 Sundays

It should be noted that this assessment method is only valid for residential properties and if applied to commercial premises without consideration of other factors may result in an excessively onerous thresholds being set. For commercial premises, the Category C value is considered an appropriate threshold value.

There are no scheduled night-time construction works proposed as part of the proposed development.

Significance of Construction Noise Levels (CNL)

In order to assist with interpretation of significance relative to calculated construction noise level (CNL) compared to the CNTs, Table 11.2 includes guidance as to the likely magnitude of impact associated with construction noise levels, relative to the threshold value. This guidance is taken from DMRB: Noise and Vibration (UKHA 2020) and adapted to include the EPA EIAR Guidelines.

The approach is as follows:

- determine the threshold value for construction noise according to the method from BS5228-1 (BSI 2014a) described above;
- compare the predicted construction noise level with the existing noise levels and the CNT according to the criteria in Table 11.2; and
- A significant effect is deemed to occur where a moderate or major impact is likely to occur for a period of greater that 10 days/nights over 15 consecutive day/nights, or greater than 40 days over 6 consecutive months.

Guidelines for Noise Impact Assessment Significance (Adapted from DMRB)	**Classification of Impact**		
	CNL per Period	**EPA EIAR Guidelines**	**Determination**
Negligible	Below or equal to baseline noise levels	Not Significant	Depending on range of CNL, and baseline noise level and duration
Minor	Above baseline 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 dB	Significant to Very Significant	

Table 11.2: Interpretation of CNL significance at NSLs

14.2.1.2 Construction Vibration

Vibration standards come in two varieties: those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. For the purpose of the proposed development, the range of relevant criteria used for surface construction works for both building protection and human comfort are expressed in terms of Peak Particle Velocity (PPV) in mm/s.

Peak Particle Velocity (PPV) is a measure of the velocity of vibration displacement in terms of millimetres per second (mm/s). It is defined as follows within BS 7385-2 (BSI 1993) as 'the maximum instantaneous velocity of a particle at a point during a given time interval'.

Building Response

There is no published statutory Irish guidance relating to the maximum permissible vibration level. The following standards are the most widely accepted in this context and are referenced here in relation to cosmetic or structural damage to buildings:

- British Standard BS 5228-2 (BSI 2014b); and
- British Standard BS 7385-2 (BSI 1993)

BS7385-2 (BSI 1993) and BS5228-2 (BSI 2014b) advise that, for soundly constructed residential properties and similar light-framed 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 for transient vibration. Where the dynamic loading caused by continuous vibration is such as to give rise to dynamic magnification due to resonance, especially at the lower frequencies where lower guide values apply, then the guide values in Table B.2 of BS5228-2 (BSI 2014b) might need to be reduced by up to 50%. On a cautious basis, therefore, continuous vibration limits are set as 50% of those for transient vibration across all frequency ranges. For buildings or structures that are structurally unsound, lower vibration magnitudes will apply, typically 50% of those for structurally sound buildings. Protected or historic buildings are not automatically assumed to be more vulnerable to vibration unless they have existing structural defects. The recommend transient vibration thresholds from BS5228-2 (BSI 2014b) for the avoidance of cosmetic damage to buildings are summarised in Table 11.3.

Type of Building	**Peak component particle velocity in frequency range of predominant pulse** Note 1	
	4 Hz to 15 Hz	**15 Hz and above**
Reinforced or framed structures. Industrial and heavy commercial buildings	50mm/s	
Unreinforced or light framed structures. Residential or light commercial buildings.	15 mm/s at 4 Hz Note 2 increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Table 11.3: Transient vibration threshold values for buildings

Note 1: Values referred to are at the base of the building.

Note 2: At frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded.

BS 5228-2 (BSI 2014b) and BS 7485-2 (BSI 1993) state that minor structural damage can occur at vibration magnitudes greater than twice those in and major structural damage can occur at vibration magnitudes greater than four times those in Table 11.3.

Human Response

Humans are sensitive to vibration stimuli, and perception of vibration at magnitudes significantly lower than those related to building response may cause concern to building occupants. BS5228-2 (BSI 2014b) notes that vibration typically becomes perceptible at around 0.15 to 0.3 mm/s and may become disturbing or annoying at higher magnitudes. Higher levels of vibration are typically tolerated for single events or events of short-term duration, particularly during construction projects and when the origin of vibration is known.

Table 11.4 presents the significance table relating to potential effects to building occupants during construction based on guidance from BS5228-2 (BSI 2014b), the DMRB Noise and Vibration (UKHA 2020) document and the associated EPA significant ratings.

PPV range	BS 5228-2 (Note A, B, C)	DMRB Impact Magnitude	EPA Significance Ratings
≥10 mm/s PPV	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments.	Very High	Very Significant
≥1 mm/s PPV	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents	High	Moderate to Significant
≥0.3 mm/s PPV	Vibration might be just perceptible in residential environments.	Medium	Slight to Moderate
≥0.14 mm/s PPV	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.	Low	Not significant to Slight
<0.14 mm/s PPV	Not perceptible	Very Low	Imperceptible to Not significant

Table 11.4: Guidance on effects of human response to PPV magnitudes

Notes from BS5228-2

A) The magnitudes of the values presented apply to a measurement position that is representative of the point of entry into the recipient.

B) A transfer function (which relates an external level to an internal level) needs to be applied if only external measurements are available.

C) Single or infrequent occurrences of these levels do not necessarily correspond to the stated effect in every case. The values are provided to give an initial indication of potential effects, and where these values are routinely measured or expected then an assessment in accordance with BS 6472 (BS1 2008), and/or other available guidance, might be appropriate to determine whether the time varying exposure is likely to give rise to any degree of adverse comment.

14.2.1.3 Construction Traffic

Vehicular movement to and from the construction site for the proposed development will make use of the existing road network. In order to assess the potential noise impact of additional traffic on the surrounding road network, the following two guidelines are referenced; DMRB Noise and Vibration (UKHA 2020) and the EPA EIAR Guidelines (EPA, 2022). For construction traffic, due to the short-term period over which this impact occurs, the magnitude of impacts is assessed against the 'short term' period in accordance with the DMRB Noise and Vibration (UKHA 2020) document. Table 11.5 sets out the classification of changes in noise level to impact on human perception based on the guidance contained in these documents.

Change in Sound Level, dB(A)	Subjective Reaction	DMRB Magnitude of Impact (Short-term)	EPA Significance of Effect
Less than 1 dB	Inaudible	Negligible	Imperceptible
1 – 2.9	Barely Perceptible	Minor	Not Significant – Slight
3 – 4.9	Perceptible	Moderate	Moderate
≥ 5	Up to a doubling of loudness	Major	Significant

Table 11.5: Magnitude of effect associated with short-term changes in traffic noise

14.2.2 Assessment Criteria and Guidelines – Operational Phase

The main potential source of outward noise from the proposed development will be limited to traffic flows to and from the development site onto the public roads. There will also be an element of mechanical and electrical plant required to service apartment buildings and a creche. The relevant guidance documents used to assess potential operational noise and vibration impacts on the surrounding environment are summarised below.

- BS 8233:2014 Guidance on sound insulation and noise reduction for buildings (hereafter referred to as BS 8233) (BSI 2014c);
- BS 4142: 2014 +A1 2019 Methods for Rating and Assessing Industrial and Commercial Sound (hereafter referred to as BS 4142) (BSI 2019);
- ISO 1996-1:2016 Acoustics - Description, measurement and assessment of environmental noise. Part 1: Basic quantities and assessment procedures (hereafter referred to as ISO 1996 – 1) (ISO 2016);
- The UK Department of Transport Calculation of Road Traffic Noise (hereafter referred to as the CRTN) (UK Department of Transport 1988).
- UK Highways Agency (UKHA) Design Manual for Roads and Bridges (DMRB) LA 111 Sustainability and Environmental Appraisal LA 111 Noise and Vibration Revision 2 (hereafter referred to as DMRB Noise and Vibration) (UKHA 2020);
- International Organization for Standardization (ISO) 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors - Part 2: General method of calculation (hereafter referred to as ISO 9613 – 2) (ISO 1996);
- ANC, IOA & CIEH (2017). ProPG: Planning & Noise – Professional Practice Guidance on Planning & Noise – New Residential Development (hereafter referred to as ProPG: Planning and Noise)

14.2.2.1 Traffic Noise Impacts

Vehicular movement to and from the proposed development will make use of the existing road network and the proposed new distributor road connecting the site to the L2228. In order to assess the potential impact of additional traffic on the human perception of noise, the following two guidelines are referenced DMRB Noise and Vibration (UKHA 2020) and the EPA EIAR Guidelines (EPA, 2022) which categorise the magnitude of effect relating to changes in road traffic. For the operational phase, traffic noise impacts are assessed against the 'long term' magnitude ratings from the DMRB. These are discussed in Table 11.6.

Change in Sound Level, dB(A)	Subjective Reaction	DMRB Magnitude of Impact (Long-term)	EPA Significance of Effect
0	Inaudible	No Impact	Imperceptible
0.1 – 2.9	Barely Perceptible	Negligible	Not Significant
3 – 4.9	Perceptible	Minor	Slight
5 – 9.9	Up to a doubling of loudness	Moderate	Moderate – Significant
≥ 10	Doubling of loudness and above	Major	Significant to Very significant

Table 11.6: Magnitude of effect associated with long-term changes in traffic noise

14.2.2.2 Mechanical and Electrical Plant

The proposed development is residential in nature comprising a mixture of houses, duplex and apartments. There will be minimal mechanical and / or electrical plant items required to service the

development that will generate any audible noise levels outside of the site boundary or at the developments buildings themselves. Plant contained within enclosed plant rooms has the least potential for impact, once consideration is given to appropriate design of the space.

The closest noise sensitive locations to any operational plant items are the residential dwellings within the proposed development. To ensure there is no adverse impact on the future inhabitants of the proposed development itself, it is appropriate to refer to internal noise targets derived from BS 8233 (BSI 2014c). The recommended indoor ambient noise levels are set out in and are based on annual average data.

Activity	Location	Daytime (07:00 – 23:00hrs), dB $L_{Aeq,12hr}$	Night-time (23:00 – 07:00hrs), dB $L_{Aeq,8hr}$
Resting	Living room	35 dB	-
Dining	Dining room/ area	40 dB	-
Sleeping (daytime resting)	Bedroom	35 dB	30 dB 45 dB L_{Amax}

Table 11.7: Internal noise design range for residential buildings

14.2.3 Criteria for Assessing Inward Noise Impacts

14.2.3.1 County Meath Noise Action Plan

The County Meath Noise Action Plan (2019 – 2023) does not prescribe an assessment approach for new residential developments in proximity to existing noise sources. Section 7.7 of the Plan relating to the proposed approach to noise mitigation, however, states the following:

The Council will consider using the planning process, where necessary:

- *To continue to integrate the recommendations of Noise Action Plans into future Development Plans*
- *To integrate environmental noise planning guidelines into planning processes to ensure that new developments give cognisance to environmental noise exposure and noise mitigation*
- *To continue to incorporate any suitable national guidance on the treatment of environmental noise into local policy*
- *To ensure that future developments are designed and constructed in such a way as to minimise noise disturbances due to environmental noise.*

These measures will be supported by consideration of environmental noise exposure when planned developments are likely to:

Introduce People to Noise

Where the locations of new housing, schools, hospitals or other noise sensitive locations are in the vicinity of major sources of environmental noise.

Given the proximity of the operational Dublin to Dunboyne (M3 Parkway) Railway line along the western site boundary, consideration should be given to the potential impact of this source on new residential units within the development site.

14.2.3.2 Professional Practice Guidance on Planning and Noise (ProPG 2017)

The ProPG: Planning and Noise document is generally considered best practice guidance adopted in Ireland the absence of equivalent Irish guidance for inward noise impact assessments, i.e. for assessing the impact of an existing source of new planned residential developments.

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.

Stage 2: Involves a detailed appraisal of the Proposed Development dependent on the risk category of the site and considers the site design and layout, internal noise levels and external noise in amenity areas.

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 11.1 presents the basis of the initial noise risk assessment; it provides appropriate risk categories for a range of continuous noise levels either measured and / or predicted on site.

A site should not be considered a negligible risk if more than 10 no. 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.

Element 2 of the ProPG: Planning and Noise document sets out recommended internal noise targets derived from BS 8233: 2014 (BSI 2014c);. The recommended indoor ambient noise levels are set out in Table 11.7 and are based on annual average data. In addition to these absolute internal noise levels, ProPG: Planning and Noise 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.

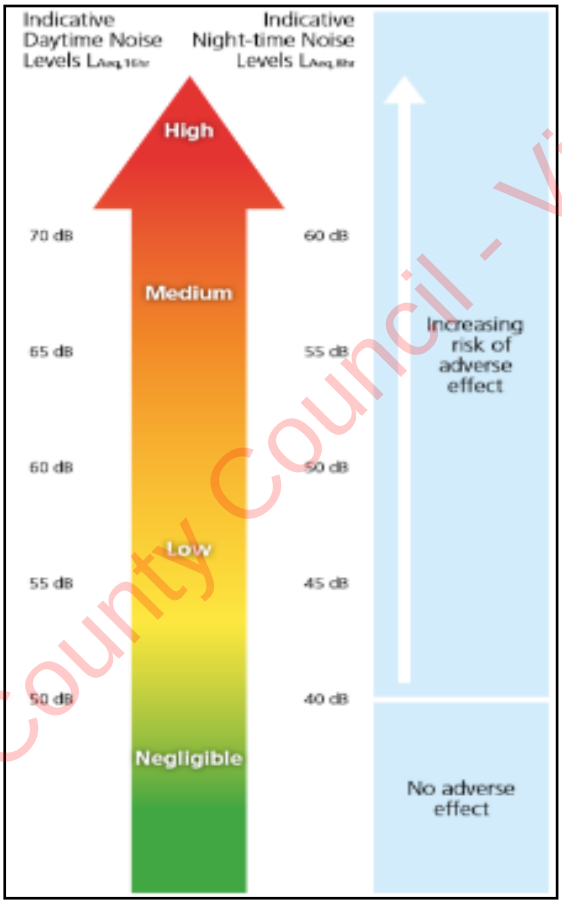


Figure 11.1: ProPG Stage 1 – Initial Noise Risk Assessment

14.3 Receiving Environment

14.3.1 Proposed Development

The proposed development relates to a site approximately 1km east of the centre of Dunboyne which is currently greenfield in nature. The site is bounded generally to the east and south by agriculturally zoned lands, to the west by the Iarnród Éireann rail line, and to the north by greenfield lands and residential development permitted under Meath County Council (MCC) Reg. Ref. RA180561 (the Castle Farm development). The development permitted under Reg. Ref. RA180561 is accessed from Station Road by a length of distributor road which shall provide future access to the proposed scheme.

14.3.1.1 Baseline Noise Survey

A baseline noise survey was undertaken within and adjacent to the site to characterise the prevailing noise environment. The surveys were conducted in general accordance with ISO 1996-2:2017 - Description, measurement and assessment of environmental noise - Part 2: Determination of sound pressure levels (ISO 2017).

Survey Locations

One unattended noise survey position and six attended survey positions were surveyed in and surrounding the proposed development site to characterise the baseline noise environment. The survey locations are described below and illustrated in Figure 11.2.

UT1	Unattended survey position located along the western site boundary at location of closest proposed buildings from the Iarnród Éireann rail line
AT1	Attended survey position located to the west of the site set back at location of closest residential units from Dunboyne to the Iarnród Éireann rail line
AT2	Attended survey position located at cul de sac in Beechdale residential estate. Position chosen to represent the closest NSLs to the west of the site boundary
AT3	Attended survey position located north of the proposed development and south of the L2228 Rd and Dunboyne Herbal Clinic. Position chosen to represent the closest NSLs to the northeast and northwest of the site boundary
AT4	Attended survey position located to the north of roundabout along the R147 (Old Navan Road) in greenfield area set back at distances representative of closest residential dwellings to roundabout
AT5	Attended survey position located to the south-east of roundabout along the R147 (Old Navan Road). Measurement position was located on green area outside apartment building facing the R147 Road.

Figure 11.2: Baseline Noise Survey Positions and Red Line Boundary

Survey Periods

The attended noise surveys at AT1 to AT4 were carried out on 12th of August 2022. Attended noise surveys at AT5 and AT6 were was carried out on 24 May 2023. Noise levels were measured over 15-minute periods on a cyclic basis at each measurement location.

Unattended noise measurements at UT1 were conducted between 11:15 hrs on Thursday the 7th of July and 10:45 hrs on the 12th of July 2022. Noise levels were logged over consecutive 15-minute periods.

The weather during the survey period was dry with varying cloud cover. Wind speeds were low to moderate.

Instrumentation and Parameters

The attended surveys were undertaken using Bruel & Kjear 2250 and Rion NL-42 Type 1 Sound Level Meters. The unattended noise survey was undertaken using a Rion NL-42 Type 1 Sound Level meter.

The instrument was calibrated using a Brüel & Kjær Type 4231 Sound Level Calibrator at the start and end of the field work. All equipment in laboratory calibrated every two years.

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

The "A" suffix for the noise parameters 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 2 x 10-5 Pa.

Survey Results

Location UT1

The survey results for Location UT1 are summarised in Table 11.8 for the 16 hour daytime period (07:00 to 23:00hrs) and the 8 hour night-time period (23:00 to 07:00hrs) for each date.

Date	Period	Measured Noise Levels, dB		
		Average L_{Aeq}	Average L_{A90}	L_{AFmax} Range
07 July 2022	Daytime	54	39	48 – 82
	Night-time	52	36	37 – 82
08 July 2022	Daytime	53	36	38 – 92
	Night-time	51	36	38 – 78
09 July 2022	Daytime	52	38	48 – 80
	Night-time	50	37	44 – 80
10 July 2022	Daytime	52	39	43 – 78
	Night-time	53	37	40 – 86
11 July 2022	Daytime	54	36	34 – 85
	Night-time	52	34	31 - 83

Table 11.8: UT1 noise survey results

At survey location UT1, ambient noise levels were in the range of 52 to 54 dB $L_{Aeq,16hr}$ with background noise levels in the range of 36 to 39 dB $L_{A90,16hr}$. The main contributors to the ambient noise environment was occasional passing trains, distant road traffic and environmental sources (bird song, leaf rustle etc.). During the night-time periods, ambient noise levels were in the range of 50 to 53 dB $L_{Aeq,8hr}$ and background noise levels were in the range of 34 to 37 dB $L_{A90,8hr}$. Highest night-time noise levels occur during the shoulder hours between 06.15 and 07:00hrs and 23:00 to 00:30 hrs when train services are operating.

The distribution of L_{AFmax} events during the night-time survey periods is presented in Figure 11.3

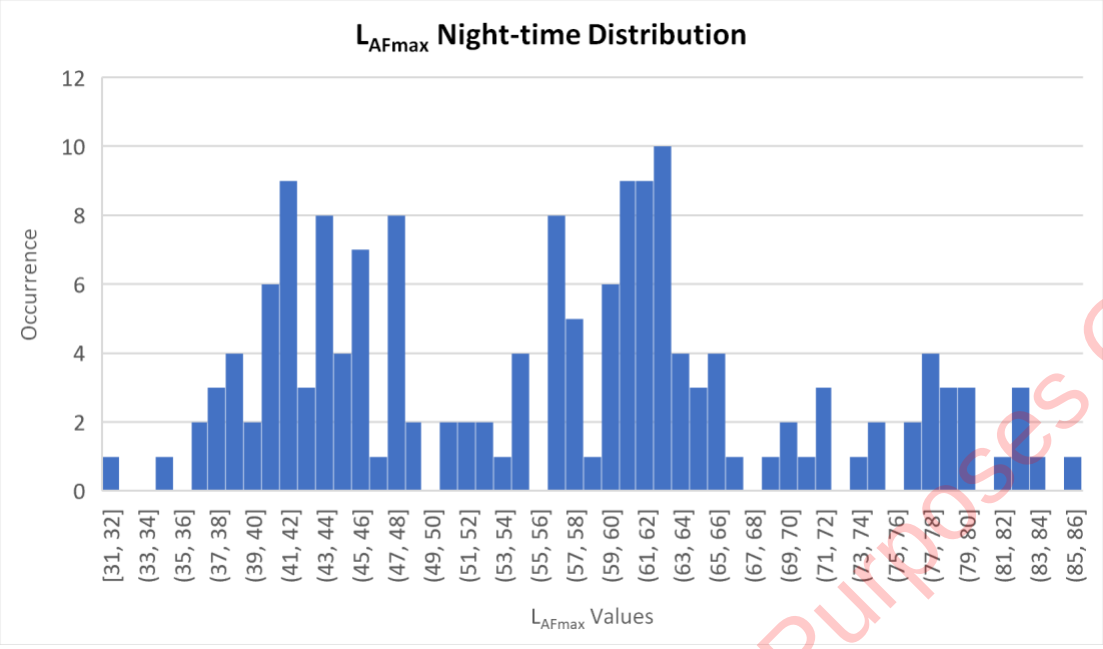


Figure 11.3: Night-time L_{AFmax} distribution at UTI

The $L_{AFmax,\ 15mins}$ distribution plot indicates most prominent L_{AFmax} values are between 60 and 63 dB L_{AFmax} over the 5 nights of survey data. Occurrences of L_{AFmax} values above 80dB occurred no more than 6 times over the survey periods over 5 nights.

Location AT1

The attended survey results for Location AT1 within the site are summarised in Table 11.9.

Date	Time	L_{Aeq}	L_{A90}	L_{AFmax}
12 August 2022	12:00 – 12:15	46	43	60
	12:21 – 12:36	47	44	61
	12:38 – 12:53	47	44	63
	13:16 – 13:31	48	42	72

Table 11.9: AT1 survey results

At Location AT1, ambient noise levels noise levels were measured in the range of 46 to 48dB $L_{Aeq,15\ mins}$ and background levels were in the range of 42 to 44 dB, $L_{A90,15mins}$. L_{AFmax} values were recorded in the range of 60 to 72 dB L_{AFmax}. Train pass by's along the adjacent rail line in addition to environmental noise sources and distant traffic were the main contributor to measured noise levels at this location.

Location AT2

The attended survey results for Location AT2 outside the site are summarised in Table 11.10.

Date	Time	L_{Aeq}	L_{A90}	L_{AFmax}
12 August 2022	15:07 – 15:22	50	48	60
	15:27 – 15:42	52	46	67
	15:47 – 16:02	47	45	60

Table 11.10: AT2 survey results

At Location AT2, ambient noise levels noise levels were measured in the range of 47 to 52dB $L_{Aeq,15\ mins}$ and background levels were in the range of 45 to 48 dB, $L_{A90,15mins}$. L_{AFmax} values were recorded in the

range of 60 to 67 dB $L_{AFmax.}$ The main contributor to measured noise levels were distant road traffic, train pass by's and local estate activities.

Location AT3

The attended survey results for Location AT3 are summarised in Table 11.11.

Date	Time	L_{Aeq}	L_{A90}	L_{AFmax}
12 August 2022	13:57 – 14:13	51	48	70
	14:22 – 14:33	52	48	67
	14:44 – 14:59	51	49	62

Table 11.11: AT3 survey results

At Location AT3, ambient noise levels noise levels were measured in the range of 51 to 52dB $L_{Aeq,15\ mins}$ and background levels were in the range of 48 to 49 dB, $L_{A90,15mins}$. L_{AFmax} values were recorded in the range of 62 to 70 dB $L_{AFmax.}$ The main contributor to measured noise levels were road traffic, train pass by's and local activities. Some distant construction activity was audible in the background.

Location AT4

The attended survey results for Location AT4 are summarised in Table 11.12

Date	Time	L_{Aeq}	L_{A90}	L_{AFmax}
24 May 2023	16:41 – 16:56	63	60	68
	17:26 – 17:41	62	60	75
	18:12 – 18:27	61	58	71

Table 11.12: AT4 survey results

At Location AT4, ambient noise levels noise levels were measured in the range of 61 to 63dB $L_{Aeq,15\ mins}$ and background levels were in the range of 58 to 60 dB, $L_{A90,15mins}$. L_{AFmax} values were recorded in the range of 68 to 75 dB $L_{AFmax.}$ The main contributor to measured noise levels were road traffic along the R147 Old Navan Road, the L2228 Station Road and the M3 Motorway.

Location AT5

The attended survey results for Location AT5 are summarised in Table 11.13.

Date	Time	L_{Aeq}	L_{A90}	L_{AFmax}
24 May 2023	17:03 – 17:18	63	60	77
	17:48 – 16:03	63	60	79
	18:34 – 18:49	63	60	76

Table 11.13: AT5 survey results

At Location AT5, ambient noise levels noise levels measured 63dB $L_{Aeq,15\ mins}$ and background levels measured 60 dB, $L_{A90,15mins}$. L_{AFmax} values were recorded in the range of 76 to 79 dB $L_{AFmax.}$ The main contributor to measured noise levels were road traffic along the R147 Old Navan Road and the M3 Motorway.

14.3.1.2 Desktop Review of Noise Mapping

A desktop review of publicly available data has been undertaken to further characterise the baseline noise environment associated with the operational rail line along the western site boundary. Reference has been made to the most recent Round 3 noise maps published by the Environmental

Protection Agency (EPA) (http://gis.epa.ie) for rail noise as part of the Environmental Noise Regulations (S.I. No. 549/2018 – European Communities (Environmental Noise) Regulations 2018).

The published noise maps are provided for the overall day-evening-night period in terms of L_{den} and the L_{night} parameters, defined below.

L_{den} is the 24-hour noise rating level determined by the averaging of the Lday with the Levening (plus a 5 dB penalty) and the Lnight (plus a 10 dB penalty). Lden is calculated using the following formula, as defined within the Noise Regulations:

$$Lden = 10log\left(\frac{1}{24}\right)\left(12 * \left(10^{\frac{Lday}{10}}\right) + 4 * \left(10^{\frac{Levening+5}{10}}\right) + 8 * \left(10^{\frac{Lnight+10}{10}}\right)\right)$$

Where:

L_{day} is the A-weighted long-term average sound level as defined in ISO 1996-2, determined over all the day periods of a year. The 12 hour daytime period is between 07:00hrs and 19:00hrs

$L_{evening}$ is the A-weighted long-term average sound level as defined in ISO 1996-2, determined over all the evening periods of a year. The four-hour evening period is between 19:00hrs and 23:00hrs

L_{night} is the A-weighted long-term average sound level as defined in ISO 1996-2, determined over all the night periods of a year. The eight-hour night-time period is between 23:00hrs and 07:00hrs.

Figure 11.4 presents the mapped rail noise levels in the vicinity of the development site in terms of the L_{den} parameter.

Figure 11.4: Mapped rail noise levels across development site, dB L_{den}

Figure 11.5 presents the mapped rail noise levels in the vicinity of the development site in terms of the L_{den} parameter.

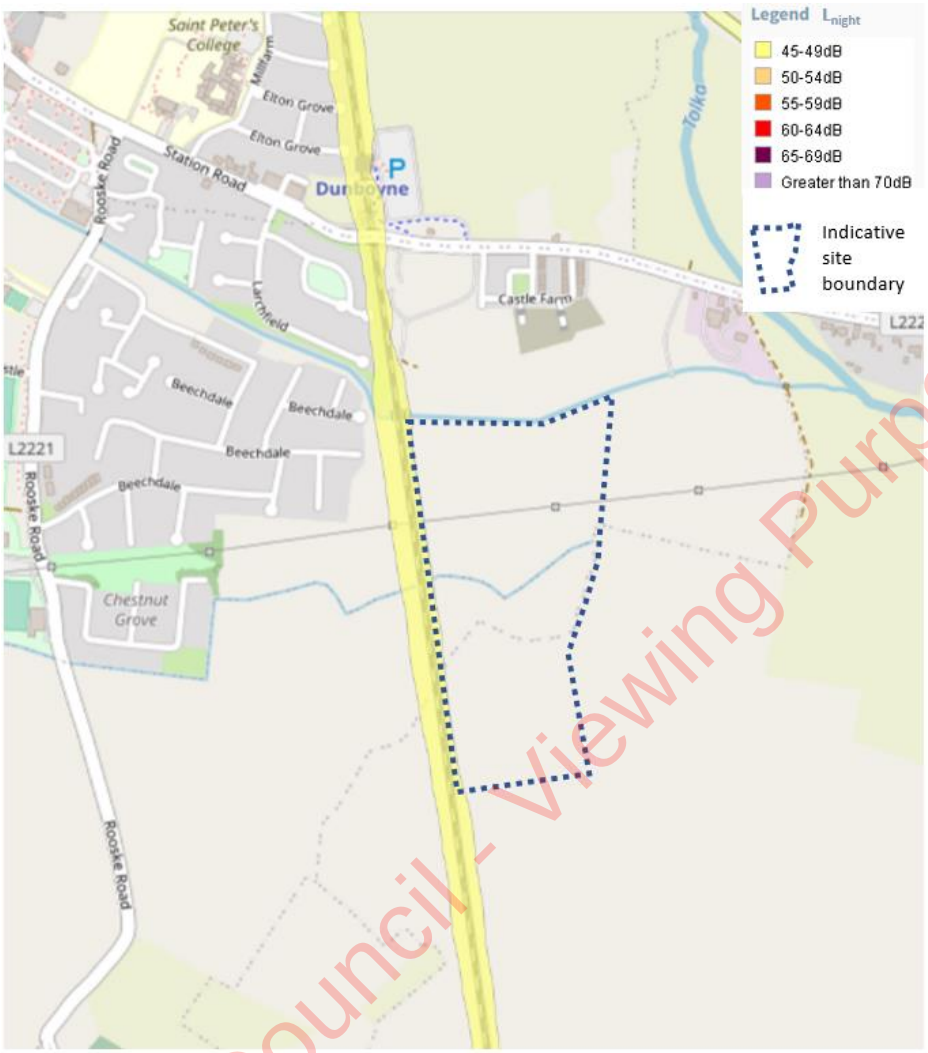


Figure 11.5: Mapped rail noise levels across development site, dB L_{night}

The mapped rail noise levels indicate a low contribution of operational rail noise across the development site. Along the immediate western boundary, at distances of 15m from the rail line, rail noise levels are mapped within the 55 to 59 dB L_{den} noise contour. Beyond this immediate boundary, rail noise levels are below 55 dB $L_{den.}$

Along the immediate western boundary, night-time rail noise is mapped within the 45 to 49 dB L_{night} noise contour. Moving east within the site, noise levels are all below 45 dB L_{night}.

Receiving Environment Summary

Within the development site, the receiving noise environment is low across the majority of the development lands due to the absence of any significant noise sources. Along the immediate western boundary the Iarnród Éireann rail line between Dublin and Dunboyne (M3 Parkway) contributes to the ambient noise levels during rail pass by's. The range of day and night-time noise levels from both measured and mapped noise sources indicate, however, the contribution of rail noise along the closest boundary is low to moderate. Background noise levels are low throughout. Consideration is given to this source in terms of noise at the proposed residential units in Section 11.5.3.

Outside the site at closest existing NSLs to the main development site (AT2 and AT3), the prevailing noise environment is from occasional rail pass bys, road traffic and environmental noise sources. At NSLs located along the R147 Old Navan Road (AT4 and AT5), road traffic is the dominant noise source.

14.4 Characteristics of the Proposed Development

14.4.1 Proposed Development (Including 2no. roundabouts)

Permission is sought for a period of 10 Years for a proposed development on a site of approximately 16.9Ha consisting of 716no. residential units in a mix of houses, duplex and apartment buildings ranging in height from 2 to 7 storeys overall; comprising of 155no. 2 storey houses; 517no. apartments accommodated in 8no. buildings ranging in height from 4 to 7 storeys; 44no. duplex units accommodated in 2no. 3 storey terraces; 1no. childcare facility (c.602sqm) located at ground floor level of Block B1; public open space; communal and private open space; public lighting; car parking, including basement car parking under some of the apartments; secure bicycle parking; and all associated and ancillary site development and infrastructural works, hard and soft landscaping and boundary treatment works, provision of c. 470m of new distributor road; provide a 200mm diameter watermain in existing section of southern distributor road adjacent to recently constructed Castle Farm development; upgrade of junction of southern distributor road and L2228 (Station Road) to provide a signalised junction with pedestrian crossings, including ancillary adjustments to road markings on both roads; provision of foul drainage pumping station; provision of a compensatory storage area adjacent to Castle Stream; ESB Sub-Stations; and improvement works to 2 no. roundabouts on the R147 (Old Navan Road).

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

- Construction Phase; and
- Operational Phase

Within each phase there is potential for cumulative impacts associated with other planned and permitted developments in the surrounding environment.

14.4.1.1 Construction Stage

During the construction phase, construction works will involve site clearance, excavation and foundation works, structural and building works associated with the house and apartment buildings, building enclosure and façade works, services across the site, road works and landscaping. For each stage there will be on-site plant and equipment operating in addition to construction traffic including movement of machinery and materials within and to and from the construction site. It is planned to construct the proposed development over 5 phases.

The proposed construction hours are 08:00 to 19:00 hrs, Monday to Friday and 08:00 to 14:00 hrs on Saturdays.

A variety of items of plant will be in use during these construction work all of which have the potential to generate high levels of noise. These will include excavators, loaders, dozers, cranes and static plant such as generators, compressors and pumps. Vibration associated with the proposed construction site activities will be low due to the absence of any intrusive ground works and the distance between the works and the nearest structures and buildings.

14.4.1.2 Operational Stage

Once operational, there are no major noise sources associated with the proposed development which is residential in nature. The range of operational activities are in line with those in the surrounding environment at nearby residential areas (e.g. local vehicle movements, amenity and play areas etc.). None of these activities are associated with any significant noise impacts to the surrounding noise environment. The main potential source of outward noise from the proposed development is

associated with traffic flows to and from the development site on the surrounding road network. There will also be an element of mechanical and electrical plant required to service apartment buildings and creche.

14.5 Potential Impact of the Proposed Development

14.5.1 Proposed Development

14.5.1.1 Construction Stage

Closest NSLs and Construction Noise Thresholds

The closest existing NSLs to the proposed residential development are residential dwellings located to the northwest of the proposed development at Beechdale residential estate at a distances of approximately 90m from the north western site boundary (NSL2) and NSLs to the northeast of the site (NSL1) at Castle Farm Meadows at distances of approximately 110m from the main northern site boundary and approximately 90m from the proposed distributor road.

The closest NSLs to the improvement works to two no. roundabouts on the R147 (Old Navan Road) are between 5 and 30m from the works boundary (NSL3 and NSL4).

Figure 11.4 illustrates the closest NSLs external to the development site and illustrates the approximate red line boundary of the proposed development.

Figure 11.6: Noise sensitive locations in the vicinity of the proposed development

It is proposed to deliver the development across 5no. phases over a 10 year period. The proposed phases of work are illustrated in Figure 11. 5. Refer to Chapter 3 (Description of Proposed Development) for further information on the project phasing proposals.

Figure 11.7: Construction phasing plan

The phasing plan generally follows a north to south direction. As the works in each phase are completed the residential units within the completed phases, once occupied, will become NSLs.

The proposed construction hours are 08:00 to 19:00 hrs, Monday to Friday and 08:00 to 14:00 hrs on Saturdays. The following construction noise threshold levels are proposed for the construction stage of this development during the construction working periods. These are summarised in Table 11.12.

Location	Rounded Baseline Noise Level, dB $L_{Aeq,T}$	BS 5228 Category	Weekday Daytime & Saturday AM CNT, dB $L_{Aeq,T}$
NSL 1	50	A	65
NSL 2	50	A	65
NSL3 / NSL 4	65	B	70
NSLs within proposed development	50 – 55	A	65

Table 11.14: Construction Noise Thresholds at NSLs

Construction Noise Assessment

Residential Buildings Construction

A description of the works proposed within each Phase of the main development site is summarised in Table 11.15.

Phase Number	Works Proposed
Phase 1	• Site set up and enabling works. • Foul sewer diversion c.330m • Construction of c. 470m of Distributor Road • 14no. houses and 70no. Block B1 Apartments • Childcare facility • 8,852sqm of Public Open Space • 1,375sqm of Communal Open Space
Phase 2A	• 10no. duplex buildings (20no. units) • 38no. houses • Open space and attenuation tank • 7,020sqm of Public Open Space

Phase 2B	• Basement completion • 118no. Block A1 and A2 apartments • 3880sqm of Public Open Space • 2,185sqm of Communal Open Space
Phase 3A	• 12no. duplex buildings (24no. units) • 32no. houses
Phase 3B	• 116no. Block A3 and Block A4 • 77no. Block B2 Apartments • 35no. Part V Apartments (Block B2) • 7,003sqm of Public Open Space • 5,339sqm of Communal Open Space
Phase 4	• 134no. Block C1 and C2 Apartments • 6,064sqm of Public Open Space • 1,712sqm of Communal Open Space
Phase 5	• 71no. houses • 8,580sqm of Public Open Space

Table 11.15: Proposed Construction Phasing Plan

During all 5 phases, construction works will involve site clearance, excavation and foundation works, structural and building works associated with the house and apartment buildings. A variety of items of plant will be in use for the purpose of these elements of work construction works.

Source Noise Levels

Due to the fact that the construction programme has been established in outline form, construction noise associated with activities on site during this phase are reviewed for the purposes of determining the likely significant effects. Indicative ranges of noise levels associated with construction may be calculated in accordance with the methodology set out in BS 5228-1. This standard sets out sound power and sound pressure levels for plant items normally encountered on construction sites, which in turn enables the prediction of noise levels. There is no excavation into rock required for the site development for any basement construction works, hence there is no rock breaking or piling into rock required.

For site clearance, building construction works, road works and landscaping works (excavators, loaders, dozers, concreting works, mobile cranes, generators, piling), noise source levels are quoted in the range of 70 to 80 dB L_{Aeq} at distances of 10 m within BS 5228-1. For the purposes of this assessment, a combined sound power value of 113 dB L_{WA} has been used for construction noise calculations. This would include, for example, 2 no. items of construction plant with a sound pressure level of 80 dB L_{Aeq} at 10 m and 3 no. items of plant with a sound pressure level of 75 dB L_{Aeq} at 10 m, resulting in a total noise level of 85 dB L_{Aeq} at 10m along the closest works boundary. This is a highly conservative value as it assumes all items of plant are operating simultaneously along the closest boundary.

Given the nature of the proposed works which will include standard house and apartment building techniques across the site, a cumulative construction noise level of 85 dB L_{Aeq} at 10m represents a conservative noise level used to assess construction activities associated with the earlier stages of construction when site clearance, excavation, foundation and piling works will be employed. This worst-case scenario is a robust assumption made for developments of this size, on the basis that it is unlikely that more than 5 no. items of such plant/equipment would be operating simultaneously in

such close proximity to each other at all times. In reality items of construction plant and machinery will be operating at varying distances from any one NSL.

Once the ground preparation and foundation works have been completed, a large portion of the work will involve manual labour and cranes with lower overall noise levels. For the purpose of this assessment a combined sound power value of 106 dB L_{WA} has been used for construction noise calculations during ongoing site works and compounds once site clearance and excavation works are completed. This would include, for example, one item of plant at 75 dB L_{Aeq} and three items of plant at 70 dB L_{Aeq} operating simultaneously within a work area resulting in a total noise level of 78 dB L_{Aeq} along the closest works boundary.

Construction noise levels have been calculated at the closest NSLs, assuming the construction noise levels discussed above. For the purpose of the assessment, partial site screening (5 dB) has been assumed from the use of a standard site hoarding of 2.4 m high for noise sensitive boundaries. The calculations also assume that the equipment will operate for 66% of the working time over a construction working day. Table 11.16 summarises the result of this assessment.

Construction Phase	**Sound Power Level, dB**	**Calculated** noise levels at varying distances, dB $L_{Aeq,T}$						
		15m	20m	30m	50m	90m	110m	150m
Site Clearance, excavation, foundations Road Works	113	73	70	67	62	56	54	51
General Construction, Compounds, Landscaping.	106	68	65	61	56	51	49	46

Table 11.16: Indicative construction noise levels at NSLs

Phase 1 and 2 Construction Works

The construction noise levels detailed in Table 11.16 indicate that construction activities can operate within the adopted CNT of 65 dB $L_{Aeq,T}$ at distances of ≥50m from construction works with higher noise emissions associated with site clearance, excavations, foundations and road works etc. The closest existing NSLs are at distances of 90 to 150m from Phase 1 and Phase 2 residential development construction works. Reference to Table 11.2 determines the construction noise impact associated with site clearance, excavations, foundations and road works is Negative, Slight and Short To Term at these NSLs.

During general construction works associated with house and apartment structural, façade and fit out works, construction activities can operate within the adopted CNT of 65 dB $L_{Aeq,T}$ at distances of ≥20m. Reference to Table 11.2 determines the construction noise impact associated with general site works is Negative, Not Significant and Short-Term at these NSLs.

Phase 3 and 4 Construction Works

During Phase 3 and 4 construction works, the closest existing NSLs are at distances in excess of 150m. During all construction works associated with the residential development site for these phases, the construction noise impact is determined to be Negative, Not Significant and Short to Medium Term at existing off-site NSLs.

During the construction of Phase 3 the residential units in Phases 1 and 2 have the potential to be occupied. Similarly, during the construction of Phase 4, residential units of Phases 1, 2 and 3 have the potential to be occupied.

Construction works during Phases 3 and 4 will for the majority be associated with the structural works for house and apartment superstructure construction. At distances of 15 to 30m from these works, indicative construction noise levels are in the range of 68 to 61 dB $L_{Aeq,T}$ respectively . The associated impact is Negative, Slight to Moderate and Short-Term at NSLs within 20 to 30m of Phases 1 and 2 works, and Negative, Moderate to Significant and Short Term at NSLs within 15m of Phases 1 and 2 works.

Phase 5 Construction Works

During Phase 5 construction works, the closest existing NSLs outside of the site are at distances in excess of 300m. During all construction works associated with the residential development site for this phase, the construction noise impact is determined to be Negative, Not Significant And Short To Medium Term at existing off-site NSLs.

During the construction of Phase 5, the residential units in Phases 1 to 4 have the potential to be occupied. The works associated with Phase 5 will involve general construction works associated with house building. The closest NSLs within Phase 4 are at distances of ≥ 50m from these works, with indicative construction noise levels ≤56 dB $L_{Aeq,T.}$ The associated impact is Negative, Not Significant and Short-Term at the closest NSLs within Phase 4 .

The construction phase will be controlled through the use of construction noise threshold values which the contractor will be required to work within as far as practicable. In this regard, the choice of plant, scheduling of works on site, provision of localised screening and other best practice control measures will be employed. Further discussion on construction noise and vibration control measures are included in Section 11.6.1.

Distributor Road Construction

Construction of the 470m length of distributor road linking to section of distributor road already built as part of the Castle Farm Meadows development forms part of the proposed development. The works will involve site clearance, ground works, levelling, road surfacing and landscape works. The range of construction noise levels in Table 11.16 for site clearance and road works are representative of the typical noise levels associated with road construction activities. The closest existing NSLs to the distributor road are at distances of approximately 90m (NSL1). Referring to Table 11.16, calculated construction noise levels at this distance are of the order of 56 dB $L_{Aeq,T}$ with the inclusion of a 2.4m site hoarding along the works boundary. In the absence of a site hoarding line, calculated construction noise levels are of the order of 61 dB $L_{Aeq,T.}$

Reference to Table 11.2 determines the construction noise impact associated with this part of the proposed development is negative, slight to moderate and short-term at NSLs north-east of the development (NSL1). At all other off-site locations, the effect is Negative, Not Significant and Short-Term.

Improvement works to Two no. Roundabouts on R174

The proposed development includes for improvement works to two no. Roundabouts on the R174 (Old Navan Road). The works will involve upgrade of the existing mini roundabout to a standard-sized roundabout with two circulating lanes and upgrades to the approaches to increased entry widths. Details of the proposed roundabout are described in Chapter 16: Material Assets (Transportation). The works will involve breaking of existing road surface, road levelling and road surfacing works. The highest noise levels will be associated during breaking works. Reference to BS 5228-1, Table C.5 noise levels associated with breaking of road surface is in the range of 82 to 88 dB $L_{Aeq,\ T}$ at 10m. Assuming an average value of 85 dB $L_{Aeq,\ T}$ at 10m (equivalent to a sound power level of 113 $L_{w(A)}$,) the values in Table 11.16 can be used to determine construction noise levels associated with this activity and for general road works which will follow any surface breaking works.

The closest NSLs are between 5 and 30m from the works, hence noise levels during the roundabout improvement works would exceed the CNT of 70 dB $L_{Aeq,T}$ at properties within 15m. Reference to Table 11.2 determines the construction noise effect associated with this part of the proposed development is Negative, Moderate to Significant and Short-term at the closest NSLs within 15m of the works.

Construction Traffic Noise

During the construction phase of the proposed development, construction traffic movements will include Heavy Goods Vehicles HGVs, and Light Goods Vehicles (LGVs) and car movements associated with the contractors and staff.

An estimate of the day-to-day traffic movements associated with construction activities is set out in Chapter 16: Material Assets (Transportation). The assessment has estimated up to c. 40-45 HGV arrivals/departures per day and, c. 40-60 number of car trips per day associated with the peak construction periods with most of the trips undertaken outside the AM and PM peak hours.

In order to increase traffic noise levels by a 1dB (A), traffic flows would need to be increased by at least 25%. The proposed construction access routes to and from the site are via the L2228 Station Road, R147 Old Navan Road and M3 Motorway. Along the L2228 (Station Road), hourly traffic flows during daytime off-peak hours are of the order of 700 to 900 vehicles per hour as per the 2023 baseline traffic flow data. Along the R147 Old Navan Road and M3 Motorway, baseline traffic flows are higher. The addition of 45 HGV movements and 60 car trips per day onto the above mentioned construction traffic routes is well below a 25% of baseline flows and hence traffic noise level increases are less than 1 dB(A). Reference to Table 11.6 determines the resultant increase in traffic noise along the roads discussed above is Negative, Imperceptible and Short Term.

Construction Vibration

Potential for vibration impacts during the construction phase of the residential development and section of the distributor road are likely to be limited to piling of apartment foundations, depending on the methodologies used. There is no excavation into rock required for the site development for any basement construction works, hence there is no rock breaking is required.

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 600 mm pile diameter for bored piling into soft ground over rock:

- 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 5 m, 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 off-site buildings (>100m from apartment buildings) will be orders of magnitude below those associated with building response or human response to vibration referred to in Table 11.3 and Table 11.4.

The predicted vibration effect during the construction phase of the residential development and distributor road is Neutral, Imperceptible and Short Term.

The main potential source of vibration during the for improvement works to two no. Roundabouts on the R174 (Old Navan Road) is associated with any road surface breaking activities. During intermittent breaking activity, there is potential for vibration to be generated. Empirical data for this activity is not provided in the BS 5228- 2 standard, however the likely levels of vibration from this activity is expected to be significantly below the vibration criteria for building damage on experience from other sites. AWN Consulting have previously conducted vibration measurements under controlled conditions, during trial construction works, on a sample site where concrete slab breaking was carried out. The trial construction works measured vibration from a 3 tonne hydraulic breaker on small CAT tracked excavator during various staged activities and at various distances. Peak vibration levels during staged activities using the 3 Tonne Breaker ranged from 0.48 to 0.25 PPV (mm/s) at distances of 10 to 50m respectively from the breaking activities. Whilst these measurements relate to a solid

concrete slab, the range of values recorded provides some context in relation typical ranges of vibration generated by construction breaking activity.

Vibration magnitudes associated with this activity are well below those associated with any form of cosmetic damage to buildings as per the guidance values in Table 11.3. In terms of human response, there is potential for a Negative, Moderate, and Brief effect for building occupants within 10m of this activity.

14.5.1.2 Operational Stage

Additional Vehicular Traffic Noise on Surrounding Roads

For the purposes of assessing the potential noise impact, it is appropriate to consider the relative increase in noise level associated with traffic movements on existing roads and junctions with and without the proposed development, given that traffic from the development will make use of the existing road network.

A traffic impact assessment relating to the proposed development is included in Chapter 16: Material Assets (Transportation). Figure 11.6 illustrates the road links assessed as part of this study.

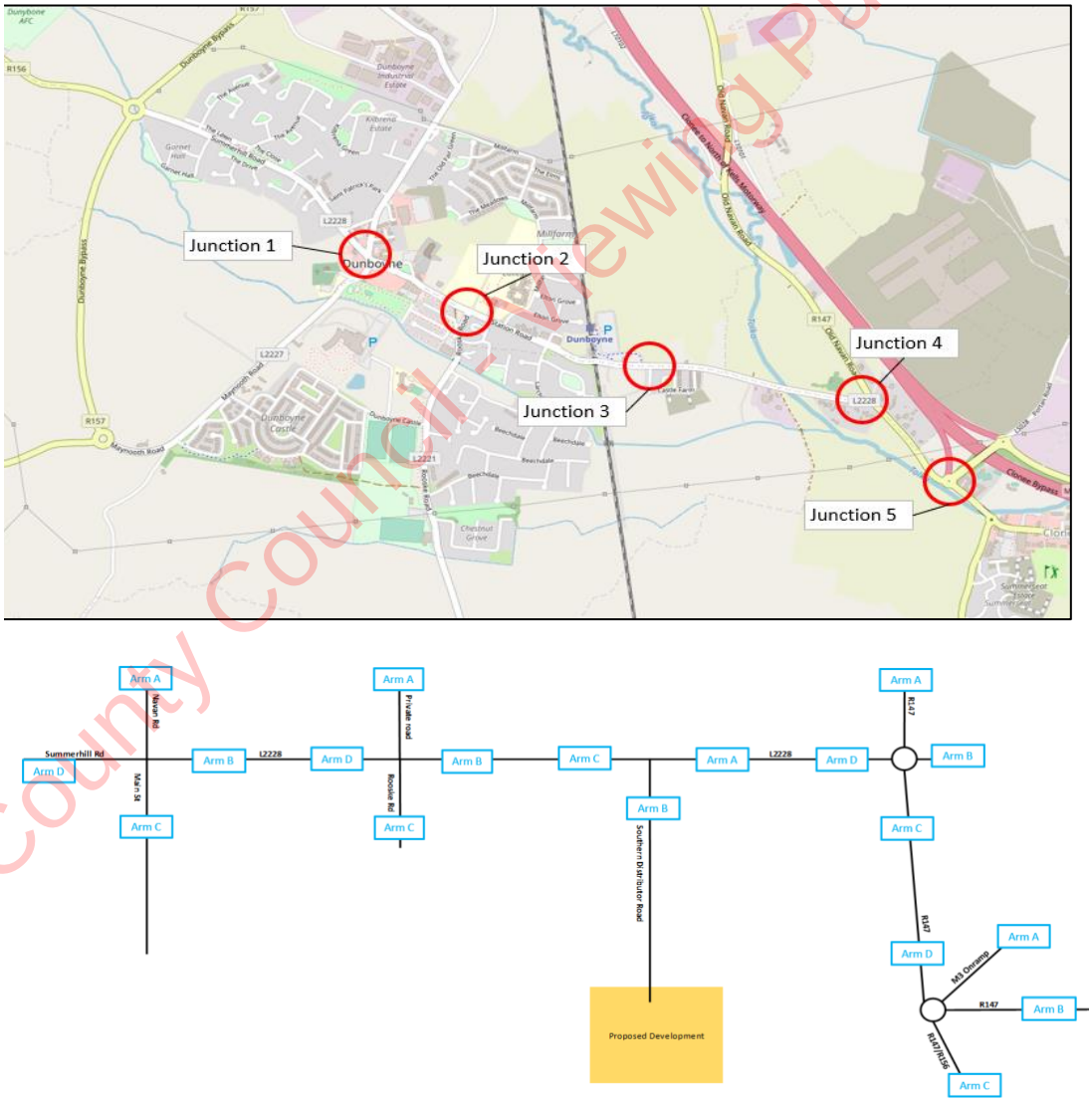


Figure 11.8: Traffic Roads and Junctions assessed

Traffic flows along the most impacted road network illustrated in Figure 11.6 in terms of Annual Average Daily Traffic (AADT) and percentage Heavy Goods Vehicles (HGVs) for the Do Nothing and Do Something scenarios have been reviewed to calculate the change in traffic noise for three assessment years; 2026, 2031 and 2041.

The Do Nothing scenario for each year has been factored up from baseline 2021 surveyed traffic flows and account for future traffic from permitted developments in the area.

The Do Something scenarios include the forecasted Do Nothing traffic flows with the proposed development traffic added. For the year 2026, traffic associated with the first 200 units and the proposed creche are added to the road network. For the years 2031 and 2041, traffic associated with the full proposed development are added to the future Do Nothing flow for these years.

The calculated change in noise level for each junction for the year 2026 and 2041 are presented in Table 11.17 to Table 11.21 which assesses the opening year and future design year. The change in noise levels for the intermediate year of 2031 are no higher than those for 2041.

Junction 1	Do Nothing		Do Something		Change in noise Level, dB
	AADT	%HGV	AADT	%HGV	
Year 2026					
Arm A	4,424	4%	4,589	4%	+0.2
Arm B	8,702	3%	9,032	3%	+0.2
Arm C	3,947	3%	3,991	3%	+0.0
Arm D	4,634	2%	4,754	2%	+0.1
Year 2041					
Arm A	5,097	4%	5,620	4%	+0.4
Arm B	10,014	3%	11,065	3%	+0.4
Arm C	4,554	3%	4,697	3%	+0.1
Arm D	5,332	2%	5,723	2%	+0.3

Table 11.17: Change in traffic noise levels along Junction 1 roads

Junction 2	Do Nothing		Do something		Change in noise Level, dB
	AADT	%HGV	AADT	%HGV	
Year 2026					
Arm A	115	0%	115	0%	0.0
Arm B	10,428	2%	10,758	2%	+0.1
Arm C	6,744	2%	6,744	2%	0.0
Arm D	10,030	3%	10,360	3%	+0.1
Year 2041					
Arm A	133	0%	133	0%	0.0
Arm B	12,008	2%	13,059	2%	+0.4
Arm C	7,790	2%	7,790	2%	0.0
Arm D	11,548	3%	12,599	3%	+0.4

Table 11.18: Change in traffic noise levels along Junction 2 roads

Junction 3	Do Nothing		Do something		Change in noise Level, dB
	AADT	%HGV	AADT	%HGV	
2026					
Arm A	12,844	2%	13,620	2%	+0.3
Arm B	862	5%	1,968	5%	+3.6
Arm C	11,829	2%	13,026	2%	0.4
2041					
Arm A	14,794	2%	17,247	2%	+0.7
Arm B	917	5%	4,421	2%	+4.4
Arm C	14,627	2%	15,678	2%	0.3

Table 11.19: Change in traffic noise levels along Junction 3 roads

Junction 4	Do Nothing		Do Something		Change in noise Level, dB
	AADT	%HGV	AADT	%HGV	
2026					
Arm A	3,809	4%	3,974	4%	+0.2
Arm B	12	0%	12	0%	+0.0
Arm C	16,798	2%	17,409	2%	+0.2
Arm D	12,870	2%	13,646	2%	+0.3
2041					
Arm A	4,393	4%	4,916	4%	+0.5
Arm B	13	0%	13	0%	0.0
Arm C	19,367	2%	21,298	2%	+0.4
Arm D	14,824	2%	17,277	2%	+0.7

Table 11.20: Change in traffic noise levels along Junction 4 roads

Junction 5	Do Nothing		Do Something		Change in noise Level, dB
	AADT	%HGV	AADT	%HGV	
2026					
Arm A	1,482	7%	1,482	7%	0.0
Arm B	12,100	4%	12,216	4%	0.0
Arm C	17,253	2%	17,748	2%	+0.1
Arm D	16,806	2%	17,279	2%	+0.1
2041					
Arm A	1,712	7%	1,712	7%	0.0
Arm B	13,969	4%	14,321	4%	+0.1
Arm C	19,900	2%	21,473	2%	+0.3
Arm D	19,377	2%	21,308	2%	+0.4

Table 11.21: Change in traffic noise levels along Junction 5 roads

The change in noise levels across all years is less than 1 dB for all roads, with the exception of Arm B of Junction 3.

Reference to Table 11.6 categorises a change in traffic noise of less than 1 dB (A) as Not Significant. The resultant noise impact associated with the addition of development related traffic noise is Negative, Not Significant and Long-term along the surrounding road network.

Arm B of Junction 3 relates to the full length of the distributor road linking the proposed development with the L2228 (Station Road). The Do Nothing flows relate to traffic along the section of road already built as part of the Castle Farm Meadows development. Highest changes in traffic flows are forecast during the year 2041 when the full extent of the proposed development is operational. During this period an increase in traffic noise of 4.4 dB(A) is calculated.

Reference to Table 11.6 categorises a change in traffic noise of 4.4dB (A) as Not Significant to Slight.

At the closest existing NSLs to this road (Castle Farm Meadows Residential NSLs, NSL1 in Figure 11.4), a traffic noise level of 49 dB L_{Aeq}, is calculated which is in line with the prevailing noise environment measured at adjacent locations in the surrounding area (AT3).

Taking account of the change in noise level and the calculated traffic noise level at the nearest NSLs, traffic noise impact associated with the new distributor road is Negative, Slight, and Long-Term.

Mechanical and Electrical Plant Noise

There are no sources of mechanical or electrical plant associated with the building types across the proposed development with potential to emit audible noise levels beyond the buildings themselves. (i.e. individual heat recovery systems serving the residential units where proposed). Plant rooms serving the apartment blocks are enclosed at basement level. Any required plant items serving development buildings will be designed and located so that there is no negative impact on sensitive receivers within the proposed development itself (e.g. within apartments above plant rooms etc.)

There are three no. ESB substations proposed across the development site within the north, mid and southern phases. The closest noise sensitive locations to these structures are the proposed residential units within the development site at distances of the order of 10 to 15m. Operational noise levels from small residential sub stations are low and are well controlled through the sub-station structure. Once the structure is well sealed and designed to control tonal noise emissions, operational noise levels from these structures are low and do not give rise to any significant noise levels beyond their immediate structure. Given the distance to the nearest noise sensitive properties and the design of sealed modern MV/LV structures, noise levels at the nearest noise sensitive locations will be well controlled.

In this instance, best practice is to set appropriate noise limits that will inform the detailed design during the selection and layout of building services for the proposed development. The operational noise level from building services plant at the nearest residences within the proposed development will be designed/attenuated to not exceed the internal noise levels discussed in Table 11.7 to ensure no negative noise impacts occur within the proposed residential units.

Once noise emissions from operational plant are designed to not exceeded the internal noise criteria at the new residential units within the proposed development, the related noise impact to existing NSLs offsite will be imperceptible. The overall outward noise impact of mechanical and electrical services on site to existing surrounding NSLs is determined to be Neutral, Imperceptible and Long-Term.

14.5.1.3 Do-Noting Impact

In the absence of the proposed development, the noise and vibration environment at the nearest NSLs will remain largely unchanged, resulting in a Neutral and Localised effect In The Long-Term.

14.5.2 Inward Noise Impact

A review of operational rail noise across the development site for both existing and future scenarios taking account of the Dart +West project is discussed in the following section.

14.5.2.1 Stage 1: Initial Risk Assessment

Existing Noise Climate

The existing noise climate within the development lands was surveyed and the results summarised in Section 11.2 of this chapter. The results of the survey and review of published rail noise mapping indicates that whilst the Iarnród Éireann rail line between Dublin and Dunboyne (M3 Parkway) borders the western site boundary, the contribution from rail noise along the western site boundary is low to moderate.

A rail noise model was developed to determine the range of existing rail noise levels over the full extent of the development site. The number and type of trains for the existing scenario is taken from the EIAR for the Dart + West project. The 3D acoustic model was undertaken using SoftNoise *Predictor* and calculated in accordance with the RMR 2012 Methodology.

Figure 11.9 presents the calculated L_{Aeq} rail noise levels for the daytime 16hr period (07:00 – 23:00hrs) and night-time 8hr period (23:00 to 07:00hrs) for the existing operational rail.

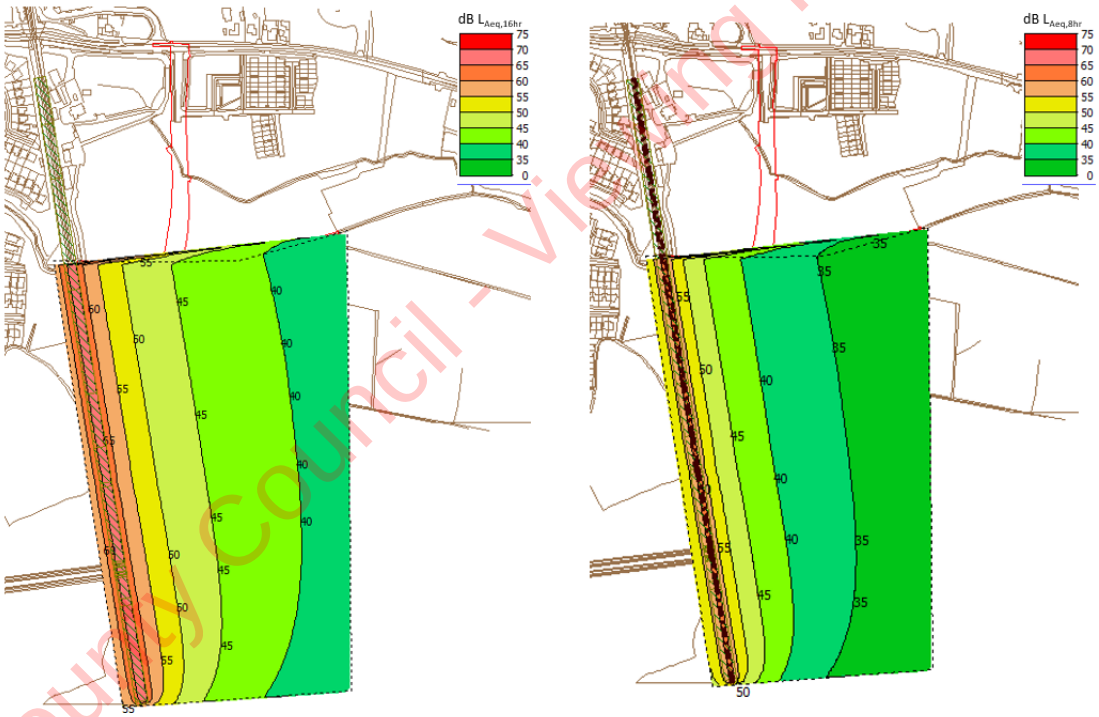


Figure 11.9: Existing Rail Noise Levels across development site, day and night-time periods

Along the immediate western site boundary with the rail line, day-time noise levels are calculated between 55 and 60 dB $L_{Aeq,16hr}$ which is categorised as *Low* to *Medium* risk in line with the ProPg Stage 1 risk assessment (Reference Figure 11.1). Across the remainder of the site, rail noise levels are between 35 and 55 dB $L_{Aeq,\ 16hr}$ and are categorised as *Negligible* to *Low.*

During night-time periods, along the immediate western site boundary with the rail line, noise levels are calculated between 50 and 55 dB $L_{Aeq,8hr}$ which is categorised as *Low* to *Medium* risk. Across the remainder of the site, rail noise levels are between ≤35 and 50 dB $L_{Aeq,\ 8hr}$ and are categorised as *Negligible* to *Low* in accordance with the ProPg Stage 1 risk assessment (Reference Figure 11.1).

Future Noise Climate

The operation of the Dart + West project has potential to alter the prevailing noise environment along the western site boundary. The rail noise model was updated to calculate noise levels across the site with the proposed electrification of the line and replacement of the DMU fleet with Dart trains. The number of Dart trains per period for the proposed future scenario is taken from the EIAR for the Dart + West project.

Figure 11.10 presents the calculated L_{Aeq} noise levels for the daytime 16hr period (07:00 – 23:00hrs) and night-time 8hr period (23:00 to 07:00hrs) for the potential future rail scenario, should the Dart + west Railway Order be approved and operated.

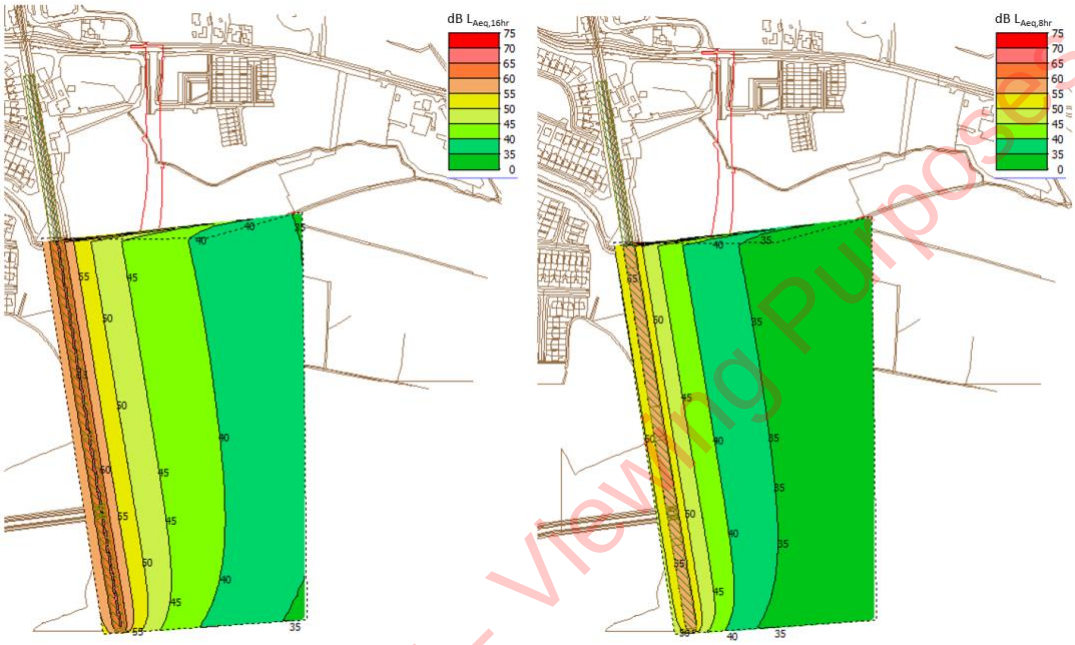


Figure 11.10: Potential Future Rail Noise Levels across development site, day and night-time periods

Under the potential future scenario, a slight reduction in rail noise level is calculated across the site. During daytime periods, the day and night-time noise contours are reduced by approximately 8m west towards the rail line. The site remains categorised as low risk across the site with a low to medium noise risk along the immediate western boundary.

Risk Classification of Site (ProPG Stage 1)

Giving consideration to the measured and calculated noise levels, the initial site noise risk assessment has concluded that the level of risk across the site falls into the negligible to low and low to medium noise risk categories.

Additionally, the Stage 1 Noise Risk Assessment requires analyses of the L_{AFmax} noise levels. In the case of the baseline noise survey undertaken at UT1, (Section 11.3.1.1) the typical L_{AFmax} noise levels were measured between 60 and 63 dB during the night with the highest sporadic events recorded at between 77 and 85 dB L_{AFmax}. In any one night-time period, the L_{AFmax} was above 80 dB for 1 to 2 measurements. ProPG guidance considers 20 night events over 80dB to be a high risk, this did not occur during any night-time measurements at UT1.

ProPG states the following with respect to low and medium 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.

14.5.2.2 Stage 2: Noise Assessment

Noise levels across development buildings

As demonstrated in the previous section, current or potential future rail noise across the site is low and with the exception of the immediate western boundary, does not require a noise risk assessment.

The proposed site layout has been modelled to determine the calculated rail noise level at the closest buildings to the rail line, taking account of any boundary treatment and screening from buildings. A 1.8m block wall is proposed along the western boundary north of the proposed future distributor road extension. A 2m high brick wall is proposed along the western boundary of residential houses south of the proposed future distributor road extension.

To assess a worst case scenario, the existing rail noise levels are modelled which include the operation of DMU fleet which assesses a marginally higher rail noise contribution across the site.

Figure 11.11 presents the calculated rail noise levels for the daytime 16hr period (07:00 – 23:00hrs) and night-time 8hr period (23:00 to 07:00hrs) for the existing rail scenario with the proposed development buildings and boundary treatments in place.

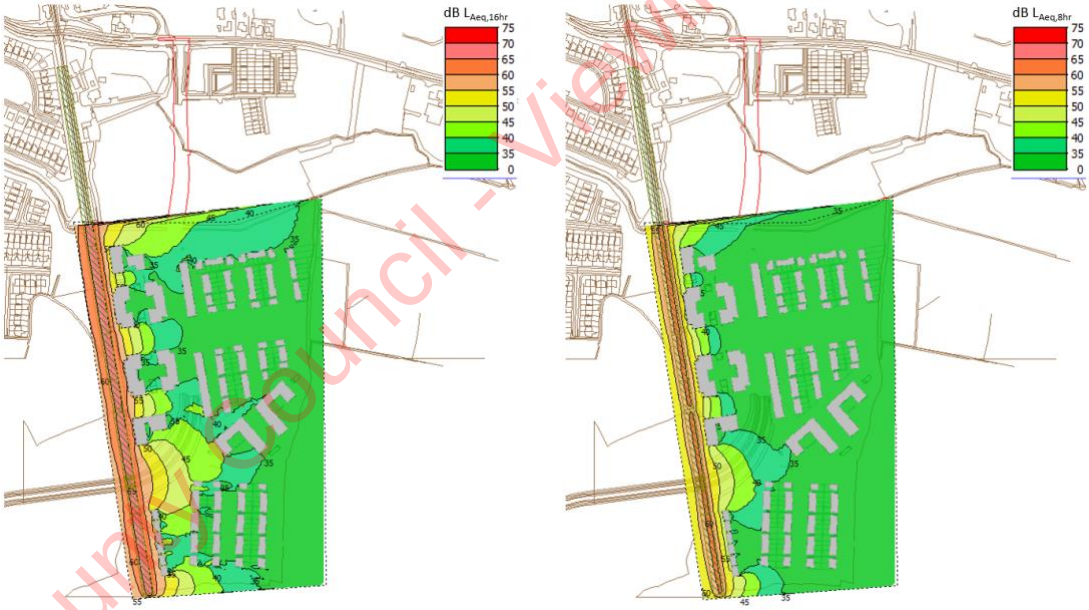


Figure 11.11: Existing Rail Noise Levels at proposed development buildings, day and night-time periods

Noise levels have been calculated the various floor levels of the buildings along the western site boundary. At the houses in Phase 5, daytime noise levels are calculated at 53 dB $L_{Aeq,16hr}$ and 47 dB $L_{Aeq,8hr}$ during night-time periods at first floor level.

Along the western facades of the apartment buildings within Phases 1, 2 and 3 daytime noise levels are calculated in the range of 56 to 58 dB $L_{Aeq,16hr}$ and night-time noise levels are calculated in the range of 48 to 52 dB $L_{Aeq,8hr}$ from first to fifth floor level.

Internal Noise Levels

Element 2 of the ProPG document sets out recommended internal noise targets derived from BS 8233 (2014). The recommended indoor ambient noise levels are set out previously in Table 11.7.

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.

Discussion on Open/Closed Windows

The typical level of sound reduction offered by a partially open window falls in the region of 10 to 15 dB. Considering the design goals outlined in Table 11.7, and a sound reduction across an open window of 15 dB, the free-field noise levels required to ensure internal noise levels do not exceed good or reasonable internal noise levels for daytime periods are summarised in Table 11.22. The highest calculated noise levels for proposed site buildings are included for reference.

Level Desired	Daytime External Noise Level Ranges (07:00 – 23:00hrs)	Development buildings which values apply
Good (i.e. at or below the internal noise levels)	50 – 55 dB $L_{Aeq,16hour}$	All development buildings not along western boundary (<50 dB $L_{Aeq,16hr}$) Houses in Phase 5 along western boundary (53 dB $L_{Aeq,16hr}$)
Reasonable (i.e. 5 dB above the internal noise levels)	55 – 60 dB $L_{Aeq,16hour}$	Apartments in Phase 1, 2 and 3 along western boundary (56 - 58 dB $L_{Aeq,16hr}$)

Table 11.22: External daytime noise levels required to achieve suitable internal noise levels.

During daytime periods, good internal noise levels can be achieved with windows open within the houses in Phase 5 and at all other proposed development buildings not along western boundary.

Reasonable internal noise levels can be achieved with windows open along the western façade of apartment buildings within Phases 1 to 3.

Table 11.23. presents the external noise levels required to ensure internal noise levels do not exceed good or reasonable internal noise levels for night-time periods with windows open.

Level Desired	Night-time External Noise Level Ranges (23:00 – 07:00hrs)	Development buildings which values apply
Good (i.e. at or below the internal noise levels)	45 dB $L_{Aeq,8hour}$	All development buildings not along western boundary (<45 dB $L_{Aeq,8hr}$)
Reasonable (i.e. 5 dB above the internal noise levels)	50 dB $L_{Aeq,8hour}$	Houses in Phase 5 along western boundary (47 dB $L_{Aeq,8hr}$) Apartments in Phase 1, 2 and 3 along western boundary (48 – 52 dB $L_{Aeq,8hr}$)

Table 11.23: External night-time noise levels required to achieve suitable internal noise levels.

During night-time periods, good internal noise levels can be achieved with windows open within all proposed development buildings not along western boundary.

For houses in Phase 5 and apartments in Phase 1 to 3 along the western site boundary, reasonable internal noise levels can be achieved with windows open. There is potential for a slight exceedance of this internal noise level at upper floor of apartments by 1 to 2 dB.

For the western façade of residential apartments within Phases 1 to appropriate acoustic specifications to windows will be provided to ensure residential rooms can achieve the good 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 principals 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 façades.

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. For western facades of apartments buildings in Phase 1, 2 and 3 and the residential dwellings in Phase 5 along the western boundary facing the rail line, the minimum sound insulation as set out in Table 11.24 should be achieved by the glazing.

SRI	SRI (dB) per Octave Band Centre Frequency (Hz)						dB Rw
	125	250	500	1k	2k	4k	
Glazing Specification	20	23	26	33	37	39	32

Table 11.24: Sound insulation performance requirements for glazing, SRI (dB)

The acoustic specification listed in **Table 11.24** can be achieved using a standard double-glazed unit and is likely to be used across the full extent of the site as a standard glazing system. As such, this does not warrant referencing as a mitigation measure as it is considered a standard specification.

The specifications provided in **Table 11.24** are indicative and may be developed further during the detailed design stage. The over-riding requirement is the Octave Band sound insulation performance values Alternative specifications will be acceptable provided the internal ambient noise criteria outlined Table 11.7 are achieved.

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.

Wall Construction

In general, all external wall constructions offer a high degree of sound insulation, much greater than that offered by glazing systems. Therefore, noise intrusion via the wall construction will be minimal. The calculated internal noise levels across the building façade have assumed a minimum sound reduction index of 50 dB Rw for this construction.

Ventilation

The ventilation strategy for the proposed 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 a closed heat recovery system, adjustable hit-and-miss acoustic ventilators or trickle vents built into the façade or window frames, respectively.

For the proposed development, it is recommended that any through wall vents are specified to achieve a sound insulation performance of 35 - 37 dB Dn,e,w.

Internal Noise Levels

Taking into account the external façade levels and the specified building envelope, the internal noise levels for sample bedrooms and living spaces have been calculated. In all instances the good internal ambient and L_{AFmax} noise criteria are achieved for daytime and night-time periods.

Comment on Rail Maintenance Activities

The rail line which borders the western site boundary is a live rail line with requirements for intermittent maintenance. Some of these works will require activities to occur at night. During the baseline noise survey, rail maintenance activities were not occurring, hence were not measured as part of the survey results.

The nature, frequency and duration of rail maintenance works are at the discretion of Irish Rail. If occurring a night, elevated levels of noise will be experienced. Reference to the DART+ West EIAR notes the following with respect to ongoing maintenance works and the control measures used to reduce noise impacts:

Extract from Section 14.6.2.2. of the DART+ West EIAR

14.6.2.2 Ongoing Maintenance

During the course of ongoing maintenance the procedures outlines in Iarnród Éireann operation procedure CCE-QMS-008-002 Noise Management – CCE Activities will be implemented. This document outlines the following noise mitigation measures:

- The Community Liaison Officer (or other nominated person) will notify affected residents in advance of any planned works commencing with a letter drop in the relevant area.
- Where planned work occurs over a 72 hr weekend shutdown there will be a noise management plan submitted to the local authority.
- All attempts to avoid, prevent or reduce the harmful effects of exposure to environmental noise arising from CCE work activities must be practical and appropriately risk assessed before implementation.
- The following measures should be implemented where feasible during maintenance activities:
  - Carry out as much preparatory work in daylight as possible (sawing or drilling rails).
  - Inspect the worksite in daylight if possible and look for the best location to position generators.
  - Position generators and lighting away from residential dwellings.
  - Take advantage of natural barriers such as vegetation, walls or embankments that can offer noise screening to adjacent neighbours.
  - Where necessary, use noise attenuation screens. The screens must be located as close to the receiver or source as possible.
  - Consider using additional supply cables and structures so that the generators can be positioned as far away from housing as practicable.

The measures outlines above are designed to inform existing and new NSLs along a live rail line of maintenance activities to provide sufficient advance notice of the works, to reduce potential effects. These mitigation measures are not part of this project but form part of IEs ongoing noise management policies.

14.6 Mitigation Measures (Ameliorative, Remedial or Reductive Measures)

14.6.1 Proposed Development

14.6.1.1 Construction Stage

Construction Noise

The assessment detailed in Section 11.5.1 has determined that construction activities can operate within the adopted construction noise threshold levels at the closest off-site NSLs due to the distance from the works and the construction activities involved. At the closest NSLs to the Improvement works to Two no. Roundabouts on the R174, the CNT values are likely to be exceeded over temporary periods during surface breaking works for lane widening.

Vibration levels at the closest neighbouring buildings are expected to be orders of magnitude below the limits set out in Table 11.3 to avoid any cosmetic damage to buildings.

Best practice noise and vibration control measures will be employed by the contractor during the construction phase in order to avoid exceedance of the adopted construction noise threshold values at the nearest NSLs. The best practice measures set out in BS 5228 (2009 +A1 2014) Parts 1 and 2 will be complied with. This includes guidance on several aspects of construction site mitigation measures, including, but not limited to:

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

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

Selection of Quiet Plant

This practice is recommended in relation to static plant such as compressors, generators and breakers. It is recommended that these units be supplied with manufacturers' proprietary acoustic enclosures or attenuated models. The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site.

Noise Control at Source

The following best practice mitigation measures relate to controlling noise at source:

- Site compounds will be located away from noise sensitive boundaries within the site constraints.
- For mobile plant items such as cranes, dump trucks, excavators and loaders, maintaining enclosure panels closed during operation can reduce noise levels over normal operation. Mobile plant will be switched off when not in use and not left idling.
- For steady continuous noise, such as that generated by diesel engines, it may be possible to reduce the noise emitted by fitting a more effective exhaust silencer system and avoid idling of engines when not in use.
- For percussive tools such as pneumatic breakers, a number of noise control measures include fitting muffler or sound reducing equipment to the breaker tool and ensuring any leaks in the air lines are sealed.
- Erecting localised screens around breaker or drill bit when in operation in close proximity to noise sensitive boundaries.
- For all materials handling, ensure that materials are not dropped from excessive heights, lining drops chutes and dump trucks with resilient materials.
- For compressors, generators and pumps, these can be surrounded by acoustic lagging or enclosed within acoustic enclosures providing air ventilation.
- All items of plant 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

Screening is an effective method of reducing the noise level at a receiver location and can be used successfully as an additional measure to all other forms of noise control. Standard construction site hoarding (2.4 m in height) with a mass per unit of surface area greater than 7 kg/m2 can provide adequate sound insulation. This is recommended, as a minimum around the north and western site boundaries of the proposed development site.

Liaison with the Public

A designated Community Liaison Officer (CLO) will be appointed to site during construction works. Any noise complaints will be logged and followed up in a prompt fashion by the CLO. In addition, prior to particularly noisy construction activity, the CLO will inform the nearest noise sensitive locations of the time and expected duration of the noisy works.

Project Programme

The phasing programme will be arranged so as to control the amount of disturbance in noise and vibration sensitive areas at times that are considered of greatest sensitivity. This will be reviewed in relation to other potential cumulative works occurring on adjacent construction sites in close

proximity to noise sensitive properties which have the potential to lead to cumulative significant construction noise impacts.

Construction Vibration

On review of the likely vibration levels associated with construction activities, construction activities associated with 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 buildings.

Vibration from construction activities will be limited to the values set out in Table 11.3 to avoid any form of potential cosmetic damage to buildings and structures.

In the case of vibration levels giving rise to human response, impacts are significantly reduced once the source of vibration is known and good communications are in place. As such, in order to minimise any potential impacts to adjacent building occupants, the following measures shall be implemented during the Construction Phase at the roundabout improvement works, during surface breaking activities. During all other phases, vibration magnitudes will be imperceptible to building occupants.

- A clear communication programme will be established by contractor to inform adjacent building occupants in advance of any potential intrusive works which may give rise to vibration levels likely to result in significant effects as per Table 11.4. The nature and duration of the works will be clearly set out in all communication circulars as necessary.

Construction Traffic Noise

Construction traffic noise impacts are determined to be imperceptible and short term along the surrounding road network, hence no specific mitigation measures are required to control this source further.

14.6.1.2 Operational Stage

Additional Vehicular Traffic Noise on Surrounding Roads

Changes to traffic flows will not result in a perceptible increase in noise level in the surrounding environment. Therefore, no mitigation measures are necessary in this case.

Mechanical and Electrical Plant Noise

With consideration at the detailed design stage, the selection and location of plant items within the development buildings will ensure that noise emissions from any mechanical and electrical building services plant do not exceed the relevant internal noise criteria within Table 11.7 for residential dwellings within the proposed development therefore no further mitigation is required. In addition, noise emissions should be broadband in nature and should not contain any tonal or impulsive elements.

Once operational noise emissions are controlled within the development site, there will be no perceptible noise impact at sensitive receivers off-site.

14.7 Residual Impact of the Proposed Development

14.7.1 Proposed Development

14.7.1.1 Construction Stage

During the construction phase of the project there is the potential for temporary to 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.

Following mitigation, the residual noise and vibration effects during the construction phase will be local, negative, slight to moderate and temporary to short-term.

The residual impact of construction traffic on the surrounding road network is determined to be of Negative, Imperceptible and Short Term effect.

The residual impact of construction vibration building occupants is determined to be of Negative, Imperceptible to slight and Short Term effect.

14.7.1.2 Operational Stage

Additional Vehicular Traffic Noise 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 Negative, Not Significant and Long-term at nearby NSLs along the existing road network.

Traffic noise level at the nearest NSLs to the distributor road linking the proposed development with the L2228 (Station Road) is determined to be Negative, Slight, and Long-Term.

Mechanical and Electrical Plant Noise

Noise levels from any building services plant within the development site will be controlled to not exceed the internal noise levels within Table 11.7 for residential dwellings within the proposed development.

Once operational noise emissions are controlled within the development site, noise emissions outside the site will be imperceptible. The residual noise effect is Neutral, Imperceptible and Long Term.

14.7.1.3 Worst Case Impact

The various considerations set out within the potential impacts section consider a range of worst case scenarios that have the potential to occur, specifically construction noise levels assumed for calculation purposes, and inward noise impact. The assessments have all determined with the inclusion of potential worst case scenarios, no significant effects are likely to occur.

14.7.2 Cumulative

14.7.2.1 Construction Stage

Cumulative Impacts of Proposed Development Phases

The preliminary construction programme for the proposed development involves the development of each of 5 phases to be constructed in sequence and hence the planned programme does not involve an overlap in the construction phases 1 to 5. There is however, potential for overlap in the construction of the 470m length of distributor road and Phase 1 residential development.

In order to assess the potential cumulative impact, the combined effect of both areas of the development site being constructed concurrently is presented in **Error! Reference source not found.**.

As a worst case analysis, the assessment assumes the higher construction noise level (85 dB at 10m) along the closest boundary of both the distributor road and Phase 1 residential development to NSL1, north-east of the proposed development.

Construction Phase	Sound Power Level, dB	Cumulative Noise Level at NSL1		
		Road works at 90m	Phase 1 works at 110m	Cumulative Noise Level, dB $L_{Aeq,T}$
Distributor Road Construction and Phase 1 residential development	113 each	61 Note 1	54	62

Table 11.25: Cumulative construction noise level from road works and Phase 1 construction.

Note 1: Construction noise level in absence of site hoarding, which may not be practicable during road construction works.

The calculated cumulative construction noise level at the closest NSLs to north east of the development site are below the daytime construction noise threshold of 65 dB $L_{Aeq,T.}$ The resultant cumulative construction noise effect is determined to be Negative, Slight to Moderate and Short-Term.

Exempted Development

Construction works associated with upgrade c. 1,100m of existing 200mm uPVC watermains with 400mm ID watermains by Irish Water will generate localised noise impacts when works are occurring immediately adjacent to NSLs along the route. Given the closest boundary of the proposed development is set back some 280m from the nearest existing road (Station Road) where watermain works may occur, the contribution of construction noise at this distance is negligible and will not be audible above the prevailing noise environment. The potential cumulative impact is therefore Neutral, Not Significant and Short-Term.

There are no additional noise or vibration mitigation measures required to control cumulative impacts associated with the exempted development and the proposed development.

Future Development

In line with the Meath County Development Plan 2021-2027, it is intended the distributor road would be extended southwards and then eastwards over the railway line.

In the event the extension to the distributor road occurs in tandem with the proposed development, there is potential for cumulative construction noise impacts at the closest NSLs to the north-west (NSL1). These properties are some 200m from the road alignment and railway crossing. Reference to Table 11.16 indicates construction noise levels below 50 dB $L_{Aeq,T}$ associated with road construction works. When added to construction noise from the proposed residential development, the cumulative noise impact remain as Negative, Slight and Short Term.

The greatest potential impact associated with the construction of the extension of the distributor road southwards and over the railway line is on the residential units within the proposed developments, if occupied during its construction.

During the construction phase of this potential future development, mitigation measures will need to be incorporated as part of the construction works to reduce potential impacts at NSLs within the proposed development, particularly at the closest NSLs within Phases 3, 4 and 5. It is outside the scope of this EIAR to specify the control measures that will be employed by this development, however any construction works will be required to work within best practice noise and vibration control measures as standard. The specific impacts associated with this development on its surrounding environment

and any required mitigation measures will be determined as part of any planning application made for its development.

The future development will be required to include noise and vibration control measures to control any potential significant noise impacts at NSLs within the proposed development, assuming the various phases will be occupied. The range of noise and vibration control measures set out in Section 11.6.1.1 form part of any best practice control measures that apply to construction sites and shall be applied to any future development of the distributor road extension.

Residential Development Meath County Council Reg. 22675

This development will involve construction of houses within a plot of land in excess of 300m from the closest boundary of the proposed residential site of the proposed development and in excess of 200m from the 470m length of distributor road included as part of this proposed development. The range of construction techniques associated with standard house building and the distances between the two developments will not result in any significant cumulative noise effects at NSLs in the surrounding area should both projects be constructed at the same time. The impact is determined to be Negative, Not Significant, and Short-Term.

There are no additional noise or vibration mitigation measures required to control cumulative impacts associated with the residential development Reg 22675 and the proposed development.

Dart + West – Railway Order

There is potential for construction of the Dart + West project to overlap with the proposed development. Closest NSLs to both projects are those to the north-west of the site (NSL1) at Beechdale and Larchfield estates. Reference to the EIAR for the Dart + West project, *Chapter 14: Noise and Vibration* notes that the majority of construction works along the rail line will take place at night and weekend possessions, specifically track lowering at OBCN2390 at Dunboyne Station, overhead line equipment (OHLE) works and new fencing. The nature of the works are linear in nature and will move along the length of the track during these possession periods.

There are no night-time construction works as part of this proposed development, hence there are no cumulative night-time noise impacts. Any daytime construction works associated with the Dart + West project will be of limited duration at any one location along the line in proximity to the proposed development. The potential cumulative construction noise effect is likely to be Negative, Slight to Moderate and Short-Term.

The Dart + West railway order project EIAR includes a range of specific noise and vibration mitigation measures that will be implemented as part of the project. There are no additional mitigation measures required as part of the proposed development to future control any potential cumulative construction noise and vibration effects at NSLs in the surrounding environment.

The residual noise and vibration impact from the various projects with potential for cumulative impacts have been assessed. There are no residual significant cumulative impacts forecast. The residual effects are negative, slight to moderate and temporary to short-term.

14.7.2.2 Operational Stage

Exempted Development

Once operational, there are no operational noise sources associated with the upgraded watermains. There are therefore no cumulative operational noise effects associated with this project and the proposed development. The resultant cumulative impact is Neutral, Imperceptible and Long-Term.

Once operational, there are no operational noise or vibration sources associated with the upgraded watermains. There are therefore no additional mitigation measures required to control any cumulative noise or vibration effects.

Future Development

Traffic flows along the extended section of the distributor road southwards and then eastwards over the railway line has the potential for cumulative traffic noise effects on the surrounding environment and on traffic noise impacts on the proposed residential units.

Information relating to the future traffic flows along this road are not available at this stage to provide specific comment on. The closest NSLs to the proposed distributor road extension are the residential units within this proposed development. As part of the design and planning of this section of the road, consideration will be given to any potential noise impact to NSLs along the road edge. Further comment is included in Section 11.5.3

As part of the design and planning of this section of the road, the potential noise impact to NSLs and appropriate noise mitigation measures will be included to reduce any potential impacts within the proposed development. Further comment is included in Section 11.5.3

Residential Development Meath County Council Ref. 22675

The operational phase of both projects will introduce additional traffic onto the surrounding road network. Traffic flows associated with this development and the proposed development have been included within the traffic modelling assessment. The change in noise levels set out in Table 11.17 to Table 11.21 confirm the cumulative impact of permitted developments in the area (including residential development Ref 22675) combined with the proposed development is Negative, Not Significant and Long-term along the surrounding road network

There are therefore no additional mitigation measures required to control any cumulative noise or vibration effects from this development and the proposed development.

Dart + West – Railway Order

The operation of the Dart + West project has potential to alter the prevailing noise environment along the western site boundary and in turn affect residential units within the proposed development. Reference to the published EIAR for the Dart + West project, *Chapter 14: Noise and Vibration,* indicates the section of rail line between Clonsilla Station and Junction to M3 Parkway Station (Project Section D) will experience a positive, slight to moderate, long term effect as a result of the proposed project. This is due to the full replacement of Diesel Multiple Unit (DMU) trains with electric DART fleet along this section of line which are quieter units. The resultant impact is a noise level reduction of the order of 2 to 3 dB during day and night-time periods and hence is Positive, Slight to Moderate, Long Term.

The impact of inward noise of the rail line across the proposed development from existing and future operational scenarios is assessed in Section 11.5.3.

The proposed Dart + West project will result in a reduction in rail noise along the section of rail line along the western site boundary. The proposed development includes a solid boundary wall along the full extent of the western site boundary and the rail line. There are therefore no additional mitigation measures required to control any cumulative noise or vibration effects from this development and the proposed development.

The residual noise and vibration impact associated with the operational phase of the proposed project and the projects assessed for cumulative impacts are negative, not significant and long-term.

Worst Case Impact

The various considerations set out within the potential impacts section consider a range of worst case scenarios that have the potential to occur for the cumulative scenarios, specifically cumulative construction scenarios and operational traffic. The assessments have all determined with the inclusion of potential worst case scenarios, no significant effects are likely to occur.

14.8 Monitoring

14.8.1 Proposed Development

14.8.1.1 Construction Stage

During the construction phase, spot check noise monitoring may be required where the construction noise thresholds have the potential to be exceeded at NSLs. The monitoring shall be carried out by the contractor and used to inform the requirement for any control measures on site to reduce construction noise levels. There are no significant vibration sources associated with the construction phase and no vulnerable structures identified adjacent to the site, hence vibration monitoring is not proposed during this phase.

Noise monitoring will be conducted in accordance with the International Standard ISO 1996-2:2017 - Description, measurement and assessment of environmental noise - Part 2: Determination of sound pressure levels (ISO 2017).

14.8.1.2 Operational Stage

There is no monitoring recommended for the operational phase of the development as impacts to noise and vibration are predicted to be imperceptible to slight.

14.9 Reinstatement

14.9.1 Proposed Development

14.9.1.1 Construction Stage

During reinstatement, similar magnitudes of noise and vibration effects associated with the construction phase outlined in Section 11.5.1.1 have the potential to occur. The mitigation measures in Section 11.6.1.1 will therefore also apply.

14.9.1.2 Operational Stage

Non applicable.

14.10 Difficulties Encountered

No difficulties were encountered in the preparation of this chapter.

15 LANDSCAPE AND VISUAL

15.1 INTRODUCTION

15.1.1 Statement of Expertise

This Townscape and Visual Impact Assessment (TVIA) has been prepared by Park Hood Chartered Landscape Architects. Park Hood is a Chartered Member of the Irish Landscape Institute and Landscape Institute UK with extensive experience in preparation of Landscape / Townscape and Visual Impact Assessments for large scale projects throughout Ireland and the UK.

The primary author is Andrew Bunbury who is a qualified Landscape Architect and Chartered Member of the Landscape Institute (CMLI) with over 25 years' consultancy experience in the profession across Ireland and the UK. He works between the Dublin, London and Belfast offices of Park Hood where there are 25 members of staff including a further twelve Chartered Landscape Architects. All work is undertaken in compliance with the Landscape Institute's Code of Standards of Conduct and Practice for Landscape Professionals and checked in accordance with Park Hood's ISO 14001:2015 and ISO 9001:2015.

15.1.2 Proposed Development Summary

The report relates to a proposed residential development across 16.92 hectares of land in the Townlands of Castle Farm, Ruskin, Loughsallagh and Clonee, Dunboyne, County Meath on lands generally bound to the east and south by agriculturally zoned lands, to the west by the Iarnród Éireann rail line, and to the north by the residential development permitted under Meath County Council Reg. Ref. RA180561, agricultural lands and the L2228 (Station Road/Clonee Road).

This chapter outlines the potential effects of the proposed development on the townscape / landscape character and visual amenity of the Application Site and surrounding area in this part of Co. Meath.

15.2 ASSESSMENT METHODOLOGY

15.2.1 Guidance Documents

The overall approach and methodology undertaken within this LVIA are based on the Guidelines for Landscape and Visual Impact Assessment (3rd Edition) by The Landscape Institute and the Institute of Environmental Assessment (2013) (GLVIA). There are a number of published guidance documents including Development Plans, which include planning designations relevant to the Study Area as listed below:-

- *Environmental Protection Agency (2022) Guidelines on the Information to be contained in Environmental Impact Assessment Reports;*
- *European Commission (2017) Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report;*
- *Meath County Development Plan 2021-2027 (MCDP);*
- *Dunboyne Clonee Pace Local Area Plan 2009-2015 Incorporating Amendment No. 1 - Adopted March 2015; and*
- *Meath County Landscape Character Assessment (as per Appendix 7 of Meath County Development Plan 2013-2019).*

Other sources of information include: -

- *National Inventory of Architectural Heritage http://www.buildingsofireland.ie;*
- *National Parks and Wildlife Service (NPWS) and Environmental Protection Agency - https://gis.epa.ie/EPAMaps;*
- *https://www.heritagecouncil.ie*

- *Design Manual for Urban Roads and Streets by the Department of Transport, Tourism and Sport and the Department of Housing, Planning and Local Government (2019);*
- *Urban design manual - a best practice guide by the Department of Environment, Heritage and Local Government (2009);*
- *Sustainable Urban Housing: Design Standards for New Apartments (2022); and*
- *Sustainable Residential Development in Urban Areas and the accompanying Urban Design Manual: A Best Practice Guide (2009).*

The baseline assessment included study of Ordinance Survey Ireland historical and recent mapping to assess how this part of Co. Meath has developed since the 19th century as well as assess approximate calculations of relevant distances or areas.

15.2.2 Summary of LVIA Objectives and Key Tasks

The objective of the LVIA is to evaluate the likely significance of landscape character and visual amenity effects to the Application Site and study area to assist the determining authority in considering the acceptability of this proposal. It is based on the interpretation of the physical and aesthetic characteristics following criteria and terminology partially drawn from Principles and Overview of Processes (Chapter 3) within the GLVIA. The LVIA focuses on key effects and issues as follows: -

- The effect of the proposed development upon the landscape resource;
- The effect of the proposed development on the perception of the landscape; and
- The effects arising from the proposed development on visual amenity.

The LVIA methodology can be summarised as undertaking the following key tasks: -

- Site Visits between September 2021 and March 2023;
- Assessing the baseline Landscape Setting and Conditions;
- Evaluation of key components of the proposed development based on site layouts, plans and elevations prepared by Plus Architecture and other members of the design team;
- Consideration of Mitigation and Enhancement measures;
- Assessment of Landscape Effects;
- Assessment of Visual Effects; and
- Summary of Significance of Landscape and Visual Amenity Effects.

15.2.3 Definition of Landscape and Visual Effects

For the purpose of this assessment, this chapter adopts the definition of landscape presented in the European Landscape Convention and as such, the term 'landscape' refers equally to areas of rural countryside and urban – built up –areas (typically historically referred to as 'townscape'). The definition of landscape is: -

"An area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors."

The assessment process helps identify the effects of the proposed development on views and on the landscape / townscape. Landscape and visual effects can be quite different and are assessed separately; although the process is similar, and effects ultimately arise as a result of combined impacts upon the landscape and visual amenity of a proposed development. Developments can have significant visual effects but no impact on landscape/townscape character and some can be vice versa.

Landscape Effects are the effects on landscape / townscape as a resource and defined as follows:

"An assessment of landscape effects deals with the effects of change and development on landscape as a resource. The concern ... is with how the proposal will affect the elements that make up the landscape, the aesthetic and perceptual aspects of the landscape and its distinctive character. ... The area of landscape that should be covered in assessing landscape effects should include the site itself and the full extent of the wider landscape around it which the proposed development may influence in a significant manner." (GLVIA3 paragraphs 5.1 and 5.2)

Visual Effects are the effects on Views and Visual Amenity and summarised as follows: -

"…establish the area in which the development may be visible, the different groups of people who may experience views of the development, the places where they will be affected and the nature of the views and visual amenity at those points." (GLVIA3 paragraph 3.13)

15.2.4 Consultations

A consultation meeting was held with the Planning Department of Meath County Council on 23rd November 2021 to review preliminary site layouts, strategy and objectives. The meeting included discussion on existing trees and vegetation, pedestrian connectivity, parks, public open space strategy, social infrastructure, surface water detention, integration of landscape, habitats, and biodiversity.

Potential viewpoints were identified following site surveys in January 2022 and a Viewpoint Booklet formed part of the initial submissions to Meath County Council. Following a review, Meath County Council advised of a potential 8 no. additional viewpoints (email to Stephen Little & Associates dated 12th April 2022). Following this, each of these sites was visited and photographed and this formed part of a subsequent Viewpoint Booklet issued to Meath County Council in advance of a LRD Meeting on 17th May 2022. This meeting also reviewed issues relating to the existing site (and Tree Surveys), the broader landscape plans and principles and the general LVIA process. No further viewpoints were subsequently requested.

A meeting with Meath County Council on 14th February 2023 and included a review of general landscape design and layout issues that were taken into consideration in preparation of the final landscape plans and proposals. This included street tree root barriers, location of play areas, general layout and the future use and management of the land set aside for the future Dunboyne Distributor Road crossing of the Iarnród Éireann railway line.

15.2.5 Baseline Landscape Character Assessment

The baseline study studies extend to include to the wider context into which the proposed development will be introduced. The baseline description of existing conditions forms an objective evaluation of the townscape / landscape character and visual amenity of the study area. This forms the base against which the townscape / landscape and visual effects deriving from the proposed development can be identified, assessed, and measured. It involves a desk-top analysis and review of material including: -

- National and Regional Landscape Character or local Landscape Character Assessments;
- Review of any historical planning applications on or near the Application Site;
- Existing National, Regional or Local Designations and relevant Planning Policy;
- Current and historical Ordinance Survey Ireland (OSI) Maps evidence;
- Aerial Photographs via Bing, Google and OSI; and
- Relevant environment / ecology, cultural heritage, historical and archaeology evidence.

As part of the baseline assessment, the combination of desk-top analysis and site survey allows a

judgment to be made on the key elements that contribute to the landscape character and its wider condition (positive, neutral, or negative) and wider value and sensitivity. Landscape value, quality and sensitivity are affected by factors including: -

(i) whether the resource is common or rare;
(ii) whether it is considered to be of local, regional, national or global importance;
(iii) whether there are any statutory or regulatory limitations / requirements relating to the resource;
(iv) the quality of the resource;
(v) the maturity of the resource, and
(vi) the ability of the resource to accommodate changes.

Terminology	Definition	Summary
Highest Value Landscape	Nationally or regionally important landscape with high quality, highly valued rare or unusual features recognised by designation such as National Parks, Areas of Scenic Value or World Heritage Sites. Distinct landscapes that exhibit a strong structure and character with valued features that combine to give the experience of scenic quality, tranquillity, rarity and harmony. Negligible pedestrian and traffic conflict.	Very vulnerable to change. High Sensitivity
Very Attractive Landscape	Locally or regionally designated landscapes – as designated in Area Plans or by the EPA - or areas where local evidence indicated as being more valued than the surrounding area.	Some ability to absorb change in some situations without having significant effects. Medium Sensitivity
Medium Landscape	"Everyday" or community / undesignated landscapes which may be appreciated by the local community but has no or little wider recognition of its value.	Able to accommodate change without significant effects. Low Sensitivity
Poor Landscape	Low importance and degraded landscapes with few redeeming features. No evidence of being valued by the community	Damaged landscapes very capable of accommodating change. Very Low Sensitivity

Table 15.1: Determination of Landscape Value and Sensitivity

15.2.6 Criteria for Landscape Character Effects

This EIAR Chapter considers how the proposed development would impact on existing landscape elements and resources which are normally associated with the direct effects on the application site itself. The indirect effects of the on the wider landscape are assessed with reference to landscape types or character areas. This is affected by factors including: -

(i) the physical extent and nature of the key elements that make up the proposal;
(ii) the landscape context of these effects; and
(iii) the timescale of impact, such as whether it is temporary (short, medium, or long term), permanent with reversible potentials, or irreversibly permanent.

Terminology	Definition
Major	Total loss or major alteration to key elements / features / characteristics of the baseline (i.e., pre-development) landscape and /or introduction of elements considered to be totally dominant when set within the attributes of the receiving landscape.
Moderate	Partial loss or alteration to one or more key elements / features / characteristics of the baseline (i.e., pre-development) landscape or view and /or introduction of elements that may be prominent but may not be substantially uncharacteristic when set within the attributes of the receiving landscape.
Slight	Minor loss or alteration to one or more key elements / features / characteristics of the baseline (i.e., pre-development) landscape or view and /or introduction of elements that may not be uncharacteristic when set within the attributes of the receiving landscape.

Negligible	Very minor loss or alteration to one or more key elements / features / characteristics of the baseline (i.e., pre-development) landscape or view and /or introduction of elements that are not uncharacteristic with the surrounding landscape - approximating the 'no change' situation.
In those instances where there would be no change to the landscape, the magnitude is recorded as 'zero' and the level of effect as 'no change'.	

Table 15.2: Magnitude Criteria for Landscape Character Effects

15.2.7 Visual Amenity Assessment

Visual Effects are concerned wholly with the effect of the development on views, along with the general visual amenity and are defined by the Landscape Institute in GLVIA3, Paragraph 6.1 which states: -

"An assessment of visual effects deals with the effects of change and development on views available to people and their visual amenity. The concern here is with assessing how the surroundings of individuals or groups of people may be specifically affected by changes in the context and character of views as a result of the change or loss of existing elements of the landscape and/or introduction of new elements."

The baseline studies establish the area from which the proposal may potentially be visible and the different groups of people ("visual receptors") who may experience views or changes to view context.

Viewpoints are usually identified in locations that are publicly accessible, such as roads, public realm / domain areas, footpaths or publicly accessible open spaces. Selection is also based on a determination of the extent of visibility towards the Application Site or from locations where there may be significant numbers of visual receptors who will see the proposed development e.g., main roads. 13 no. viewpoints are chosen to be representative, specific or illustrative and cover as much of the study area as reasonable or necessary and address all areas where there may be changes in terms of views or visual amenity.

Viewer sensitivity is based on the nature of the visual receptor (resident, tourist, commuter etc.) and the visual quality or value attached to a particular view.

Terminology	Definition	Summary
High	Notable views of heritage assets, quality, valued or scenic landscapes. Views that may be designated or feature in guidebooks, scenic tours, associated with culture, literature and art or an important contributor to experience.	People engaged in outdoor activity whose interest is likely to be focused on the landscape or particular views. e.g., hillwalkers, tourists, scenic tours, users of public rights of way or visitors to heritage assets. Residents (at home).
Medium	Ordinary views where the reason for visual receptor to be in the area and does not involve or depend upon an appreciation of the views of the landscape.	Outdoor activity with focus on recreation, sports or water-based activities such as golf, mountain biking, or country sports. Travellers on road and rail. Residents / Communities living within close proximity of the proposal.
Low	Areas that may be viewed by the majority as incidental landscapes where the focus of the viewer is on their work or activity and the setting is not important to the visual amenity or quality of working life.	Landowners for proposal. Workers with employment related to construction and management / maintenance activity and likely to have a low interest or appreciation of the view.

Table 15.3: Viewer Sensitivity and Types

The visual effects deriving from the proposed development are based on the combined judgement of the anticipated change in nature, visual amenity, and duration of the particular view (magnitude) and the nature of the visual receptor (sensitivity). The magnitude and nature of visual effects are based on several factors including: -

- Scale of change;
- Distance from proposed development site;
- Contrast in terms of mass, colour, form and texture deriving from new feature(s);
- Extent of intervening vegetation (and seasonality if deciduous) or buildings and topography;
- Speed of passing visual receptor (and how long view is experienced);
- Angle and elevation of view e.g., oblique, direct, perpendicular;
- Nature of backdrop or skyline; and
- Duration of change or effect.

Where mitigation measures are proposed or relevant, these are described as part of any judgement which are set out as per definitions below:-

Terminology	Definition
Major	A major change or obstruction of a view that may be directly visible, appearing as a prominent and contrasting feature and/or appearing in the foreground / middle ground.
Moderate	A moderate change or partial view of a new element within the view that may be readily noticeable, directly or obliquely visible including glimpsed, partly screened or intermittent views, appearing as a noticeable feature in the middle ground.
Slight	A small level of change, affecting a small part of the view that may be obliquely viewed or partly screened and/or appearing in the background landscape. May include moving views at speed. The proposal forms a minor component in the wider view which might be missed by the casual viewer / observer.
Negligible	The proposal is barely discernible or may be at such a distance that it is very difficult to perceive equating to a no-change situation.

Table 15.4: Magnitude Criteria for Visual Effects

15.2.8 Nature of Landscape and Visual Effects

The assessment process aims to be objective and quantify effects as far as possible. However, landscape and visual assessment has aspects of it that can be considered subjective. Magnitude of change to a view can be factually defined but any subsequent objective assessment should be based on professional training, experience, observation, evidence and informed opinion.

Terminology	Definition
Positive Effect	A change that improves the quality of the landscape character and fits very well with the existing setting.
Neutral	A change which does not affect the scale, landform or pattern of the landscape and maintains existing quality.
Adverse Effect	A change which reduces the quality of the landscape and cannot be fully mitigated.

Table 15.5: Nature of Landscape and Visual Effects

15.2.9 Significance Criteria and Determination

Final judgment is made about which landscape effects are significant. Significance of an effect is determined by the combination of sensitivity or value of the affected receptor(s) and the predicted magnitude of change which combine to form a level of effect.

The assessment of likely significant environmental effects as a result of the proposed development takes into account the construction and operational phases. The duration of the effect has been assessed as either 'short-term', 'medium-term' or 'long-term'. Short-term is considered to be up to 1 year, medium-term is considered to be between 1 and 10 years and long-term is considered to be greater than 10 years. Note that this proposed development is regarded as being permanent and long-term in LVIA terms.

This LVIA bases "Significance" of effects on the following definitions: -

"Significant" in the Oxford Dictionary 2023 is defined as "Sufficiently great or important to be worthy of attention; noteworthy"; and

"Significance" in the GLVIA guidelines 2013 is defined as "A measure of the importance or gravity of the environmental effect, defined by significance criteria specific to the environmental topic."

▪ Sensitive views or visual receptors; ▪ Effects on recognised scenic, rare or distinctive landscapes; ▪ Effects on mature or diverse landscape elements, features, characteristics, aesthetic or perceptual qualities; and ▪ Large scale changes	More Significant ↑
▪ Effects on poorer condition or degraded landscapes; ▪ Effects on low sensitivity visual receptors; and ▪ Small scale changes	↓ Less Significant

Table 15.6: Summary Scale of Significance

Significance of visual effects is not absolute and can only be defined in relation to each development and its specific location. Usually an effect is considered 'significant' if the level of effect is 'moderate/substantial' or 'substantial'. The significance of landscape and visual effects is determined by cross-referencing sensitivity of landscape or view with the magnitude of change.

Landscape and Visual Sensitivity	Magnitude of Effect			
	Negligible	**Low**	**Medium**	**High**
Negligible	Negligible	Negligible or minor	Negligible or minor	Minor
Low	Negligible or minor	Negligible or minor	Minor	Minor or moderate
Medium	Negligible or minor	Minor	Moderate	Moderate or major
High	Minor	Minor or moderate	Moderate or major	Major

Table 15.7: Assessment of Significance Matrix

15.2.10 Duration of Effects

The assessment of likely significant environmental effects as a result of the proposed development takes into account the construction and operational phases. Note that the operation of this proposed

development is regarded as being permanent in LVIA terms.

Terminology	Definition
Temporary Effects	Effect lasting one year or less.
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 60 years.

Table 15.8: Duration of Effects

15.2.11 Photomontages and Visualisations

To support the visual assessment, photomontages, wirelines and graphics have been prepared from 13 no. representative viewpoints to allow assessment of its potential scale and nature in these views and these are contained in **Appendix 15B** and based on Landscape Institute Technical Guidance Note 06/19: 'Visual Representation of Development Proposals (2019). This includes guidance on photographic technology, including camera selection, choice of lens and printing.

The principal function of a photomontage is as an illustrative tool to demonstrate development proposals for the benefit of the consultation process and any planning application. These images have the advantage of providing a high degree of accuracy on the basis of mathematical formulae correlated with OSI digital survey data and are used as the basis of the Visual Assessment.

15.3 RECEIVING ENVIRONMENT AND EXISTING LANDSCAPE SETTING

15.3.1 Establishing the Study Area

The study area includes the Application Site itself and the wider landscape where the Development may have an influence either directly or indirectly. There is no specific guidance on extents of study areas applicable to this type of development in Ireland. Given the baseline landscape / townscape setting and context, the study area is assessed as being primarily within a short range area to the south-east of Dunboyne following site surveys which confirmed any significant views are within this range.

15.3.2 Site Location

The Application Site comprises 16.9 hectares of land set to the south of Station Road (L2228) in the townland of Castlefarm, Ruskin and Clonee to the south-east of Dunboyne in Co. Meath. Dublin City centre is located 15km to the south. See Appendix 13A - Figure 13.1 Site Location Plan

The site comprises a landholding of an approximate rectangle that abuts the operational Irish Rail (Iarnród Éireann) railway line to the west and rural lands or countryside to the south and east. The lands to the north are being finished out as part of a new residential development (called Castle Farm Meadows) as per planning consent RA180561. On-going construction at time of writing is altering the landscape in this area as the associated planting works are completed.

Two roundabouts on the R147 (Old Navan Road) to be upgraded are a slight remove from the housing site.

15.3.3 Baseline Landscape Character

<u>Landform, Topography and Drainage</u>

The site comprises open fields set in a low-lying rural landscape with levels set between +65m and +68m ASL. The land has a very gently undulating character with no steep slopes or gradients which have not been subject to any historical changes with the lands used for farming purposes. Any

modifications to levels would have been related to agricultural use and would not be categorised as significant. The ground levels rise by 1 to 2m just beyond the western boundary of the site with this variation associated with the railway line corridor constructed in the 19th century.

Existing Site Setting and Context

Figure 15.1: Aerial Photograph of Application Site and local area (March 2022 courtesy of Google-Earth)

The site is bound to the north, south and east by drainage ditches set within hedgerows. To the north is Castle Stream with man-made banks and concrete walls in the vicinity of the railway bridge to the north-west of the site but otherwise is very inconspicuous set to the base of a wooded hedgerow or riparian corridor with any water being masked by peripheral vegetation. The collective watercourses flow east to join the Tolka River (or historically known Tullaghanoge River), located approximately 415m from the Application Site at its closest point, which flows on south into Dublin city. A smaller ditch is located to the core of the site and historically defined the demesne boundaries of Rusk and Castlefarm.

No standing water bodies or ponds are noted on OSI Maps or evidenced in the topographical survey undertaken in July 2021 (J Weir Land Surveying Limited). All fields are self-draining with ditches or sheughs located on field boundaries aside or below hedgerows.

Land use and Vegetation

The site comprises farmlands set out across four medium to large fields that are used for arable and pasture farming purposes. OSI maps indicate that the southern fields were historically on the eastern edge of a wider demesne associated with Rusk House in the 19th century.

The fields have been subject to historical intensive agriculture use with little space left between the field edge and boundary hedges. Fields are bound by hawthorn (Crataegus monogyna) and blackthorn (Prunus spinosa) dominated hedgerows with some sections including colonising scrub such as brier, gorse (Ulex europaeus) and extensive ivy (Hedera helix). The Tree Survey (A Boe 2022) noted the following:-

"The tree population has arisen through a combination of deliberate planting and self-seeding. The amenity value of the majority of the trees should be considered low to medium due to being mostly self-seeded and unmaintained" and "The remaining contribution of the majority of the trees is very limited with the exception of the Oak woodland to the South of the site."

The Tree Survey identified 385 no. trees surveyed as individuals and groups with the majority being mixed species groups, Ash (Fraxinus excelsior) and Hawthorn (Crataegus monogyna). However there are notable line of Beech trees to the centre and east of the site. See Appendix 15A – Tree Survey. The majority were categorised as "early-mature" and "mature". In terms of Retention Category, the survey concluded as follows:-

- 86% of the trees have been categorised as C and thereby noted as unremarkable trees of limited merit, small-growing, young species which have a relatively low potential amenity value, and low landscape benefits;
- 4.4% of the trees have been categorised as U and noted as being is a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years and/or are unsuitable for retention in the proximity of new dwellings or areas of public open space.
- The remainder, approximately 10%, are classed as B categorised as healthy attractive trees with remediable defects that are in a condition as to be able to make a significant contribution for a minimum of 20 years.

Existing Site Setting and Context

Photo 15.1: View east across Application Site towards group trees on the south-eastern boundary

The ecology survey (See Chapter 6) identified no significant habitats, designated sites or individual or group of species on the Application Site.

The site boundaries to the east, north and south abut open fields either used for farming or unused at this time with the boundaries defined by mixed quality and height hedgerows. Part of the lands to the north towards Station Road are being finished out as The Paddocks – Castle Farm development for 83 no. residential dwellings (as approved under RA180561). This sits aside further residential areas off Station Road including the recently constructed 20 no. terraced houses at Castle Farm Meadows.

Landscape History, Infrastructure and Settlement

OSI Map evidence shows that the field structure and layout has remained largely unaltered since the 19th century and the general alignment of hedgerows and fields remains very similar. The Application Site lands are shown as being devoid of features such as lanes, trees, buildings or names with the only map annotation being those of field boundaries.

The site is crossed by an overhead ESB 220kv high-voltage powerline with a 41m high steel lattice

tower that has a base that extends across approximately 80m² to the mid-east of the site with towers acting as notable land-marks in the east Dunboyne landscape.

The most significant change to the field structure and pattern was the construction of the Dublin-Dunboyne Railway line with the original Dunboyne station opening in 1862 as part of the Clonsilla to Navan line. The line defines the western boundary of the Application Site for approximately 575m. The line closed in 1947 but reopened in 2010. The station is located approximately 430m to the north of the Application Site and includes 300 no. surface car parking spaces serving as a park & ride stop for commuters.

Existing Site Setting and Context

Photo 15.2: The western boundary of the Application Site is defined by the Iarnród Éireann Dunboyne to Dublin railway line that sits on a slightly raised bank.

There are no buildings on the Application Site and the only access is a gravel farm track that aligns part of the railway corridor to the west of the site. This connects to the yard within the property to the north at Castlefarm that includes a privately owned detached dwelling and outbuildings (including the Dunboyne Herbal Clinic) within a mature garden set between the Application Site and Station Road. There are no vehicular or pedestrian / farm accesses across the railway line to the west towards the residential housing estates at Beechdale or Larchfield or any connection lanes to the farmlands to the east and south.

The routes or alignments of the nearest roads (namely Station Road (L2228) the R147 /R156 Road, over 625m to the east at Clonee) are very similar to that shown on 19th century OSI Maps though they have been clearly widened and formalised since that time. While the site field pattern has remained relatively similar, Dunboyne extended significantly over the 20th century with new housing estates built out across the landscape between the adjacent railway line and historic town core, located 1km to the north-west. These include Beechdale (dating from the 1980s and 1990s comprising 293 no. detached and semi-detached houses) and Larchfield (dating from the 1990s including 89 no. detached houses). Further housing estates off Station Road to the north-west and Rooske Road to the west comprise similar detached, semi-detached and terraced houses set off short cul-de-sacs and lanes. The estates merge into the wider townscape of Dunboyne centre including sports pitches, institutional lands, open spaces and commercial / retail lands.

To the north at Castle Farm is a cluster of 6 no. detached dwellings (bungalows) set off Station Road. As noted above, the housing development at Castle Farm to the south of Station Road is currently being finished out. Further to the east, there is a collective of approximately 25 no. dwellings at the junction of Station Road and the R147 Road towards Clonee, between 390m and 750m from the

Application Site.

Station Road links a roundabout at the R147 Road / R157 Road to the east with Main Street and Dunboyne centre to the west. The road is set between low rise housing and commercial premises and bound by hedgerows for much of its route limiting views across areas of adjacent landscapes including towards the Application Site. The R157 is the primary route from Dunboyne to the M3 Motorway which cuts a swathe through the Co. Meath landscape approximately 750m to the east of the Application Site.

The nearest main road to the west is the Rooske Road over 600m from the Application Site with the intervening lands characterised by housing estates.

Existing Site Setting and Context

Photo 15.3: The site will be accessed off Station Road (L2228) to the north near the area where the new Castle Farm Meadows (residential) development has recently been completed.

Adjacent Landscape Character

Dunboyne town is centred on a crossroad formed by the R156 (regional road) and the old Maynooth Road (formerly designated R157) and located in the Metropolitan Area of the Greater Dublin Area. The census recorded the population of Dunboyne rose from 3,080 to 7,272 inhabitants between 1996 and 2016 related in part to the close proximity of Dublin City and this expansion being, in part, due to commuter reasons.

The settlement grew via association with Dunboyne Castle (1km due north-west from the Application Site) which was built c.1764 with elements dating back to c.1720. The National Inventory of Architectural Heritage (NIAH) identifies a number of sites in close proximity to the castle suggesting possible early medieval activity and medieval enclosure. The castle was repurposed and opened as a 4* hotel with 145 rooms in 2006. Further historic buildings within Dunboyne include the National School (1905-10), the Parochial House (1875-1880), Courthill House (1820-1840), St Peter's Church of Ireland (1865-1870) and the Dunboyne (railway) Bridge (1860-1865).

Set away from the historic core and towards the town periphery are several large townscape elements set between the more recent residential housing estates including institutional premises / schools, sports pitches including St Peter's GAA and supermarkets.

The Dunboyne Clonee Pace Local Area Plan 2009-2015 noted that "*Dunboyne and Clonee have historically been under significant development pressure, primarily of a residential nature, due to their geographical proximity to Dublin and good transportation links to the wider Greater Dublin Area"*. LAP Section 2.2 also noted that the *"… footprint of Dunboyne is broad with the land take of its residential*

element particularly large due to its relatively low density" and the "the development of the town is spatially imbalanced due to the presence of the railway corridor and the Tolka River flood plain to the east".

The newer housing estates and developments date from the last 40 years and comprise a mix of terraced, detached and semi-detached single, dormer and two-story houses with enclosed rear gardens. The houses tend to be set off small lanes and cul-de-sacs with open front gardens planted with occasional trees and ornamental shrubs. The close proximity of the town and nature of residential and commercial developments has led to fragmentation of the urban / rural edge in some locations though the railway line has served as a boundary to some residential areas.

Existing Site Setting and Context

Photo 15.5: Internal view from the Beechdale Housing Estate looking east in direction of the Application Site which is obscured by buildings and trees (aligning the intervening Iarnród Éireann Dunboyne to Dublin railway line).

To the south and east, the landscape is characterised initially by open rural farmland in pasture and arable draped over a gently undulating topography divided by broad roads and associated roundabouts (R147 and R149) with the most significant being the M3 Motorway. The undulating nature of the countryside together with the presence of larger properties, collectives of houses and tree belts has resulted in a varied but mostly rural and farmed landscape though the sense is one of an area on the city periphery.

Beyond the M3 Motorway are large scale commercial and industrial parks (including the Facebook Datacentre and the IBM Technology Campus) and ESB sub-stations set in and around the Co. Dublin / Co. Meath county boundary towards Mulhuddart (less than 3.5km from the Application Site). These areas signify the current edge of the urbanised townscape of Dublin city.

In transport terms, Dunboyne is well served by railway line and the nearby M3 Motorway. Dunboyne Train Station is located 450m to the north of the core Application Site.

Public Amenities and Facilities

The site is privately owned and there is no public access, paths or rights or way. A review of information provided by Fáilte Ireland shows that there are no promoted tourism amenities, sites, routes or attractions on or in close proximity to the Application Site. There are no public footpaths / rights of way, amenities or designated cycle routes in close proximity though the area to the east of the site is used for informal dog walking via a gated access off Station Road near the Clonee Sawmills.

To the south, east and north, the lands are primarily private farmlands with no public access,

amenities or facilities. The railway line ensures no possible access from the west towards Dunboyne.

Dunboyne town has a number of public parks though these are largely open spaces associated with more recent housing developments such as Beechdale and Larchfield. Being enclosed by dense residential blocks, there are no significant views from these areas or the town centre towards the Application Site. The Dunboyne Athletic Club including sports pitches is located approximately 675m to the west of the site off Rooske Road but there are no views in the direction of the Application Site.

Dunboyne Castle (Hotel) is set within a mature landscape setting from which there are no views towards the Application Site due to intervening vegetation and built environment.

Existing Site Setting and Context

Photo 15.4: Elevated view (over wall) from embankment at Station Road bridge across the east of Dunboyne and Iarnród Éireann Dunboyne to Dublin railway line. The Application Site is located to the east / left of the railway line.

15.3.4 Published Landscape / Townscape Character Assessments

The Landscape Character Assessment for Co. Meath was prepared in May 2007 and is included in Appendix 5 within the Meath County Development Plan 2021-2027. While now slightly dated, it includes broad overview of the landscape character, description, condition and sensitivity for each area and is a useful research document as a base for assessment of this study area.

The LCA divides the County into 20 no. Landscape Character Types and the Application Site is located within LCA No. 11 South East Lowlands and carries the following landscape description:-

"The land is extensively used for pasture in the north, with arable land more prominent further south particularly in the Ratoath environs. The landscape condition gradually deteriorates to the south of Dunshaughlin where development pressure from the Dublin metropolitan area becomes more evident (particularly around Ratoath and Dunboyne.) The landscape is relatively enclosed due to the topography and wooded hedgerows although longer views are afforded at the top of many drumlins. Many of the views in the lowlands are restricted to those along the road corridors and the immediate hinterland".

With reference to the Key Characteristics, the following are noted within the LCA and of relevance to the Application Site area:-

- ***Land Use*** *- Mix of small pasture fields with some large arable fields in the south; Small copses of beech and birch woodland; and Extensive estate landscapes.*

- ***Ecology & Habitat*** *- No designations; and Strong network of wooded hedgerows.*
- ***History & Culture*** *- Long established mixed scale farmland; Estate landscapes.*
- ***Tourism*** *- Historic features in centre of Dunboyne;*
- ***Settlements and Built Structures*** *- Main settlement is Dunboyne; Settlement type is small villages and towns; Settlements have most vernacular buildings; Built development in countryside consists of individual dwellings, generally modern rather than traditional buildings with concentrations of modern development adjacent to the main towns of Dunshaughlin and Dunboyne.*

The M3 Motorway was under development at the time the LCA was written but it correctly predicted that it would "…dramatically change the scale of road infrastructure" and that "Motorway interchanges are likely to encourage further development around them". It went on to state that "Significant residential development in Dunboyne is likely to be exacerbated by improved road infrastructure".

With specific regard to Dunboyne, the LCA states it "…is a large town with an attractive historic centre, particularly the village green surrounded by mature lime trees. The town is an important traffic node linking north Dublin with Navan to the north and Kinnegad to the west. There is extensive modern housing on the periphery and ribbon development adjacent to the main arterial routes. The interface between the edge of town and the surrounding countryside is in poor condition". The LCA later summarises it as a " Large growth town with attractive historic centre and village green. Large modern housing developments on outskirts. Degraded landscape setting".

Within the Meath County Development Plan 2021-2027, there are more up-to-date references to Dunboyne including noting it is "…located along the North-West Strategic Residential and Employment Corridor as set out in the Dublin Metropolitan Area Strategic Plan (MASP). It is a strategically located multi-modal settlement that has benefitted from substantial investment in road and rail infrastructure over the last decade". (MCDP 2.10.1).

It also notes that "Dunboyne is "…an important centre for economic growth in the County due to its location in the Dublin Metropolitan Area and along a multi-modal corridor. The town has enjoyed recent successes in attracting inward investment. It is an objective of this Plan to continue to attract high-quality investment to the town. In addition, there is capacity for the town to accommodate significant population growth, with strategically located lands zoned for residential use in proximity to the rail stations available for development".

MCDP Section 2.10 Population and Household Distribution outlines the rationale for "concentrating growth in the large urban centres that have a comprehensive range of services and public transport provision with the capacity to support growth" and later specifically includes Dunboyne as a location where development can be concentrated with it being the "… primary focus of future growth".

15.3.5 Planning and Landscape / Townscape Designations

Meath County Development Plan 2021-2027 (MCDP)

Within the MCDP, Dunboyne is categorised as a "Self-Sustaining Growth Towns" with the description of this being "Towns with a moderate level of jobs and services – includes subcounty market and commuter towns with good transport links and capacity for continued commensurate growth to become more self-sustaining".

MCDP Settlement Strategy Objective OBJ 9 states the objective to "…continue to promote Dunboyne as a key settlement in the Metropolitan Area of Dublin" that is "…based on the principles of balanced and sustainable development that support a compact urban from and integration of land use and transport."

On the Land Use Zoning Map (MCDP Sheet No. 13a), the Application Site is predominantly zoned "A2 New Residential" with an indicative road route running through the site. Lands to the north (beyond the site boundary) are zoned "F1 Open Space". The objective of A2 is "To provide for new residential communities with ancillary community facilities, neighbourhood facilities as considered appropriate".

With reference to Public Open Space in such areas, MCDP Section 11.5.11 notes that "… residential developments should be designed so as to complement the residential layout and be informally supervised by residents. A variety of types and sizes of open spaces should be provided at suitable locations to cater for the active and passive recreational needs of children and adults of all ages". Policy DM OBJ 26 goes on to state "Public open space shall be provided for residential development at a minimum rate of 15% of total site area. In all cases lands zoned F1 Open Space, G1 Community Infrastructure and H1 High Amenity cannot be included as part of the 15%. Each residential development proposal shall be accompanied by a statement setting out how the scheme complies with this requirement."

In terms of Landscape Character Assessment, Section 8.17.3 of the MCDP includes the following policies:-

- *HER POL 52 To protect and enhance the quality, character, and distinctiveness of the landscapes of the County in accordance with national policy and guidelines and the recommendations of the Meath Landscape Character Assessment (2007) … to ensure that new development meets high standards of siting and design.*
- *HER POL 53 To discourage proposals necessitating the removal of extensive amount of trees, hedgerows and historic walls or other distinctive boundary treatments.*
- *HER OBJ 49 To ensure that the management of development will have regard to the value of the landscape, its character, importance, sensitivity and capacity to absorb change as outlined in Appendix 5 Meath Landscape Character Assessment and its recommendations.*
- *HER OBJ 50 To require landscape and visual impact assessments prepared by suitably qualified professionals be submitted with planning applications for development which may have significant impact on landscape character areas of medium or high sensitivity.*

Related in part to landscape and visual considerations, MCDP Section 8.9.7 Woodlands, Hedgerows and Trees notes that "Although the County is one of the least wooded counties, its woodlands, hedgerows and individual trees contribute positively to biodiversity and landscape character".

In terms of Boundary Treatments, MCDP 11.5.13 includes a number of policies including DM POL 8 that states a requirement for the "…provision of high quality, durable, appropriately designed and secure boundary treatments in all developments".

MCDP Policy DM OBJ 38 states "All proposals for residential developments above 75 units shall incorporate works of public art".

Dunboyne Clonee Pace Local Area Plan 2009-2015

The stated Objective within this LAP "To consolidate the centre of Dunboyne as the focal point for cultural, social and retail facilities and to encourage the provision of new retail uses".

The Application Site is partially captured within the area outlined as being part of the "Integrated Action Area Plan for Land East of the Railway Line" (IAAP) setting this out as the largest single tract of residentially zoned and undeveloped land in Dunboyne. The IAAP is a non-statutory plan which was adopted by Meath County Council in December 2006. It was prepared to consider the potential for sustainable and planned development east of the railway line in Dunboyne in response to the (then) specific objective DB16 of the 2007 County Development Plan. Consequently, the zoning for the land within the LAP as "A2 New Residential" and the location of the new distributor road corresponds with that identified in the current MCDP. However, it also annotates that open space (F1) is to be located within the Application Site under and along the line of the overhead 220kv powerline. The key objectives are set out as follows:-

- *To ensure that all development is sustainable;*
- *Development of the IAAP area does not exacerbate existing flooding problems in the town;*
- *Promote a mixture of uses to ensure the sustainable development of the IAAP area;*
- *Buildings proposed for the area should be robust in their design to allow for future Changes of use. In the case of new housing they should be designed with 'life change' in mind in terms of internal space*

standards and should be adaptable;

- *Promote good access and linkage to the rest of the town and adjoining transportation network for vehicles, pedestrians and cyclists. Ensure phasing of development is consistent with future provision and improvement of roads;*
- *Promote areas of quality public and private open space utilising existing and proposed open space and green corridors; and*
- *Ensure development potential accruing from the reinstatement of the rail line is maximised.*

There are no sites with special designations to protect the natural heritage (for example, candidate Special Area of Conservation, Special Protection Area, or Natural Heritage Area) within the LAP area.

LAP Policy LAN 2 states that "Mature trees and hedgerows will be preserved and protected in recognition of the contribution mature trees make to the landscape and character of an area in addition to their value as wildlife corridors. Open space and walkways will incorporate, where possible and appropriate, existing mature trees and hedgerows and contain new planting to strengthen potential habitat links". Policy LAN 3 states that "Native species (preferably of native genetic stock) will be used for preference in planting schemes in existing and new parks and in open space areas".

Current Local Area Plan

There is no current Local Area Plan for Dunboyne at this time though the MCDP states under Objective SH OBJ5 the intent to prepare on during the lifetime of the current plan.

Cultural Heritage and National Inventory of Architectural Heritage Designations

The National Inventory of Architectural Heritage (NIAH) identifies no sites or monuments on the Application Site. The nearest are the Dunboyne (railway) Bridge and Water Tower dating from the 1860s located over 300m to the north of the Application Site. MCDP Map 8.1.14 identifies the Dunboyne Architectural Conservation Area (ACA) which is located approximately 800m distant from the Application Site at the closest point. The ACA includes numerous NIAH sites but Intervening townscape and vegetation ensure there are no views from this area towards the site.

Environmental Protection Agency

Maps available from the Environmental Protection Agency (EPA) indicate no protected landscapes, environment or ecology areas on or close to the Application Site.

15.3.6 Landscape Sensitivity

Sensitivity is based on the landscape's physical landform shape, scale, pattern, its visual environment/enclosure, any sense of remoteness or tranquillity, presence of man-made features, its skyline, inter-visibility with adjacent sensitive areas and the presence of sensitive or rare features. Landscape sensitivity ultimately is an assessment of the ability of a surrounding landscape or townscape to accommodate and absorb change within the Application Site without affecting its character.

Existing Site Setting and Context

Photo 15.6: Internal view of Application Site lands showing current land-use and nature of overhead ESB pylons.

Within the MCDP, Map 9.1 identifies the "Rural Area Types – Development Pressure" and annotates the Application Site and Dunboyne area as "Rural Areas under Strong Urban Influences". In terms of wider sensitivity, MCDP Section 8.17.5 defers to the Meath LAP.

MCDP LCA Map 3 rates the Landscape Sensitivity of the wider county and shows the Application Site and wider "South East Lowlands" as having "Moderate or Medium Sensitivity". This is described as "A landscape that can accommodate a certain amount of change without affecting the overall character. There are unlikely to be large numbers of people using or viewing this landscape". Associated maps related to the LCA identify no notable trees, landmarks, ecological sites or protected structures near the site that would be a factor in reducing sensitivity at a site-specific level.

In visual amenity terms, the Application Site itself is rated as having Low sensitivity on account of a limited visual envelope due to a combination of transport infrastructure and built-up townscape towards Dunboyne and the low rolling topography and accumulation of mature hedgerows in other directions. In general terms, the Application Site is well concealed from public vantage points. From the majority of areas in south and east Dunboyne, it would be considered that the site has a good ability to absorb changes without significant detriment to landscape / townscape character or the visual amenity of this area.

The lands on and aside the Application Site are zoned for residential development in the Development Plan and the proximity to the town and lower landscape sensitivity would have been factored into historical considerations by Meath County Council in determining this designation.

15.3.7 Landscape Quality and Value

The Application Site comprises a rural landscape set on the urban periphery which is largely managed farmland and, in broad terms, the landscape value and quality would be categorised as Medium based on its "everyday" character and undesignated status in landscape or amenity terms. The gently rolling landscape, while attractive in its own right does not possess many notable features other than hedgerows and a tree belt and it would not be considered unique or rare in this part of Ireland. The cores of the fields are intensely managed arable lands and there is little in the way of any species or landscape diversity away from hedgerows and ditches that would result in a higher category of value.

The south and east of Dunboyne is characterised by extensive housing estates that have been built out over the last couple of decades with retail, commercial and institutional development aligning the main roads leading from the town centre. Where the urban edge meets the rural landscape, there are often formal and abrupt edges with the adjacent fields being subject to differing management regimes. However, the Application Site displays no visible signs of anti-social behaviour that are often associated with rural landscapes on town edges.

Existing Site Setting and Context

Photo 15.7: The recently constructed Castle Farm Meadows (residential) development to the north of the Application Site

15.3.8 Baseline Visual Evaluation

Site surveys were undertaken to establish locations where there are potential views of the proposed development or where key visual receptor groups might visit, work or stay and any general movement through the area. Built-up townscape, infrastructure and vegetation are features of the landscape / townscape around Balbriggan and this ensures that views consistently change in context, scale and extent with many views of the Application Site, even from close proximity locations closed off.

Reference was also made to Views and Prospects to be protected identified within the MCDP Map 8.6 which identifies approximately 100 designated locations across the county but none are within Dunboyne or in close proximity to the Application Site.

Viewpoints were selected within publicly accessible areas based on the following criteria:-

- Site investigation to establish those locations where there was likely to be significant views (e.g., exposed and elevated landscapes);
- Site investigation to establish those locations where there was likely to be a significant number of visual receptors (e.g., main roads or town areas); and
- Ensuring that key areas in the broader study area are covered to give representative likely visual effect.

Meath County Council requested that assessment be made from additional viewpoints in April 2022 and a total of 13 no. representative viewpoints for the visual assessment are taken from the following locations:-

Representative Viewpoints Location Map

- Viewpoint Nos. 1 to 5 – Beechdale;
- Viewpoint No. 6 – Chestnut Grove;
- Viewpoint No. 7 – Larchfield;
- Viewpoint No. 8 – Castle Farm;
- Viewpoint No. 9 – L2228 Station Road, Dunboyne Railway Bridge;
- Viewpoint No.10 – Dunboyne Train Station;
- Viewpoint No. 11 – L2228 Station Road, Castle Farm;
- Viewpoint No. 12 – L228 Station Road near Clonee Sawmills; and
- Viewpoint No. 13 - R147 Road, Clonee

Figure 15.2: Representative Viewpoint Location Map

15.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

15.4.1 Proposed Development

A detailed description of the proposed development is provided at Chapter 3 and is not repeated here. The development is summarised as follows:-

Permission is sought for a period of 10 Years for a proposed development on a site of approximately 16.9Ha consisting of 716no. residential units in a mix of houses, duplex and apartment buildings ranging in height from 2 to 7 storeys overall; comprising of 155no. 2 storey houses; 517no. apartments accommodated in 8no. buildings ranging in height from 4 to 7 storeys; 44no. duplex units accommodated in 2no. 3 storey terraces; 1no. childcare facility (c.602sqm) located at ground floor level of Block B1; public open space; communal and private open space; public lighting; car parking, including basement car parking under some of the apartments; secure bicycle parking; and all associated and ancillary site development and infrastructural works, hard and soft landscaping and boundary treatment works, provision of c. 470m of new distributor road; provide a 200mm diameter watermain in existing section of southern distributor road adjacent to recently constructed Castle Farm development; upgrade of junction of southern distributor road and L2228 (Station Road) to provide a signalised junction with pedestrian crossings, including ancillary adjustments to road markings on both roads; provision of foul drainage pumping station; provision of a compensatory

storage area adjacent to Castle Stream; ESB Sub-Stations; and improvement works to 2 no. roundabouts on the R147 (Old Navan Road).

In order to accommodate this development and other developments in and around the Dunboyne area, Irish Water will be required to upgrade c. 1,100m of existing 200mm uPVC watermain so as to provide a 400mm ID watermain in its place. This is to be undertaken by Irish Water under their exempted development provisions and these works do not form part of this planning application as a result.

The planning application includes an 470m length of distributor road linking to that part of the distributor road already built as part of the Castle Farm Meadows development which ultimately connects with Station Road. This proposed road forms part of the overall Dunboyne Distributor Road; an objective of the Meath County Development Plan 2021-2027. It is intended as part of that Development Plan objective that in the future that distributor road would be extended southwards and then eastwards over the railway line. The design for this future extension to the distributor road and bridge has been included in this application as evidence that it provides a viable workable solution, however permission for that extension is not being sought at this time as it is not required to cater for this development.

Of relevance to the LVIA Chapter, the following are the most appreciable elements:-

- Parking to serve the proposed development will be provided at surface level in curtilage and on street with an underground car park located under Block A1 and A3;
- The main vehicular access will be a core spine road that links to the L2228 Station Road approximately 285m to the north of the site. This will provide access to the proposed dwellings and 887no. car parking spaces (355no. in a basement) including 16no. creche car parking spaces;
- Internally there will be a hierarchy of roads including provision for bus, pedestrian and cycle routes to provide linkages to all development areas and existing road network;
- Provision of cycle and pedestrian linkages including a new cycle-link to the town centre. Within the siter there will be 1,362no. secure bicycle parking spaces, including 12no. creche bicycle parking spaces;
- Provision of compensatory storage area to Castle Stream; and
- Extensive landscape works related to public open space (c. 31,544m²) including equipped children's play areas, boundary planting, landscape buffers, amenity planting, semi-mature avenue trees, extra heavy standard and standard garden trees, hedgerow planting and meadow / wildflower and grass seeding works. Further open space for communal areas (c. 6,830m²) are proposed in proximity to the Apartment blocks.

15.4.2 Site Layout and Landscape Design Considerations

As part of the design process, existing environmental and technical constraints and assets were reviewed with the design team and the landscape design considerations focused on provision of public realm areas, open spaces, playgrounds, and linkages / connectivity within the proposed development site that would be accessible to all members of the community. The objectives include creation of different landscape treatments including avenue tree types and building types to create identifiable character zones.

In terms of Green Infrastructure and Connectivity, the following elements are designed into the proposed development:-

- The main vehicular, cyclist and pedestrian access will be a core spine road that links to the L2228 Station Road approximately 285m to the north of the site;
- The main link street through the site, is designed to provide a strong "green" boulevard character that is aligned with avenue trees, landscape areas and broad walking routes and cycle-ways;

- Off this is a clear hierarchy of roads and interconnected streets to enable residents, users and visitors to move in a sustainable manner (as alternative options to vehicle trips) to the childcare facility and towards Station Road / Dunboyne;
- Link paths across the site will provide a safe environment for walkers, runners and cyclists across the site and to the core and linear open spaces including new pedestrian / cyclists bridges over the ditches where necessary; and
- Landscape areas will be retained and enhanced towards the site boundary and throughout the site to allow for connected habitat creation and wildlife corridors. This will include areas managed for biodiversity and ecosystems that will see a net gain of biodiversity on the site.

In terms of Parklands and Open Space, the following elements are designed into the proposed development:-

- The proposed layout includes significant open space which is interconnected by landscaped links or pedestrian paths that have a functional and aesthetic purpose with the collective exceeding the open space requirements as set out in Objective 26 of the Development Plan;
- The core open space within the Oakfield Development will be the rectangular open space to the centre of the site which will have a mix of informal and formal landscape character with recreational and amenity spaces;
- On-going open space management plans will identify areas that can be managed to encourage habitats creation as the designed landscape measures mature and evolve;
- Retention of existing natural features to form part of public open space and peripheral vegetation / hedgerows where feasible on information from Tree Survey Report (Andy Boe 2022) and Ecology Assessments;
- All age groups will be catered for with the layout based on best practice in terms of safe and aesthetic design proposals that will complement interaction between varied groups with Universal Design being the overring consideration. This will include provision of playgrounds to cater for the recreational and educational requirements of children of residents. These will be designed to be both secure and overlooked in line with RoSPA safety advice and European Standard (EN 1176). Playgrounds are located well away from any ESB infrastructure;
- The site layout has been designed in a manner that allows for natural surveillance of all open spaces with houses fronting these areas to give a feeling of security and encourage positive social behaviour;
- The design sets out a clear distinction between public, communal and private spaces. Public spaces will feel welcome to all, while communal spaces associated with the Apartments will be differentiated from the public either physically or perceptively; and
- Open spaces are designed with consideration given to their long term management ensuring this is not onerous with heavy resource requirements.

15.5 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

15.5.1 Introduction

Any assessment must be measured against that of the situation that pertains at present. In the case of this site, it is – on balance – Medium in terms of landscape quality and condition and Low in terms of landscape sensitivity. The lands have been affected by the close proximity of the town edge and adjacent transport infrastructure and being on a rural/town interface but the fields and peripheral areas have a “Everyday” character which may be appreciated by the local landowners or the low numbers of those who visit these fields but has no or little wider recognition of its value beyond that.

15.5.2 Construction Stage

The nature of groundworks, construction activity, road building and associated infrastructure will mean that the core of the Application Site will be subject to Major alteration on account of re-grading and profiling works. The elements that will have landscape and visual impacts are as follows:

- New access to connect to existing road towards Station Road to the north;
- Fixed construction plant, including cranes and scaffolding and gantries;
- Earthworks and ground profiling;
- Underground services installation and drainage including SUDs;
- Replacement and repair of boundary fencing;
- Mobile construction plant, such as excavators and lorries;
- Storage and compound areas;
- Erection of welfare facilities and retention of existing protective hoardings;
- Security and safety lighting; and
- The presence of an evolving development.

15.5.2.1 In terms existing trees and vegetation, the following summarises direct impacts to trees and tree groups as identified within the Tree Survey (Any Boe 2022):-

- Felling of 4 no. trees (T002, T010, T021 and T032) categorised "U" on basis of their health and condition;
- Felling of 4 no. trees or groups of trees (T008, T011, T035 and T036) categorised "C" to facilitate development;
- Felling of 3 no. Beech trees (T004, T005 and T032) categorised "B" to facilitate development;
- Canopy reduction or removal of part of tree group is required to 3 no. trees groups (T033, T038 and T039).
- Removal of approximately 365 linear meters of mixed quality hedgerows to the centre of the Application Site though many of these are sparse or not of any significance in landscape or visual amenity terms.

The majority of trees requiring felling or monitoring for health on this site are Ash (Fraxinus excelsior) with the reason being they are unfortunately suffering Ash die-back (Hymenoscyphus fraxineus). No high quality (Category A) trees exist on the site or are to be felled to facilitate development, The amount of trees rated as being Category B and C that are to be felled to facilitate the development are 7 no. (equating to 1.8% of all the trees or tree groups on this site) and sections of hedgerows to facilitate access or compensatory storage areas. None of the vegetation removal would be categorised as significant.

There is likely to be Moderate Adverse effects during the construction period though the most appreciable aspects of this will not be easily discerned from publicly accessible areas and only the new access to the north towards Station Road being evident. This area of Dunboyne is partially characterised by busy transport corridors (with a number of local sites under development) ensuring effects deriving from construction traffic would not represent a significant change, in landscape or visual terms, from the existing situation. Construction traffic and materials can access from Station Road which is already a busy road and any increased usage will not be significant in landscape and visual terms.

The removal of internal hedgerows will not be significant in landscape or visual terms due to their limited nature and distance from possible vantage points beyond the site itself. As noted above the vast majority of tees in boundary hedgerows and within the site will be retained (subject to on-going

health and safety condition surveys).

The construction stage will represent a significant change to the site character and result in direct effects to peripheral areas with Slight Adverse effects on these areas but, in general the site is well contained in visual terms and these would not be rated as significant or notable to the wider Dunboyne area.

Across the wider Dunboyne area including the town centre, the construction phase will have Negligible effects on any appreciation of the setting. The collective factors of existing site context, built environment, vegetation and distance ensure any effects would be of a Low Magnitude and not of a significant nature.

15.5.3 Operational Stage

The landscape and visual effects deriving from this proposed development are deemed to be permanent changes (i.e., effects lasting over twenty-five years and irreversible).

Application Site

The proposal will result in permanent changes to the landscape character of the Application Site due to loss of farmland and hedgerows. This will be replaced by a built townscape character across this part of the "A2 New Residential" designated lands including buildings, landform changes and boundary treatments that will essentially change its context to a residential and predominantly urbanised area. The proposed development has been designed to follow the principles of this designation but has sought to retain key woodland groups and natural features across the site within areas of public open space.

The integrity and presence of the boundary hedgerows will be retained even with the removal of part of the hedge aside Castle Stream to facilitate the flood compensatory area and short sections to facilitate site access. Only 7 no. trees (rated Category B or C) require felling to facilitate the development. The boundary vegetation will be manged in accordance with the recommendations as set out in the Tree Survey (e.g. ivy removed) and these areas augmented to ensure that they continue to feature and be a presence in the Dunboyne landscape into the future. The loss of trees and hedgerows should be considered in relation to the proposed landscape works across the quality open spaces and to the central core of the site that will, as it matures, redress and significantly increase the extent of trees and vegetation on the site. The generally low profile of the landscape in this area ensures than any modifications to ground levels of up to 1m or related to removal of the internal hedgerow would be of little consequence to the landscape character of this area.

The collective development will have Major effects to the character and sense of place across the site but would not necessarily be one of an adverse nature on account of the significant landscape and open space development (equating to approximately 23% of the site set out and landscaped as areas of public open space and 11% for communal open space) in line with the "A2 New Residential" designation that would contribute to the local landscape character in the medium to longer term. Furthermore, the site is not one that would be considered a pristine landscape or one of an overly sensitive nature due to current land-use, its medium landscape condition / quality rating, location on the urban / rural interface and proximity to the Iarnród Éireann Dunboyne to Dublin railway line.

Dunboyne Town

In areas to the south-east of Dunboyne town, there would be a conscious feeling the urbanised form has shifted south beyond the current town edge and railway line "edge" and that areas perceived as open landscape or farmland have become part of the Dunboyne townscape. Across much of the southern town, the effects will be Negligible due to intervening townscape, the railway line buffer and tree-lined hedgerows on the site boundaries which will remain intact thus visually obscuring the

development extent. The new site entrance and road will be a readily discernible change with Moderate effects on a short section of the road in the Castle Farm area but given the actual residential development is set back over 300m from the road, any impacts deriving from this would be of a Slight and not-significant nature. The design includes for planting of trees and hedgerows in the intervening landscape (and retention of hedgerows on the site periphery) that would have Slight Positive effects by the medium-term offsetting some of the perceived adverse effects deriving from the loss of farmland for urban development in this area.

Residential properties closer to the site within the Beechdale estate will experience Slight Adverse effects in terms of sense of place as the context of the site and backdrop views to the east will include the taller apartment blocks sitting behind the intervening trees and hedgerows. The railway line buffer and distance would serve to mute the effects in terms of general character impacts to the wider estate. Within the new Castle Farm residential area, effects are judged as Slight Neutral due to retained hedgerows and the decision to locate a band of open space aside the Castle Steam corridor to the north of the Application Site. Any significance and magnitude of effects will reduce over time as the landscape measures mature as the proposal allows for retention and augmentation of existing boundary vegetation.

The proposed development will be largely obscured from the local road network (including Station Road, the R147 Road towards Clonee and the Rooske Road), due to the relatively low profile of the development when set into this landscape type with the accumulation of hedgerows but there will be a conscious feeling or sense that Dunboyne has extended. In landscape of visual terms, this would not be rated as a significant change beyond the actual site and any significance or magnitude of effect will reduce over time as the proposed landscape works within the site matures. Effects on the landscape character of the general Dunboyne are assessed as Slight Neutral.

The only area where any significant appreciation of the changes on this landscape will be discernible will be to those travelling on the adjacent Iarnród Éireann Dunboyne to Dublin railway line where, due to proximity, there are open and transient views for an approximate 600m section of the line. The raised view from the train carriages would mean passengers would note the extension of the town and change from field to housing estate with some views closed off by the new apartment blocks to the west of the site equating to a Major change.

In terms of Dunboyne town centre any of the associated National Inventory of Architectural Heritage (NIAH), there will be Negligible Neutral effects. The proposal would have no bearing on any views or townscape character and It would not result in any lessening of appreciation or enjoyment of its key features, designated or quality areas including Dunboyne Castle.

The proposed upgrades to the two roundabouts on the R147 (Old Navan Road) will have on completion, negligible landscape or visual effects and entail no removal of hedgerows or trees to facilitate these works.

This proposal will introduce a large scale residential and neighbourhood development onto the town's southern periphery on land that has been historically farmland. Any effects should be measured in context with the adjacent townscape and the Development Plan zoning that ensure this will appear as a logical and appropriate location for this type of development.

LCA No. 11 South East Lowlands

There will be Negligible effects on the landscape or character to the vast majority of this LCA due to topography, vegetation and built environment. The proposed development would not change the

actual character of the LCA apart from areas near and aside the Application Site as assessed above. There will be Slight effects to areas within south-east Dunboyne with the extension of the urban form of the city being discernible but this would not be something that would be readily appreciable or have a significant effect on any broader appreciation of landscape, setting or context. Effects are rated as Neutral.

The proposal will have a Negligible and neutral effect on the sense of place and would not result in any lessening of appreciation or enjoyment of the more visited or notable landscapes in the LCA areas. Any effects should be measured in context with the adjacent cityscape and the Area Plan zoning ensuring this will appear as a logical and appropriate location in landscape (and visual) terms for this type of development.

Area	Sensitivity	Summary of Landscape Effects	Magnitude	Significance	Significant (Yes / No)
Application Site	Medium	Loss of vegetation and change of baseline setting from predominantly open fields to townscape and associated open space.	Major	Slight Adverse	Major Significant
Station Road	Medium	Changes to local sense of place but development mostly screened from these areas	Slight / Moderate	Slight Adverse	Medium Not Significant
SE Dunboyne	Medium	Changes to local sense of place but development mostly screened from these areas	Slight / Moderate	Slight Adverse	Medium Not Significant
Dunboyne Town	Medium / High	Change of peripheral town edge area to townscape	Neutral / Negligible	Neutral / Negligible	Low to Negligible Not Significant
LCA No. 11 South East Lowlands	Medium / High	Change of peripheral town edge area to townscape	Neutral / Negligible	Neutral / Negligible	Low to Negligible Not Significant

Table 15.9: Landscape Effects Summary

15.5.4 Residential Amenity

Potential effects on residential amenity are generally considered a planning matter and should be judged collectively and not just by Landscape Architects. As noted within "Residential Visual Amenity Assessment" Technical Guidance Note 2/19 (RVAA):-

"The threshold at which a residential property's visual amenity becomes an issue of Residential Amenity has sometimes been described as the point when 'the effect(s) of the development on the 'private interest' is so great that it becomes a matter of 'public interest''. The planning system is only concerned with public interest." (Reference: RVAA Section 5.2)

There are no existing buildings on the Application Site. The nearest residential areas are at Beechdale to the west of the railway line and Castle Farm to the north towards Station Road which are both visually separated from the Application Site by intervening fields, hedgerows or wooded belts. The detached property at Castlefarm is located over 200m distant from the core of the Application Site with intervening hedgerows located across the intervening lands. In terms of the RVAA, none of these properties have any "public interest" or uses directly associated with the landscape character or visual amenity of this area.

Within the estates, the majority of properties are internally focused and only the very peripheral dwellings would have vantage in the direction of the Application Site. The proposal will result in Negligible changes to the internal character of these areas but they will no longer be seen as the outskirts of the town with the landscape to the south and east being integrated into townscape which will affect the wider "sense of place". Beyond this, any effects on character reduce appreciably due to an accumulation of vegetation and built environment as well as the fact these parts of Dunboyne already have an urbanised character.

It is worth noting that the proposal retains open space to the north of the site in the vicinity of Castle Stream that will link into further (designated) open space to its north towards Station Road and the Castle Farm development thus ensuring separation by a retained green landscape between these two areas.

15.5.5 Visual Effects

The following tables summarise the views and context of the 13 no. representative viewpoints and the likely impact on the views and visual quality deriving from the proposed development. They include wireframes and photomontages presented at a larger scale from these viewpoints but the following include extracts of these photomontages and annotated site photos from other selected views for ease of reference.

Viewpoint 1 – Photomontage of proposed development from Beechdale

Viewpoint 2 – Photomontage of proposed development from Beechdale

Viewpoint 3 – Photomontage of proposed development from Beechdale

Viewpoint 4 – Photomontage of proposed development from Beechdale

Viewpoint 5 – Wireline of proposed development which is obscured by intervening houses and vegetation

Viewpoint Locations	Beechdale Estate, Dunboyne	Distance to Application Site	90m to 460m
Viewpoint Baseline	The Beechdale Housing Estate is located on lands to the west of the Application Site and comprises a large residential area spreading across lands between the railway line and the Rooske Road (650m distant from the site boundary). These viewpoints have been selected from publicly accessible areas within the estate at locations that are either in close proximity or there is vantage to the east in the direction of the Application Site. The nature of the housing estate ensures that the majority of properties or internal streets / cul-de-sacs will not have a view in the direction of the site on account of intervening built environment and vegetation, including that which aligns the railway line between the site and Beechdale. The majority of visual receptors will be local residents and users of the associated open spaces.		
Viewpoint Sensitivity	Medium		
Predicted Change	At incidental locations, part of the proposed development will be a discernible change to views to the east altering it to include the upper portions of apartment blocks set over, partially behind (i.e. filtered) and between the trees and hedgerows that align the railway line. The nearest properties in Beechdale to the site are approximately 100m distant from these closest proposed apartments. To open spaces and areas to the east of Beechdale, there will be **Moderate** effects from the proposed development but the nature and magnitude of effect is reduced on account of the intervening railway and vegetation that ensures the proposal while evident would not be overwhelming or significant in terms of visual amenity and view context. The key change will be the sense that townscape has extended and that the railway line is no longer the edge of the town having **Slight** effects though this would be more due to a sense of place than actual view due to the extent of retained vegetation.		
Significance Summary	Moderate to Minor: proposed development will form a component in incidental views to the east but would not have a marked effect on its overall quality.		

Table 15.10: Visual Impacts to Beechdale Estate, Dunboyne

Viewpoint 6 – Wireline of proposed development which is obscured by intervening vegetation.

Viewpoint Location	Chestnut Grove	Distance to Application Site	385m
Viewpoint Baseline	This is a representative view from the Chestnut Grove housing estate located to the west of the Application Site and accessed off the Rooske Road in south Dunboyne. The viewpoint is taken from within a large area of open space between Chestnut Grove and Beechdale to the north. The site is obscured by intervening trees and hedgerows with the lands between this viewpoint and the site boundary comprising fields that include further hedgerows. The majority of visual receptors will be local residents and users of the open space for recreational purposes. (Note the viewpoint was requested in pre-application discussions by Meath County Council)		
Viewpoint Sensitivity	Medium		
Predicted Change	The proposed development will be obscured by intervening buildings and trees and **Negligible** visual impacts are predicted.		
Significance Summary	Negligible: proposal will not be visible equating to a no-change situation.		

Table 15.10: Visual Impacts to Chestnut Grove

Viewpoint 7 – Photomontage of proposed development from open space to east of Larchfield

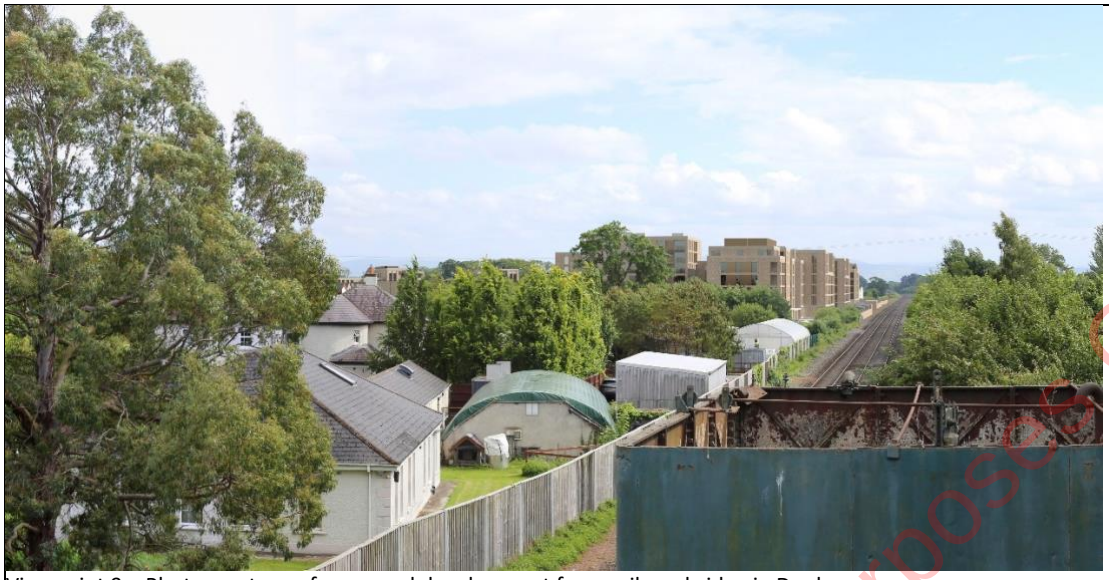
Viewpoint Location	Larchfield, Dunboyne	Distance to Application Site	130m
Viewpoint Baseline	Larchfield is a housing estate dating from the 1990s and includes 89 detached houses located on lands to the north-west of the Application Site on lands between Castle Street and Station Road towards Dunboyne Town Centre. The nearest property within the estate is adjacent to this viewpoint location which is aside a small area of open space that is bound, to the east, by a tree-lined hedgerow that obscures the Application Site and the intervening railway line. The nature of the housing estate ensures that the majority of properties or internal streets / cul-de-sacs will not have a view in the direction of the site on account of intervening built environment and vegetation. The majority of visual receptors will be local residents and users of this open space.		
Viewpoint Sensitivity	Medium		
Predicted Change	The western parts of the proposed development will be a discernible change to view to the south-east altering it to include the upper portions of apartment blocks set over, partially behind (i.e. filtered) and between the trees and hedgerows that align the railway line. The closest proposed building is over 160m from this viewpoint and this, combined with the intervening railway and vegetation ensures the proposal while evident would not be overwhelming or significant in terms of visual amenity and view context. The key change will be the sense that townscape has extended and that the railway line is no longer the edge of the town having **Slight** effects though this would be more due to a sense of place than actual view due to the extent of retained vegetation.		
Significance Summary	Minor: proposed development will form a minor component in the view but would not have a marked effect on its overall quality.		

Table 15.11: Visual Impacts to Larchfield, Dunboyne

Viewpoint 8 – Wireline of proposed development which is obscured by intervening vegetation and buildings.

Viewpoint Location	Castle Farm	Distance to Application Site	45m
Viewpoint Baseline	To the north of the Application Site on lands between Castle Stream and Station Road is the recently completed residential development at Castle Farm Meadows which is largely completed. From the open spaces and southern and western periphery of the development are views in the direction of the core of the Application Site but they are closed off by a hedgerow on the intervening lands and a further hedgerow aligns Castle Stream. More open views are afforded of the proposed access road corridor to the west that connects to the existing entrance to Castle Farm. The majority of visual receptors will be local residents and users of this open space.		
Viewpoint Sensitivity	Medium		
Predicted Change	The core of the proposed development (i.e. the area where houses and apartments are proposed) will be obscured by an accumulation of intervening hedgerows equating to a **Negligible** effect on the views from the Castle Farm area on account of being out of view. The only part of the proposal that will be evident is the new access road connecting the proposed development to Station Road via part of the existing access set in place for the Castle Farm scheme. This would entail removal of approximately 30m of hedgerow, installation of street lighting columns and avenue tree planting in lands to the west of this viewpoint. This would have the backdrop of existing trees and, while visible, would not have a significant impact given the baseline setting and context equating to **Slight** effects.		
Significance Summary	Minor: the proposed road extension will form a minor component in the view but would not have a marked effect on its overall quality.		

Table 15.12: Visual Impacts to Castle Farm Meadows, Dunboyne



Viewpoint 9 – Photomontage of proposed development from railway bridge in Dunboyne

Viewpoint Location	L2228 Station Road, Dunboyne Railway Bridge	Distance to Application Site	185m
Viewpoint Baseline	This view is from the top of the embankment aside the railway bridge just to south of Station Road. The raised elevation allows open views along the railway corridor in the direction of the core of the Application Site (320m distant) though it is partially obscured by trees and hedgerows located across the intervening landscape. The viewpoint is difficult to access being in an area of overgrown scrub on a steep bank but is considered on basis of request from Meath County Council Planning Department to assess views in this area. In reality, this view has negligible numbers of visual receptors. Note there are no views possible from the actual Railway Bridge due to the high roadside wall and there is no footpath or safe area for pedestrians to attain a view in this location. The pedestrian crossing is further north and there are no views afforded in the direction of the Application Site due to intervening walls and vegetation from this bridge or the approach paths.		
Viewpoint Sensitivity	Medium		
Predicted Change	The proposed development will be a discernible addition to the view with new apartment blocks being evident additions on lands to the east (left) of the railway line. The development beyond these peripheral buildings will be visually obscured by the apartment blocks and existing vegetation. The effects are rated as **Slight** due to distance, intervening screening elements and the exceptionally low numbers of visual receptors who might be affected by the proposal.		
Significance Summary	Minor: proposed development will form a minor component in the view but would not have a marked effect on its overall quality.		

Table 15.13: Visual Impacts to Station Road / Railway Bridge, Dunboyne

Viewpoint 10 – Wireline of proposed development which is obscured by intervening vegetation.

Viewpoint Location	Dunboyne Railway Station	Distance to Application Site	250m
Viewpoint Baseline	Dunboyne Train Station is located to the north of Station Road. From the parking areas and platforms, views to the south towards the Application Site are obscured by buildings and a ground of mature trees to the south of and aside Station Road. This is an elevated viewpoint from the footbridge within the station that allows elevated views over the eastern Dunboyne townscape / landscape. The visual receptors would be commuters / passengers and those at the railway station for travelling reasons.		
Viewpoint Sensitivity	Medium		
Predicted Change	The majority of the proposed development will be obscured by intervening buildings and trees. The only part of the proposal that will be visible would be the upper parts of the new apartment blocks to the north-west corner of the Application Site located approximately 440m distant. This would introduce townscape features aside the railway line and behind an intervening bridge into an area previously perceived as rural. While discernible change, it would not have a significant impact given the baseline setting and existing view quality equating to **Slight** effects.		
Significance Summary	Minor: proposed development will form a minor component in the view but would not have a marked effect on its overall quality.		

Table 15.14: Visual Impacts to Dunboyne Railway Station

Viewpoint 11 – Photomontage of proposed development and new access road from Station Road to the north.

Viewpoint Location	L2228 Station Road, Castle Farm	Distance to Application Site	>10m
Viewpoint Baseline	Station Road (L2228) links a roundabout at the R147 Road / R157 Road to the east towards Clonee with Main Street and Dunboyne centre to the west. The road is set between low rise housing and commercial premises and bound by hedgerows for much of its route that limit views across areas of adjacent landscapes. This viewpoint is from the recently constructed road junction providing access to the Castle Farm housing development to the east. The new road is to be extended as part of this proposed development. The majority of viewers will be road users using this as the main entrance / exit to Dunboyne to the east and the those exiting the adjacent train station car park. There are pedestrian footpaths on both sides of the road and adjacent residential properties including at Castle Farm.		
Viewpoint Sensitivity	Medium		
Predicted Change	The majority of the proposed development will be obscured by an accumulation of intervening hedgerows and hedgerows. The most notable change will be the removal of a 30m section of the hedge approximately 150m distant and another section approximately 285m distant to allow for the extended access road connecting the proposed development to this junction and related to road infrastructure. This would include footpaths and installation of street lighting columns and avenue tree planting. The gap would open up a view of the northern part of the proposed residential development (over 300m distant at the closest point) that would impact the view context and its nature by introducing townscape features into an area previously perceived as rural. While discernible change, it would not have a significant impact given the baseline setting and existing view quality equating to **Slight** effects.		
Significance Summary	Minor: proposed development will form a minor component in the view but would not have a marked effect on its overall quality.		

Table 15.15: Visual Impacts to L2228 Station Road near Castle Farm, Dunboyne

Viewpoint 12 – Wireline of proposed development which is obscured by intervening vegetation.

Viewpoint Location	L228 Station Road near Clonee Sawmills	Distance to Application Site	260m
Viewpoint Baseline	Station Road (L2228) links a roundabout at the R147 Road / R157 Road to the east towards Clonee with Main Street and Dunboyne centre to the west. The road is set between low rise housing and commercial premises and bound by hedgerows for much of its route that limit views across areas of adjacent landscapes. This view is from a section of road near the Clonee Sawmills where there is a gap in the roadside hedgerow that allows views over the adjacent field areas in the direction of the Application Site. Further hedgerows are located on the intervening lands ensuring the site is visually obscured. The majority of viewers will be road users using this as the main entrance / exit to Dunboyne from the east.		
Viewpoint Sensitivity	Medium		
Predicted Change	The proposed development will be obscured by intervening trees / hedgerows and **Negligible** visual impacts are predicted.		
Significance Summary	Negligible: proposal will not be visible equating to a no-change situation.		

Table 15.16: Visual Impacts to L2228 Station Road near the Clonee Sawmills, Dunboyne

Viewpoint 13 – Wireline of proposed development which is obscured by intervening vegetation.

Viewpoint Location	R147 Road, Clonee	Distance to Application Site	715m
Viewpoint Baseline	The R147 Road is the nearest road to the east of the site. It is part of the main link between Junction 4 on the M3 Motorway and Dunboyne. It traverses mainly through a rural landscape with the road aligned by hedgerows or earth banks. This viewpoint is selected from a location where there is no or limited roadside hedgerows thus allowing open views to the west in the direction of the Application Site though this is obscured by an accumulation of hedgerows across the intervening fields. The majority of viewers will be road users for which this would be an oblique view and there is little reason to look in this direction. There are adjacent residential properties in the Clonee area but these are generally enclosed visually by mature vegetation and have no views towards the Application Site area.		
Viewpoint Sensitivity	Medium		
Predicted Change	The proposed development will be obscured by intervening trees / hedgerows and **Negligible** visual impacts are predicted.		
Significance Summary	Negligible: proposal will not be visible equating to a no-change situation.		

15.17: Visual Impacts to R147 Clonee Road

15.6 MITIGATION MEASURES

15.6.1 Proposed Development

15.6.1.1 Construction Stage

The proposed development will entail significant groundworks to facilitate construction of the residential properties. The subsoils and topsoil are to be retained on site and reused to ensure no requirement for moving material off site.

The hedgerows will be managed to remove dead, dying and dangerous branches and any colonising scrub or brier. The works will also entail removal of trees on site suffering from Ash die-back disease. For retained trees, the recommendations given in BS5837:2012 Guide for trees in relation to

construction will be adopted to ensure site and tree safety.

15.6.1.2 Operational Stage

At the core of the site is a large rectilinear public open space which has capacity and scale to accommodate informal and various amenity and landscape / parkland areas. This will be overlooked from the surrounding development to ensure safety in design with multiple connections and access points offered throughout. Further integrated elements relating to the landscape in terms of remediation, mitigation and enhancement include the following:-

- The main spine road leading into the development will be planted with street trees in broad grass verges to create a strong green link through the development for motorists, cyclists and pedestrians;
- Public and Communal Open Space includes extensive planting with a mix native and ornamental tree species to create a natural environment with colour and seasonal interest. The general principle will correspond with Development Plan Objective 26 and exceed the requirement for 15% Open Space provision with recreational and amenity spaces to the core of the site in a major new parkland space. Public spaces will feel welcome to all, while communal spaces will be differentiated from the public areas either physically or perceptively;
- Biodiversity and habitats creation or enhancement will be the objective in terms of landscape design to the site edge (with reference to County Meath Biodiversity Plan 2015-2020) and will include a 10m wide buffer / riparian corridors free from new development alongside the watercourses and streams;
- The planting of semi-mature trees will give instant impact and provide enclosure and screening. High canopy trees or ones that will be easy to manage in terms of such will be used along avenues to ensure vehicular sightlines are retained;
- Communal open spaces areas are positioned between and around the apartment blocks and connected along a linear arrangement that ties in with larger area of public open space. Again there is flexibility within these spaces for passive leisure, recreation, play and seating throughout. The use of "Advanced Turf" with a netlon mesh is proposed to provide reinforced grass in areas of lawn to allow these areas to have a green character and also have the capability of accommodating fire service access;
- Green links connects peripheral parks and internal open spaces including tree lined avenues, planted embankments, pocket parks, and ecology / biodiversity areas;
- Provision of playgrounds to cater for the recreational and educational requirements of children of residents;
- The Western boundary will also be augmented with native planting to visually screen the railway line. This will be augmented by a 2.2m high masonry wall to prevent access and reduce noise impacts;
- The masterplan will be supported by drawings including Landscape Sections., Boundary Treatments. Specification and Planting Plan. Generally the planting objectives are to propose a mix of native tree species and shrub planting to create a natural and welcoming environment for residents;
- The open spaces are designed with consideration given to long-term management ensuring this is not onerous with heavy resource requirements; and
- Due regard will also be given to coordinating with engineers in terms of *Sustainable Urban Drainage Systems (SuDS)* with the landscape designs working around required swales, compensation areas and retained watercourses or culverts. Any works on or aside ditches will be undertaken in dry spells and in correct season if vegetation removal required (i.e. Autumn to Winter).

The landscape works include for planting of trees within parkland areas and the central boulevard core through the proposed development that will entail over 600 no. semi-mature' or 'extra-heavy standard' size trees to provide an instant impression. The collective trees will, as they mature, assist in merging the proposed development into the surrounding landscape and local views as well as set about creation of the areas new landscape character. Other landscape works will include structure

planting, amenity planting, garden trees, hedgerows and wooded belts. The extent of planting will more than compensate for the loss of any vegetation on this site and enhance the overall wooded character, biodiversity and ecological nature of the site.

Planting and augmentation of existing boundary hedgerows will consist of evergreen and deciduous trees with under-story scrub mix. A range of plant species and heights will be selected to provide quick establishment and assist in visual integration. Amenity planting will consist of trees, native woodlands, hedgerows, shrub / groundcover planting, meadow / wildflower and grass seeding works. As the planting matures, it will change the nature of the site and its visual amenity and the height of planting for assessment purposes is as follows:-

- Planting at Year 1 : 3 metres;
- Planting at Year 15 : 8 metres; and
- Planting at maturity : 20 metres (i.e., Year 25)

Plants selected will be predominantly indigenous and species selection based on those in the "All-Ireland Pollinator Code 2021-2025" to ensure successful plant establishment that will merge visually and ecologically into this area. Landscape works will be undertaken by an ALCI approved landscape contractor and in accordance with BS 4428:1989 Code of practice for general landscape operations (excluding hard surfaces). Any trees or shrubs dying, damaged or removed will be replaced in the following planting session with plant of similar size and species. Trees supply and planting shall correspond to BS 8545 Trees: from nursery to independence in the landscape - Recommendations.

While the baseline site character will change due to this proposal, in terms of woodland and trees the retention of the majority of boundary trees and the new planting provides the opportunity for this part of Dunboyne to have significantly enhanced tree cover and a more wooded character in the longer term with positive effects on amenity, environment and ecology.

15.7 RESIDUAL IMPACT OF THE PROPOSED DEVELOPMENT

15.7.1 Proposed Development

15.7.1.1 Construction Stage

There is likely to be temporary Moderate Adverse effects during the construction period though the most appreciable aspects of this will not be easily discerned from publicly accessible areas within the wider Dunboyne townscape or any farmland areas to its south-east periphery (that would be subject to very few visual receptors) and only the new access to the north towards Station Road being evident.

15.7.1.2 Operational Stage

The proposed development is regarded as being permanent or long term in landscape and visual terms. The residual impacts are muted in terms of significance and magnitude on account of the site's medium quality and condition rating and this equating to a general low sensitivity rating.

The most appreciable effects relate to the scale and nature of the proposed development which will result in houses and apartments occupying the majority of the site footprint although in excess of 20% is to be set out as public open space. While having a Major effect, the proposed development, associated parklands, open space and public realm landscapes will include positive and significant elements that will contribute to the amenity, character and broader environment of this part of

Dunboyne.

The most notable natural features on the site, namely the mature trees and boundary hedgerows are to be retained within areas of public open space. The proposals include for planting over 600 no. standard tree and – in conjunction with more general woodland, shrub and hedgerow planting – this will contribute to far more significant vegetation cover on this site than it had a present.

The low-lying topography and existing vegetation ensure the majority of areas within the Dunboyne area will experience no or negligible effects due to the proposal being visually obscured or not being a significant factor in any view or association with any visual amenity provision.

While recognising there are localised significant landscape and visual impacts, the proposed development, while sizeable, can be accommodated and absorbed into this part of Dunboyne without causing any significant detrimental or unacceptable landscape or visual effects.

15.7.1 Exempted Development

15.7.1.1 Construction Stage

Negligible due to very limited areas that will be affected by works related to the underground watermain / sewer upgrades. The proposed corridor of work is not visually exposed or would be subject to high numbers of visual receptors so the associated construction works would have very Slight and insignificant effects in landscape and visual terms.

15.7.1.2 Operational Stage

Negligible as the exempted development relates to underground services. Given this work is underground effects are rated as Negligible.

No mitigation is necessary in landscape or visual terms due to the short-term nature of this work.

15.7.2 Future Development

15.7.2.1 Construction Stage

The proposed construction works will have a Major effect on the area within immediate proximity to the proposed extending of the Dunboyne Distributor Road and bridge due the nature of works required to facilitate this type of road engineering and height requirements for a bridge over a railway line. Due to the low-lying nature of the landscape and extent of vegetation, there will be insignificant and largely Negligible effects to the wider Dunboyne townscape deriving from this proposal. A broad corridor is retained for the proposed bridge to allow the Dunboyne Distributor Road to cross the railway line and then extend to south Dunboyne in the future. This area is to be retained as field in the intervening period though some Ash trees (subject to Ash die-back) will be felled to ensure no health and safety issues in this time. The construction stage would entail substantial groundworks to facilitate appropriate height for the new bridge and this would have notable and Major effects to a localised area in close vicinity to the road and bridge corridor. The area to the south of the site set aside for the Dunboyne Distributor Road and bridge over the railway line will be graded out and retained as a grassed field with stock-proof boundary fencing. Access will be provided via a gate to the south of the proposed development. Once the grass has grown, this area will - for the period of time until bridge construction – have a character that is visually comparable with the adjacent fields in the south Dunboyne area. During the construction period hoardings are likely to be installed to the construction area to restrict access and views into the site.

15.7.2.2 Operational Stage

The road and bridge will have Major impacts on the landscape and visual amenity of the local area. Due to the extent of existing (and proposed) townscape, the low-rolling landscape and extent of tree cover, beyond the immediate area, there will be very limited landscape or visual effects with the majority of Dunboyne experiencing Negligible effects from this section of road and new bridge. A new bridge is likely to be a notable landmark in south-east Dunboyne on account of its relatively raised profile in an otherwise low-rolling landscape. The final bridge designs are not available at this time but it is reasonable to assume based on the land-take that sufficient room has been retained to either side of the proposed carriageway to allow for the banks to be landscaped in a manner that can contribute to the landscape setting and reduce the impact of the road corridor. The road is clearly a functional requirement (and objective of the Meath County Development Plan 2021-2027) and will have Major impacts on the landscape and visual amenity of the local area. Due to the extent of existing (and proposed) townscape, the low-rolling landscape and extent of tree cover, beyond the immediate area, there will be very limited landscape or visual effects with the majority of Dunboyne experiencing Negligible effects from this section of road and new bridge. Landscape works to the banks and verges aside the bridge are likely to include planting of trees and hedgerows to assist blending the road corridor into the landscape. Sufficient room has been retained to allow for such measures which can link into the proposed tree planting and retained tree belts within the Application Site.

15.7.3 Cumulative Development

Cumulative landscape or visual effects are the combined effects that arise through the interaction of two or more developments, whether of the same type or not, within the landscape and visual baseline context. Collectively they give rise to an overall combined effect.

A significant cumulative effect will occur where the addition of the proposed development to other existing and developments results in a landscape or view that is defined by the presence of more than one major development and is characterised primarily by large scale development so that other patterns and components are no longer definitive.

The proposed development is a large scale residential development that – as noted above – will in isolation result in significant changes to the Application Site but there is a degree of physical and visual separation between the site and the nearest residential areas at Beechdale / Larchfield / Chestnut Grove to the east and the recently completed Castle Farm to the north. South Dunboyne is an area already defined by housing estates and associated infrastructural elements including busy roads and the railway line. The effects on these area or Dunboyne deriving from this proposal have been assessed above.

The Area Plan identifies a link road through the Application Site lands that crosses the railway line via a bridge and connects to the Rooske Road to the south of Dundalk. This proposal retains lands to the mid and west of the site to allow appropriate space to facilitate this connection. This area is to be retained as a field until such a time as this link road can be constructed.

A residential development (Meath County Council Planning Reference 22675) is proposed to the north of Station Road and west of Dunboyne Railway Station. Due to intervening built environment, townscape and vegetation, there will be Negligible cumulative effects with the proposed development site.

The Dart+West Project entails the proposal by Córas Iompair Éireann (CIÉ) for the construction, maintenance, improvement and operation of the railway along an approximate 40km section of the existing railway line between Dublin City Centre and M3 Parkway Station (County Meath) and a new maintenance depot to the west of Maynooth (County Kildare). Due to the railway line already being in place and having a presence in the landscape / townscape setting of Dunboyne and that any proposed buildings are sufficiently distant from the Application Site, there will be Negligible cumulative landscape and visual impacts.

There are no other proposed developments in the south-Dunboyne area that would have a significant bearings on the magnitude or nature of cumulative effect to local landscape character.

No residual landscape and visual impacts predicted. No landscape and visual impacts predicted and therefore mitigation not necessary.

15.8 WORST CASE IMPACTS

15.8.1 Proposed Development

15.8.1.1 Construction Stage

The above assessment is based on a worst-case scenario.

15.8.1.2 Operational Stage

The visual effects of the proposed development are assessed on the basis of and photography undertaken for the photomontages / visualisations on a clear summer's day (June 2022) in good lighting conditions. Visual effects can invariably change due to cloud, rainfall, dusk and sun angle that would lead to differences in clarity, colour and contrast. It is therefore reasonable to assume there would be reduced visibility in these scenarios particularly in mid to long distance views. The assessment of effects is based on the worst-case scenario with photography times allowing the proposed development to be as visible as possible in any of the photomontages.

There is a case that in winter, with less foliage on intervening trees and vegetation, views are likely to be more open but investigations on this site suggests this would not have any significant bearing on the impact assessment due to the low-lying nature of the landscape in this part of Co. Meath and the thickness of boundary vegetation and location of key viewpoints. It is notable that in winter months the sun is generally lower, reducing contrast and therefore potentially reducing visual impact further. The assessment of effects is based on the worst-case scenario throughout and often shows a range of effects with some considered in balance.

15.9 MONITORING

15.9.1 Proposed Development

15.9.1.1 Construction Stage

The management of all areas will initially be undertaken by an ACLI approved landscape contractor with the developer remaining as client for duration of their contract for each section of the development. After 12 months the maintenance will be handed over to the long-term Management Company who will take over maintenance of set areas on completion of the development. There will be a five-year guarantee after construction that all the proposed planting works still exists and has established in line with landscape design expectations. This will ensure that no planting has been removed or damaged due to the subsequent construction or plant failure. The planning application is accompanied by Landscape Management and Maintenance Plans setting out the objectives for management of external spaces or public realm areas for a 20-year period. This would equate to a Negligible and Neutral effect.

15.9.1.2 Operational Stage

Regular monitoring will be undertaken to determine success of landscape operations and ensure they are behaving in the manner anticipated at design stage. If required, elements of the design can be

adapted to accommodate changes required by actual field experience. This would equate to a Negligible and Neutral effect**.**

15.10 REINSTATEMENT

15.10.1 Proposed Development

15.10.1.1 Construction Stage

Landscape areas disturbed during the construction stage will be reinstated as and when the adjacent works are completed. The reinstatement will entail the reuse of any stripped subsoils and topsoil prior to cultivation, grass seeding or planting works as set out in the accompanying Landscape Plans. The visual impacts of this work will be of a Negligible and Neutral nature.

15.10.1.2 Operational Stage

The landscape contract would include a 12 month management and defects liability period for the general landscape works and planting. Should any planting fail during this period, replacement planting shall be carried out within the following planting season (i.e. November to March) as necessary. The works are likely to be of a Negligible and Neutral nature.

15.11 DIFFICULTIES ENCOUNTERED

No particular difficulties were encountered in compiling information for this report.

16 MATERIAL ASSETS (TRANSPORTATION)

16.1 Introduction

This chapter has been prepared by Waterman Moylan Consulting Engineers to assess 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 area surrounding the application site, the characteristics of the proposal in terms of physical infrastructure, the potential impact that proposals of this kind would be likely to produce, the mitigation measures required to prevent, reduce or offset any significant adverse effects, and the predicted impact of the proposal examining the effects of the proposed development on the local road network.

16.2 Assessment Methodology

The following methodology has been adopted for this assessment:

- Review of the relevant available information including, Development Plans and Local Area Plans, existing traffic information and other relevant studies.
- Site visit to gain an understanding of the site access and observe the existing traffic situation and receiving environment.
- Description of the proposed development and other relevant nearby developments.
- Detailed estimation of the transport demand to be generated by the proposed and relevant nearby developments. The morning and evening peak times have been addressed as well as an estimation of the construction stage traffic and the Annual Average Daily Traffic (AADT), and
- Assessment of the impact of the generated traffic on local junctions and associated mitigation measures, car and bicycle parking proposal and accessibility of the site by sustainable modes including walking, cycling and public transport.

16.3 Receiving Environment

This section considers the baseline conditions of the surrounding area, providing background information to determine the significance of any traffic and transport implications. It also considers the existing accessibility of the site by sustainable modes of transport.

16.3.1 Local Road Network

Roads

Access to the subject development is proposed from north off L2228 Station Road, via the proposed extension of the Southern Distributor Road (SDR).

The L2228 Station Road is the east-west road bisecting Dunboyne village which provides access to several residential and non-residential developments along its extension.

To the east, the L2228 Station Road terminates at a mini roundabout with the R147. From this intersection, the R147 continues north and south providing access to the M3 at Junction 5 and 4 of the motorway, respectively. To the south, the R147 also provides access to Clonee village.

To the west, the L2228 crosses the Navan Road at Dunboyne village centre and terminates at a four-armed roundabout with R157 and R156. From this intersection, the R157 continues north providing access to the M3 Parkway rail station (with a major park & ride facility) and south towards Maynooth.

The L2228 Station Road is a single carriageway road subject to a speed limit of 50kph. At the section of its intersection of the constructed portion of the Southern Distributor Road (SDR), the L2228 Station Road comprises right turning pocket lanes that facilitate access to the SDR, to the Dunboyne station carpark and to the Dunboyne Herbal Clinic.

Junctions

A comprehensive Traffic and Transport Assessment (TTA) for the subject proposed development is accompanying the documentation package under a separate cover. The scope of the junction assessment to be undertaken as part of the TTA was discussed and agreed with the Transportation Department of the Meath County Council. The junctions identified relevant for the proposed development are the following:

- Junction 1 (Signalised Crossroads): L2228 / Navan Road / Main Street.
- Junction 2 (Signalised Crossroads): L2228 / Rooske Road. There is a private road opposite Rooske Road which supports a negligible amount of traffic.
- Junction 3 (Priority Staggered Junction): L2228 / Access Road to Dunboyne Station carpark / Southern Distributor Road (SDR).
- Junction 4 (Mini Roundabout): L2228 / R147. There is a fourth leg (eastern approach) that leads to private properties which supports a negligible amount of traffic.
- Junction 5 (Roundabout): L2228 / R147 / R156 / M3 Offramp.

The location of each junction in relation to the subject development site is illustrated in Figure 16.1.

Junction 3 was recently upgraded as part of the nearby recently constructed residential development (Planning Reg. Ref.: RA180561). As part of the works carried out, the first c. 90m was constructed.

Currently there are no further upgrades of redesigns approved for the above junctions. The 'Transportation Study at Dunboyne & Environs' (2018) and the Meath County Council Development Plan 92021 – 2027) however, include plans to upgrade the road layout at Junctions 4 and 5.

Figure 16.1: Local Road Network and Main Junctions.

16.3.2 Baseline Traffic Data

Traffic Survey

In order to quantify the volumes of traffic movements at key points on the road network surrounding the site, as part of the TTA prepared by Waterman Moylan Consulting Engineers for the subject proposed development (accompanying the documentation package under a separate cover), a 12-hour traffic survey was carried out at the five junctions (Junctions 1 to 5) outlined above.

The 12-hour traffic survey was carried out by 'IDASO' on Tuesday 16th November 2021. A copy of the survey is included in Appendix B of the accompanying TTA.

The results of the survey indicated that the peak levels through the junctions occurred between 08h00 and 09h00 in the AM and 17h00 and 18h00 in the PM. The surveyed peak hour movements are illustrated below.

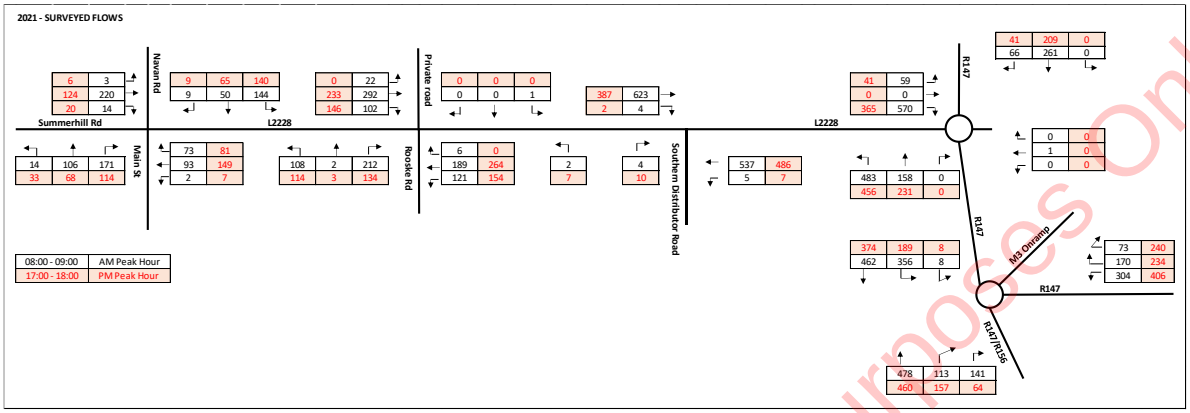


Figure 16.2: Surveyed AM and PM Peak Hour Volumes.

For Junction 3, the traffic movements as summarised above did not include the traffic flows entering and exiting the access road to the Dunboyne rail station carpark. Therefore, these flows have been obtained from the car park survey carried out on the 24th of May 2022 as part of the 'Report on Public Transport Capacity' prepared by Waterman Moylan Consulting Engineers for the subject application, which is accompanying the documentation package under a separate cover.

17 cars were recorded in the carpark during the morning peak (08h00 to 09h00). For robustness, it was considered 20 cars arriving and 20 cars departing the carpark during both the AM and PM peak hours, 70% from/to west and 30% from/to east along the L2228 Station Road.

Annual Average Daily Traffic (AADT)

As recommended in the Transport Infrastructure Ireland (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 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 into AADT. The corresponding factor for the Mid-East (Kildare, Meath & Wicklow) were used (set out in Appendices B and C of the TII Publication).

Hour Ending	Proportion of Daily Traffic	Surveyed Flows (2-way)
08:00	0.072	493
09:00	0.078	882
10:00	0.062	723
11:00	0.053	581
12:00	0.053	615
13:00	0.056	694
14:00	0.058	809
15:00	0.061	727
16:00	0.066	722
17:00	0.080	788
18:00	0.093	815
19:00	0.080	718
12-Hour	0.812	8,567 vehicles
	Total 24-Hour Flows =	10,550 vehicles

Weekly Average Daily Traffic (WADT) = 10,550 veh. x 0.97 (Day – Tuesday) =	10,234 vehicles
Annual Average Daily Traffic (AADT) = 10,234 veh. X 0.99 (Month – Nov) =	10,132 vehicles

Table 16.1: AADT Calculations – Junction 1.

Hour Ending	Proportion of Daily Traffic	Surveyed Flows (2-way)
08:00	0.072	677
09:00	0.078	1,044
10:00	0.062	817
11:00	0.053	670
12:00	0.053	689
13:00	0.056	781
14:00	0.058	999
15:00	0.061	923
16:00	0.066	835
17:00	0.080	989
18:00	0.093	1,042
19:00	0.080	945
12-Hour	0.812	10,411
	Total 24-Hour Flows =	12,821 vehicles
Weekly Average Daily Traffic (WADT) = 12,821 veh. x 0.97 (Day – Tuesday) =		12,436 vehicles
Annual Average Daily Traffic (AADT) = 12,436 veh. X 0.99 (Month – Nov) =		12.312 vehicles

Table 16.2: AADT Calculations – Junction 2.

Hour Ending	Proportion of Daily Traffic	Surveyed Flows (2-way)
08:00	0.072	711
09:00	0.078	1,162
10:00	0.062	767
11:00	0.053	604
12:00	0.053	708
13:00	0.056	688
14:00	0.058	946
15:00	0.061	891
16:00	0.066	867
17:00	0.080	870
18:00	0.093	893
19:00	0.080	743
12-Hour	0.812	9,850
	Total 24-Hour Flows =	12,131 vehicles
Weekly Average Daily Traffic (WADT) = 12,131 veh. x 0.97 (Day – Tuesday) =		11,767 vehicles
Annual Average Daily Traffic (AADT) = 11,767 veh. X 0.99 (Month – Nov) =		11,649 vehicles

Table 16.3: AADT Calculations – Junction 3.

Hour Ending	Proportion of Daily Traffic	Surveyed Flows (2-way)
08:00	0.072	1,148
09:00	0.078	1,569
10:00	0.062	1,043
11:00	0.053	803
12:00	0.053	923
13:00	0.056	954
14:00	0.058	1,222
15:00	0.061	1,193
16:00	0.066	1,218
17:00	0.080	1,263
18:00	0.093	1,335
19:00	0.080	1,048
12-Hour	0.812	13,719
	Total 24-Hour Flows =	16,895 vehicles
Weekly Average Daily Traffic (WADT) = 16,895 veh. x 0.97 (Day – Tuesday) =		16,388 vehicles
Annual Average Daily Traffic (AADT) = 16,388 veh. X 0.99 (Month – Nov) =		16,224 vehicles

Table 16.4: AADT Calculations – Junction 4.

Hour Ending	Proportion of Daily Traffic	Surveyed Flows (2-way)
08:00	0.072	1,665
09:00	0.078	2,047
10:00	0.062	1,317
11:00	0.053	1,007
12:00	0.053	1,148
13:00	0.056	1,218
14:00	0.058	1,508
15:00	0.061	1,546
16:00	0.066	1,725
17:00	0.080	1,988
18:00	0.093	2,113
19:00	0.080	1,577
12-Hour	0.812	18,859
	Total 24-Hour Flows =	23,225 vehicles
Weekly Average Daily Traffic (WADT) = 23,225 veh. x 0.97 (Day – Tuesday) =		22,691 vehicles
Annual Average Daily Traffic (AADT) = 22,691 veh. X 0.99 (Month – Nov) =		22,464 vehicles

Table 16.5: AADT Calculations – Junction 5.

16.3.3 Pedestrian and Cycling Facilities

Pedestrian

As part of the development works that are now complete on the initial section of the Southern Distributor Road (SDR), footpaths have been constructed along both sides of the road. These footpaths tie into the existing footpath along L2228 Station Road.

There is an existing footpath along the north side of L2228 Station Road towards Dunboyne village centre with a segregated pedestrian bridge across the railway line. Beyond the railway line, towards Dunboyne, there are footpaths on both sides of the road.

A push button pedestrian crossing facility is provided on L2228 Station Road c. 65m west of its junction with the Southern Distributor Road (SDR).

There is good pedestrian footpath connectivity to Dunboyne village centre and also to nearest bus stops and the railway station.

Cycling

There are cycle lanes provided along both sides of the first c. 90m section of the Southern Distributor Road (SDR) which provide connection to the L2228 Station Road. The segregated L2228 bridge that crosses the railway line also comprises a dedicated cycle path. Beyond the bridge, towards Dunboyne village centre, there are limited cycle facilities.

16.3.4 Local Bus Service

The closest bus stops are located on L2228 Station Road c. 500m (6-minute walk) north of the proposed development site (central point) – Refer to Figure 16.3. The Dublin Bus and Go-Ahead bus routes operating at these bus stops are outlined below. The frequencies of which these routes operate are summarised in Table 16.6. Full timetables are provided in Appendix A of the accompanying TTA.

- Dublin Bus Route 70: Mespil Road (City Centre) – Dunboyne Village.
- Dublin Bus Route 70d: The Helix (DCU) – Dunboyne Village.
- Go-Ahead Bus Route 270: Blanchardstown Shopping Centre – Dunboyne Village.

Route	Frequency
70	Every 10 – 20 minutes during weekday peak periods (07:00-11:00 & 17:00-20:00) Every 1 hour during off-peak periods
70d	1 service starting at 07:15 AM – from Dunboyne. 1 service starting at 17:05 PM – to Dunboyne.
270	Hourly starting at 06:31, last service at 23:03

Table 16.6: Local Bus Routes and Frequencies.

16.3.5 Local Rail Service

Dunboyne Rail Station is located c. 800m (9-minute walk) to the north of the proposed development (north of L2228 Station Road and east of the Railway Line). This station services the 'Dublin – Maynooth, Longford and M3 Parkway' route. A train departs from Dunboyne Station every 30 minutes between 08:30 AM and 10:00 AM towards Grand Canal Dock Station taking approximately 1-hour for this journey. This rail service already connects Dunboyne to many key areas in Dublin providing access to several employment and service destinations.

Dunboyne is an intermediate station on the Docklands to M3 Parkway Western Commuter Service which operates during the AM and PM peaks. Off-peak, Dunboyne is served by the Clonsilla – M3 Parkway Shuttle Commuter Service.

Access to the bus stops on the L2228 Station Road and to the Dunboyne Railway Station will be provided via the proposed extension of the Southern Distributor Road (SDR). The proposed SDR extension is designed in a way to comprise good quality and wide footpaths along both sides of the carriageway that will tie into the existing footpaths that were recently constructed as part of the nearby residential development (Planning Reg. Ref.: RA180561).

A push button pedestrian crossing facility is provided on L2228 Road c. 65m west of its junction with the SDR. This currently provides local residents with a safe crossing point to Dunboyne rail station.

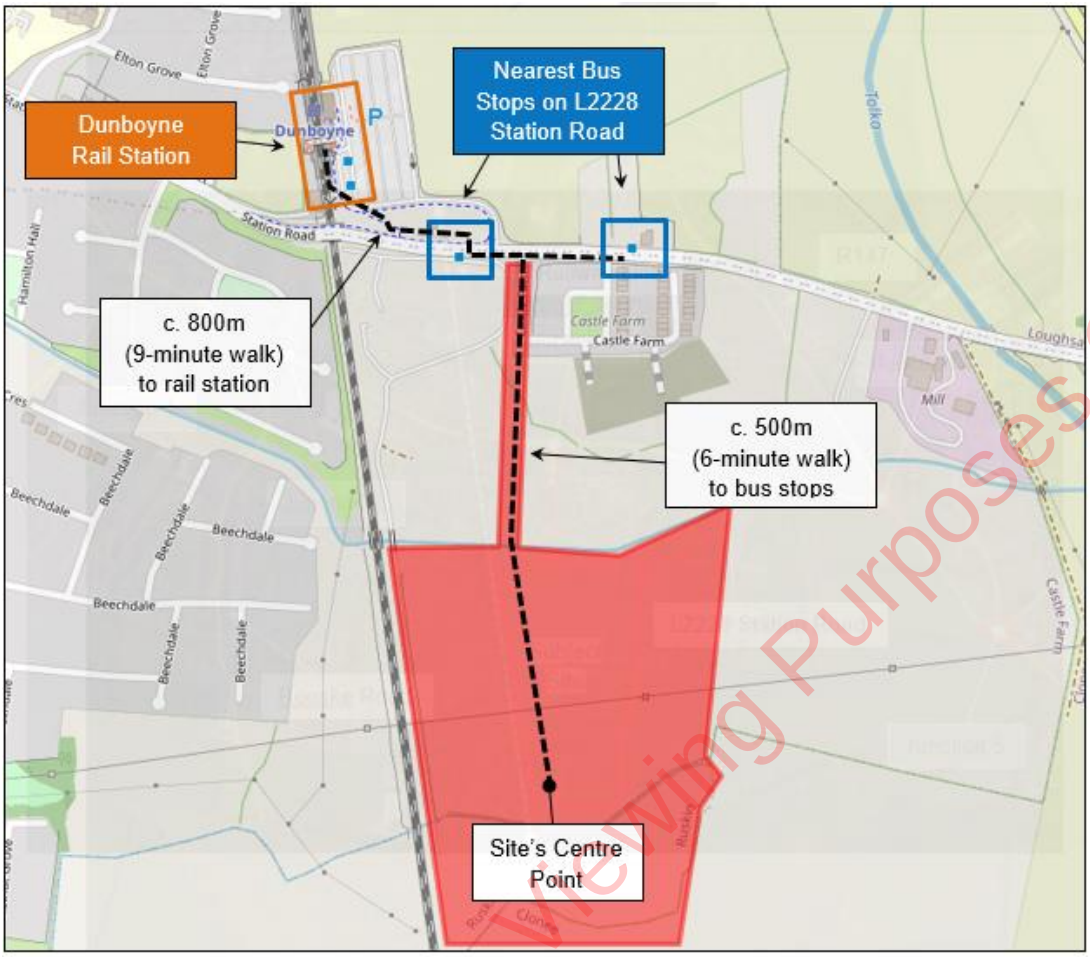


Figure 16.3: Location of Nearest Bus and Rail services and Route from the Site.

16.3.6 Public Transport Capacity Assessment

A Public Transport Capacity Assessment was prepared by Waterman Moylan Consulting Engineers to support this planning application (accompanying the documentation package under a separate cover). The results of this report indicate that the local public transport available have adequate spare capacity to cater for the proposed development and that the capacity will be further enhanced in the near future by the BusConnects project, the extension of the rail line to Navan and the DART+ programme.

16.3.7 Transportation Improvements

There are a number of local transportation improvements currently being promoted by the local and national authorities to improve the transportation conditions across the local network, such as, BusConnects, GDA Cycle Network Plan, DART+ West and several interventions within the '*Transportation Study at Dunboyne & Environs*'.

BusConnects

The BusConnects routes proposed to serve Dunboyne are the Local Route L64 and the Peak-only Route P64, both operating along the L2228 Station Road.

The frequency of the Route L64 is 15 minutes on Weekdays and 20-30 minutes on Weekends. This route is proposed to operate as a connection link between Dunboyne and Blanchardstown Hub, where a number of other BusConnects routes will depart.

The Route P64 will only operate on Weekday Peak Hours at a frequency of 30 minutes.

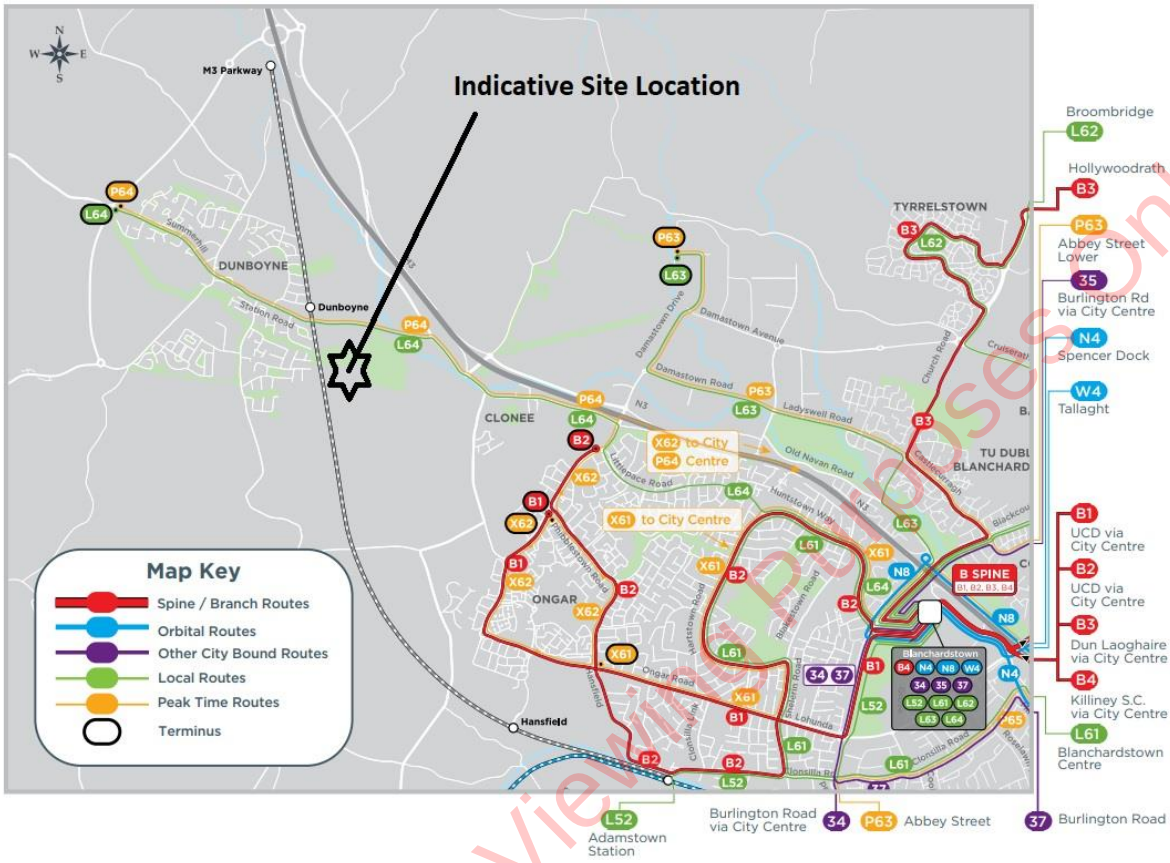


Figure 16.4: BusConnects Routes.

GDA Cycle Network Plan – NTA, 2022

The proposed development site lies within the '*Dublin North West Sector*'. The future cycle network, as set out in the GDA Cycle Network Plan, includes a west-east secondary route along the L2228, which becomes a primary route at the junction with the R147 and a greenway route running parallel to the south of L2228 crossing Dunboyne village from east to west.

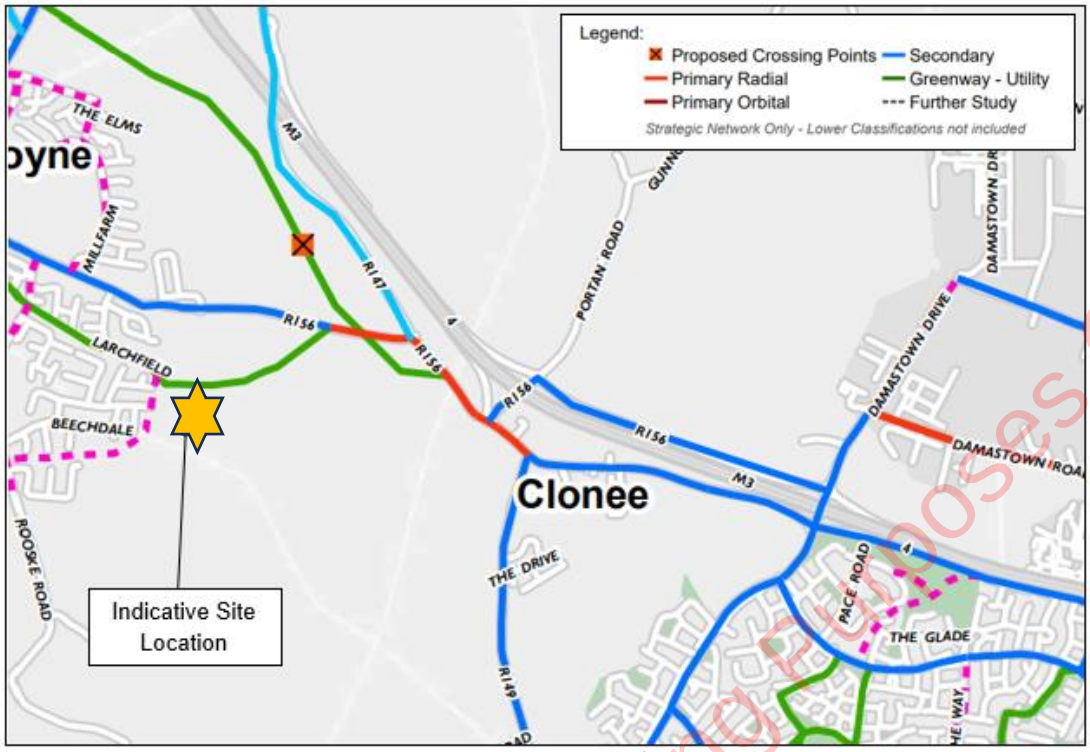


Figure 16.5: Proposed Cycle Network – from GDA Cycle Network Plan, 2022.

DART+ West

Dunboyne Rail Station is part of the western route of the DART railway network. The DART+ Programme aims to improve current rail services across Dublin City and Greater Dublin, by modernising and providing an electrified and more frequent and reliable rail service, enhancing capacity on the rail corridors. The following improvements – extracted from the DART+ website, are included as part of the DART+ West programme:

- *"Increase peak passenger capacity from 5,000 to 13,200 passengers per hour per direction and increase train frequency between Maynooth and M3 Parkway and Dublin City – facilitating fast, frequent and reliable transport to the surrounding communities.*
- *Enhance public transport opportunities for work, education or leisure purposes.*
- *Facilitate the development and future growth of existing and new communities that will greatly benefit from the connectivity that DART+ West will deliver.*
- *Alleviate road congestion, particularly at the existing level crossings.*
- *Build a sustainable and connected city region, supporting the transition to a low carbon and climate resilient society.*
- *Facilitate sustainable choices by encouraging a move away from private cars to reliable, efficient and safe public transport network.*
- *Improve multimodal transport connectivity through interchange with the Luas at Broombridge and the proposed Spencer Dock station and with the Metrolink at Glasnevin/Phibsborough (Station to be delivered as part of the MetroLink Railway Order).*
- *Improve journey time reliability."*

Transportation Study at Dunboyne & Environs – MCC, 2018

In order to update and refine the development strategy in Dunboyne & Environs in terms of transportation, in July 2016 Meath County Council commissioned AECOM to carry out the 'Transportation Study at Dunboyne & Environs' (TSDE). The Transport Strategy presents a comprehensive analysis of the current transport situation in Dunboyne, the effect of future development on transportation and presents potential solutions to improve conditions across the network for walking/cycling, driving and public transport services. In summary, the Study sets out 5 key objectives and numerous interventions that respond to those objectives.

Key Transport Objectives
1: Improve transport connectivity and accessibility within Dunboyne
2: Improve accessibility to other urban centres and new growth areas outside Dunboyne
3: Contribute to improved air quality by minimising the growth in traffic levels and congestion
4: Improve journey time reliability
5: Make it easier and more attractive to travel by active and public transport

Table 16.7: TSDE – Key Transport Objectives.

The proposed interventions are outlined below:

- Approximately 20KM of dedicated pedestrian/cyclist paths including 2 greenways.
- Replacement of roundabouts with pedestrian/cyclist accessible junctions.
- Extension of Dublin Bus by 2.7km to Dunboyne North.
- 4 new pedestrian/cyclist bridges to reduce trip distances.
- Introduction of a Navan-Dunboyne-Blanchardstown bus services.
- The creation of a public transport hub for rail/bus at M3 Parkway.
- Reduce through traffic on the R147 to improve local access for jobs and residents. Achieved through the conversion of the Black Bull Roundabout to a signalised junction and the provision of signal-controlled accesses on the R147.
- HGV bans in Dunboyne and Clonee to enhance pedestrian/cyclist safety.
- Multiple junction upgrades to improve the safety, reliability and capacity including significant upgrades at the Clonee Interchange.
- An eastern distributor road to facilitate rail-focused development, new bus routes and reduce traffic levels in the town centre by providing a local bypass.
- Removal of 9 physical barriers to allow for greater pedestrian/cyclist movement.
- Targeted road capacity upgrades to eliminate congestion blackspots.
- Provision of 2 new junctions to facilitate access to Dunboyne North for all modes from a high-quality regional road and not Kennedy Road, an unsuitable local link near the site.
- Development Policy proposals will ensure that new developments actively encourage the use of active/PT modes through the delivery of infrastructure.

Figure 16.6: Location of all Road, Walk/Cycle and PT Interventions – extracted from TSDE.

It was advised by MCC that the Active Measure A4 as illustrated above – Pedestrian and Cycle Facilities along the southern R147, is currently a work in progress being carried out by MCC. This intervention will improve pedestrian/cycle connection and safety between the Pace Interchange to the north and the L2228 / R147 intersection further south.

16.4 Characteristics of the Proposed Development

16.4.1 Proposed Development

A full description of the proposed development can be found in Chapter 3 of this EIAR. The following is a broad outline of the development.

The proposed development, on a site of approximately 16.92Ha, will consist of 716 No. residential units in a mix of houses, duplex and apartment buildings ranging in height from 2 to 7 storeys overall; comprising of 155 No. 2 storey houses; 517 No. apartments accommodated in 8 No. buildings ranging in height from 4 to 7 storeys; 44 No. duplex units accommodated in 2 No. 3 storey terraces; 1 No. childcare facility (c.602sqm) located at ground floor level of Block B1; public open space; communal and private open space; public lighting; car parking, including basement car parking under some of the apartments; secure bicycle parking; and all associated and ancillary site development and infrastructural works, hard and soft landscaping and boundary treatment works, provision of c. 470m

of new distributor road; provision of a compensatory storage area adjacent to Castle Stream and improvement works to 2 No. roundabouts on the R147 (Old Navan Road).

The breakdown of the proposed residential units is shown below.

Land Use	Block	1-Bed	2-Bed	3-Bed	4-Bed	5-Bed	Total
Houses		-	8	69	74	4	155
Duplexes		18	18	8	-	-	44
Apartments	A1	2	50	6	-	-	58
	A2	3	51	6	-	-	60
	A3	2	50	6	-	-	58
	A4	3	51	6	-	-	60
	B1	25	39	6	-	-	70
	B2	30	41	6	-	-	77
	C1	18	39	10	-	-	67
	C2	18	39	10	-	-	67
	Subtotal	101	360	56	-	-	517
Total		119	386	133	74	4	716

Table 16.8: Proposed Schedule of Accommodation.

16.4.2 Project Programme

It is envisaged that the proposed development will be delivered in an organised manner following planning approval. For the purpose of assessment carried out as part of the accompanying 'Traffic and Transport Assessment' (TTA), it was assumed that the first c. 200 residential units and the Creche will be developed by 2026, whilst the proposed overall development will be constructed by 2031.

16.4.3 Site Access

The proposed development will benefit from one vehicular access point off L2228 Station Road, via the staggered junction between the L2228 Station Road, the Southern Distributor Road (SDR) and the access road to the Dunboyne railway station, which was recently upgraded as part of the nearby recently constructed residential development (Planning Reg. Ref.: RA180561). As part of the works carried out for the nearby constructed development, the first c. 90m of the SDR was constructed. To provide the access to the proposed development, the SDR is proposed to be further extended. In total, c. 470m of the SDR is proposed as part of the subject application - this includes the section along the subject site.

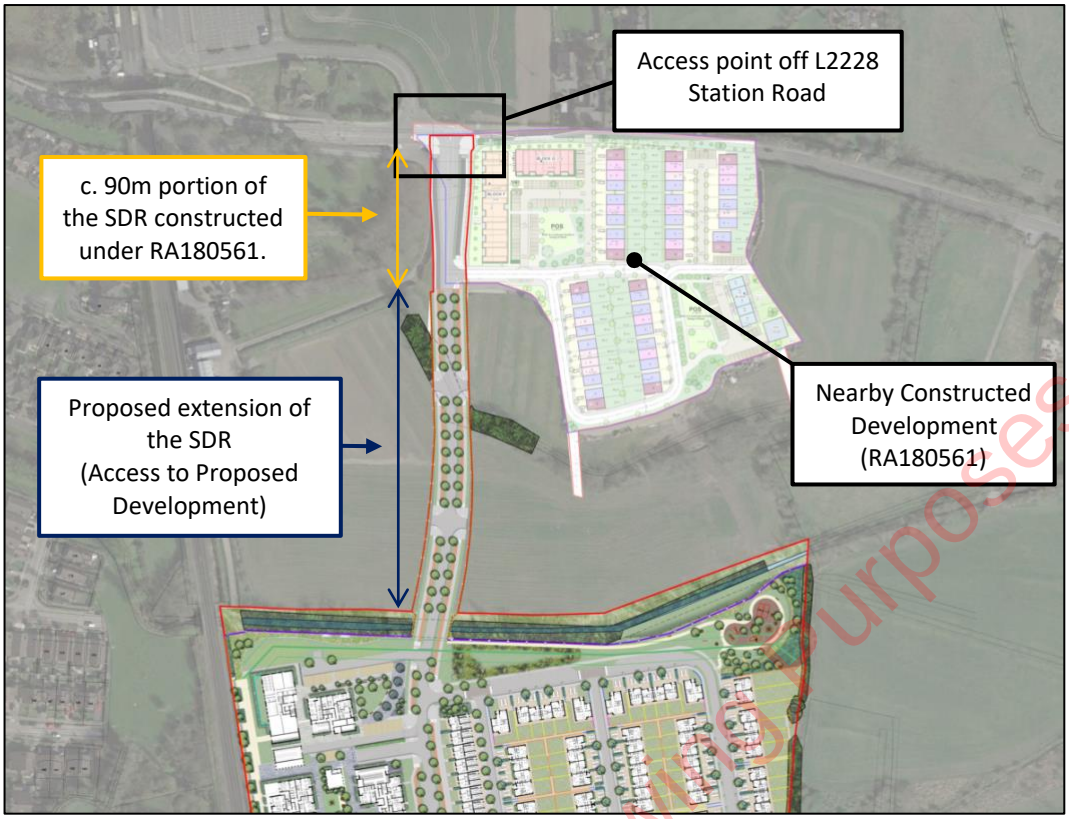


Figure 16.7: Access Point to the Proposed Development Site.

16.4.4 Internal Road Network

All internal roads in the proposed development, apart from the Southern Distributor Road (SDR), are designed for a speed limit of 30kph with generally 5.5m wide carriageways and 2.0m wide footpaths along both sides of the road.

The SDR is designed for a speed limit of 50kph and is proposed as a 6.0m wide single carriageway road with 2.0m wide footpaths and 2.0m wide cycle tracks on both sides of the road.

All road intersections within the development itself will be priority junctions. The low design speeds and traffic calming measures will ensure the safe operation of these junctions.

The visibility splays requirements for the vehicular access points on the SDR are based on the 50kph design speed limit. The sightline requirements for a new priority junction on 50kph road are identified within the Design Manual for Urban Roads and Streets (DMURS) which recommends visibility splays of 45m x 2.4m on roads without bus routes. The minor junctions on the 30kph roads, were designed with the visibility splays of 23m x 2.0m as recommended by DMURS.

For designed cross sections and visibility splays, please refer to Waterman Moylan drawings accompanying the documentation package.

16.4.5 Internal Pedestrian and Cycling Infrastructure

Pedestrian

The internal layout of the proposed development provides 2.0m wide pedestrian pathways on both sides of the roads, separated from the road by a 1.0m wide grass verge. All footpaths for the proposed development will be provided in accordance with Section 4.3.1 of the DMURS, which recommends that minimum 1.8m wide footpaths should be provided.

Cycling

Cycle tracks are proposed along both sides of the SDR to tie in with the existing cycle tracks already in place along the initial c. 90m of the SDR – constructed as part of Planning Reg. Ref.: RA180561. Proposed cycle tracks are designed as 2.0m wide, separated from the road by a grass verge.

16.4.6 Car Parking

The standards used to set out the required car parking for the proposed development are the current Meath County Council Development Plan (2021 – 2027) and the Design Standards for New Apartments (December 2022).

A total of 887 car parking spaces are proposed to serve the subject development, including 16 no. spaces for the Creche.

Car parking is proposed in a number of forms on site. Housing units are proposed to be predominantly served by on-curtilage car parking spaces, whilst car parking spaces for the apartment units are proposed at the basement level parking. A number of parallel parking spaces are proposed alongside the proposed Southern Distributor Road (SDR) within the scheme.

16.4.7 Bicycle Parking

The standards used to set out the required bicycle parking for the proposed development are also the current Meath County Council Development Plan (2021 – 2027) and the Design Standards for New Apartments (December 2022).

A total of 1,362 bicycle parking spaces are proposed to serve the subject development, including 12 no. spaces for the Creche.

Bicycle parking for the houses will be provided on-curtilage or in rear gardens, whilst bicycle parking for the apartments will be provided within the basement level area.

16.5 Potential Impact of the Proposed Development

16.5.1 Introduction

The potential impacts of the proposed development from a traffic and transport perspective at both construction and operational stages are outlined in the following sections.

16.5.2 Proposed Development

16.5.2.1 Construction Stage

Traffic Impact

There is potential for construction traffic to impact from a noise, vibration and dust perspective in relation to the surrounding road network. Deliveries to and from the site by heavy good vehicles will impact on noise and vibration levels, whilst dust may result from vehicles travelling along gravel roads and from general earthwork activities. There is also potential for traffic congestion, due to increased heavy good vehicles on the road network which may also perform turning movements on areas that impact on traffic. The potential for inappropriate parking, particularly along the Southern Distributor Road (SDR) whilst waiting for access to the site, may also impact local road users.

During the construction phase of the proposed development, some construction traffic movements will be undertaken by heavy goods vehicles, though there will also be vehicle movements associated with the appointed contractors and their staff.

An estimate of the day-to-day traffic movements associated with the construction activities, based on experience of similar sites, considered that the number of construction heavy goods vehicle

movements to and from the application site will be c. 40-45 arrivals/departures per day, with most of the trips undertaken outside the AM and PM peak hours.

The general workforce is likely to be c. 100 in number per day, reaching 150 persons at peak times. Given the location of the proposed development site and its access to public transport facilities, such as rail and bus, it is estimated that c. 50% of the workforce will travel to/from the site by a private vehicle and will carpool on an average 1.25 workers per vehicle. As a result, the site is estimated to attract/generate c. 40-60 number of car trips per day, with the majority of the trips being undertaken outside the AM and PM peak hours.

Workers will be encouraged to reduce or eliminate the use of private cars by being informed about the existing public transport options to/from the site.

The number of construction vehicle movements is low compared to the number of vehicular trips expected to be generated by the proposed development during the operational phase (refer to Section 16.6.2.2). It should be noted that most of such trips will occur outside the traditional peak hours, and it is not considered that this level of construction traffic would result in any major operational problems. No road or junction assessment for the construction phase was undertaken.

A construction carpark, within the construction compound, will be created at the start of works by the laying of a temporary surface for vehicles.

Walking and Cycling Infrastructure

There is potential of conflict between construction traffic and pedestrian/cyclists using the existing facilities on L2228 Station Road and the Southern Distributor Road. There is also potential for conflicts with pedestrian and cyclists during the extension works of the Southern Distributor Road and the improvements works to the road and junction network.

16.5.2.2 Operational Stage

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.

16.5.2.3 Do-nothing

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.

16.6 Mitigation Measures (Ameliorative, Remedial or Reductive Measures)

16.6.1 Introduction

This section discusses the mitigation measures to reduce, mitigate and/or eliminate the impact of the proposed development on the surrounding area during the construction and operational phases.

16.6.2 Proposed Development

16.6.2.1 Construction Stage

A Preliminary Construction & Environmental Management Plan (PCEMP) has been prepared by Waterman Moylan for the subject development in order to provide guidance on how to minimise the potential impact of the construction stage of the proposed development on the safety and amenity

of other users of the public road. The PCEMP, which accompanies the documentation package under a separate cover, considers the following aspects:

- Dust and dirt control measures.
- Noise assessment and control measures.
- Routes to be used by vehicles.
- Working hours of the site.
- Details of construction traffic forecast.
- Times when vehicle movements and deliveries will be made to the site.
- Facilities for loading and unloading.
- Facilities for parking cars and other vehicles.

Further to the above, a detailed Construction Management Plan (CMP) and a detailed Construction Traffic Management Plan (CTMP) will be prepared by the main contractor prior to the construction stage. These documents, which will be prepared in coordination and agreement with the Local Authority, will outline site logistics and indicate the following:

- Site access location.
- Site boundary lines.
- Tower crane locations.
- Vehicle entry and exit routes to/from the site.
- Location of loading and unloading areas.
- Location of site offices and welfare facilities.
- Location of material storage areas.
- Banksmen locations.

Through the implementation of the detailed CMP and CTMP prior to the construction stage, it is anticipated that the effect of traffic on the surrounding road network during the construction stage will be short-term in nature and slight negative in terms of effect – causing noticeable changes in the character of the environment without affecting its sensitivities.

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 carpark is provided within the site for contractor's vehicles. It is likely that construction will have a not significant effect on pedestrian and cycle infrastructure – causing noticeable changes in the character of the environment but without significant consequences.

16.6.2.2 Operational Stage

Context

In order to understand the traffic impact and to determine suitable mitigation measures, a `Traffic and Transport Assessment' (TTA) has been prepared by Waterman Moylan as is accompanying the documentation package under a separate cover. This assessment includes a detailed traffic modelling exercise to assess impact and determine if any upgrade works were required on surrounding road network to facilitate the proposed development. A summary of the modelling exercise if provided below.

Assessed Junctions

The traffic modelling carried out as part of the TTA includes the analysis of the following junctions on the surrounding road network:

- Junction 1 (Signalised Crossroads): L2228 / Navan Road / Main Street.
- Junction 2 (Signalised Crossroads): L2228 / Rooske Road.
- Junction 3 (Priority Staggered Junction): L2228 / Access Road to Dunboyne Station carpark / Southern Distributor Road (SDR).
- Junction 4 (Mini Roundabout): L2228 / R147.
- Junction 5 (Roundabout): L2228 / R147 / R156 / M3 Offramp.

Proposed Development Trip Generation

The peak hour trip generation estimated for the proposed development (716 residential units + Creche) is shown in Table 16.9. The trip rates used to calculate the potential traffic to/from the proposed development were obtained by consulting TRICS database. TRICS output report is provided in Appendix C of the accompanying TTA.

It is envisaged that the proposed development will be delivered in an organised manner following planning approval. For the purpose of the assessment carried out as part of the TTA, it was assumed that the first c. 200 residential units and the Creche will be developed by 2026, whilst the proposed overall development will be constructed by 2031.

Year	Proposed Development Units	AM Peak Hour		PM Peak Hour	
		Arrivals	Departures	Arrivals	Departures
2026	200 units	31	60	49	29
	Creche	16	0	0	16
	200 units + Creche	**47**	**60**	**49**	**45**
2031	**716 units + Creche**	**126**	**216**	**176**	**120**

Table 16.9: Proposed Development Trip Generation.

It is estimated that the proposed overall development will generate a total of 342 trips in the AM peak hour (126 inbound and 216 outbound) and a total of 296 trips in the PM peak hours (176 inbound and 120 outbound).

Proposed Development Trip Distribution

Access to the subject development is proposed off L2228 Station Road via the extension of the Southern Distributor Road (SDR). The trip distribution characteristics assumed for the proposed development trips are:

- 30% to/from west via L2228 Station Road, of which, at Junction 1, 15% arrive/depart from/to north via Navan Road, 11% arrive/depart from/to west via L2228 Summerhill Road and 4% arrive/depart from/to south via Main Street.
- 70% to/from east via L2228 Station Road, of which, 15% arrive/depart from/to north via R147 at Junction 4, and 10% arrive/depart via R147 and 45% via R156 at Junction 5.

Nearby Recently Constructed Residential Development (Planning Reg. Ref.: RA 180561)

In order to undertake a complete and cumulative assessment of the local road network, the nearby recently constructed development approved under Reg. Ref.: RA 180561, which was not occupied when the traffic survey for the accompanying TTA was carried out, was also included in the analysis.

The trip generation has been extracted from the "Traffic & Transport Assessment" report prepared as part of the planning application for the site. This is reproduced below.

Land Use Category	AM Peak Hour		PM Peak Hour	
	Arrivals	Departures	Arrivals	Departures
Houses/Duplexes	10	29	25	13
Apartments	1	1	2	1
Creche	3	2	2	2
Total	14	32	29	16

Table 16.10: Nearby Recently Approved Development Trips.

Potential Impact on Assessed Junctions

The extent of traffic impact from the proposed development has been determined by initially checking where generated traffic would exceed 10% of the traffic flow on the adjoining road of 5% on the road where congestion exists, or the location is sensitive. A summary of the existing two-way traffic and the expected traffic increase at each assessed junction is presented below.

Junction	Surveyed Two-way Flows (AM)	Surveyed Two-way Flows (PM)	Prop. Dev. Two-way Traffic (AM)	Prop. Dev. Two-way Traffic (PM)	Traffic Increase (AM)	Traffic Increase (PM)
1	899	816	103	89	11.46%	10.91%
2	1,055	1,048	103	89	9.76%	8.49%
3	1,175	899	342	296	29.11%	32.93%
4	1,598	1,343	239	207	14.96%	15.41%
5	2,105	2,132	188	163	8.93%	7.65%

Table 16.11: Surveyed Two-way Traffic and Expected Traffic Increase by Proposed Development.

All junctions are estimated to receive a two-way traffic increase higher than or close to 10%. Therefore, all junctions were modelled.

Assessed Scenarios

The performance of the junctions was analysed for the critical AM and PM peak hours (08h00 to 09h00 and 17h00 to 18h00) for the following scenarios:

- **2026 DO NOTHING**: 2021 surveyed flows factored up + trips to/from the recently constructed residential development.
- **2026 DO SOMETHING**: 2026 DO NOTHING + trips to/from the first c. 200 units + Creche of the proposed development.
- **2031 DO NOTHING**: 2021 surveyed flows factored up + trips to/from the recently constructed residential development.
- **2031 DO SOMETHING**: 2031 DO NOTHING + trips to/from the overall proposed development.
- **2041 DO NOTHING**: 2021 surveyed flows factored up + trips to/from the recently constructed residential development.
- **2041 DO SOMETHING**: 2041 DO NOTHING + trips to/from the overall proposed development.

Analysis Results

Junction 1

Junction 1 is an existing 4-armed signalised junction located at Dunboyne town centre. This junction was modelled based on its existing layout and the TRANSYT analysis results are summarised below. The arms of the junction were labelled as follows within the model:

- Arm 1: Summerhill Road (NW)
- Arm 2: Navan Road (N)
- Arm 3: L2228 (E)
- Arm 4: Main Street (S)

Arm (Mov)	AM Peak Hour			PM Peak Hour		
	Queue (veh)	Delay (sec/veh)	DOS	Queue (veh)	Delay (sec/veh)	DOS
2026 DO NOTHING						
1 (S/L/R)	8.61	52.34	67%	5.81	58.96	63%
2 (S/L/R)	7.77	60.02	71%	7.67	51.30	63%
3 (S/L/R)	6.78	58.19	66%	8.59	48.88	64%
4 (S/L)	4.00	48.32	40%	3.52	52.81	42%
4 (R)	6.27	56.24	62%	4.17	56.64	53%
2026 DO SOMETHING						
1 (S/L/R)	9.09	55.69	71%	6.12	60.21	65%
2 (S/L/R)	7.93	58.07	70%	7.98	52.28	65%
3 (S/L/R)	7.45	58.54	69%	9.21	50.41	67%
4 (S/L)	4.05	49.76	42%	3.52	52.81	42%
4 (R)	6.52	59.60	66%	4.25	56.96	53%
2041 DO NOTHING						
1 (S/L/R)	10.42	56.08	75%	6.84	60.95	68%
2 (S/L/R)	9.16	60.62	75%	9.31	56.58	73%
3 (S/L/R)	8.25	65.11	75%	10.39	53.98	73%
4 (S/L)	4.89	53.50	52%	4.27	57.23	53%
4 (R)	8.38	73.86	80%	5.16	64.04	64%
2041 DO SOMETHING						
1 (S/L/R)	12.22	69.47	85%	7.91	66.70	75%
2 (S/L/R)	11.62	83.33	88%	11.42	68.57	83%
3 (S/L/R)	11.35	72.17	84%	11.80	54.25	76%
4 (S/L)	4.89	53.50	52%	4.37	60.11	56%
4 (R)	8.80	76.72	82%	5.75	72.42	72%

Table 16.12: Existing Junction 1 – TRANSYT Analysis Results.

The TRANSYT analysis results indicate that Junction 1 would operate within capacity for the 2026 DO SOMETHING scenario and would continue to do so for the 2041 DO SOMETHING.

Junction 2

Junction 2 is an existing signalised junction located to the northwest of the proposed development site. This junction was modelled based on its existing layout and the TRANSYT analysis results are summarised below. The arms of the junction were labelled as follows within the model:

- Arm 1: L2228 (W)
- Arm 3: L2228 (E)
- Arm 4: Roskee Road (S)

Arm (Mov)	AM Peak Hour			PM Peak Hour		
	Queue (veh)	Delay (sec/veh)	DOS	Queue (veh)	Delay (sec/veh)	DOS
2026 DO NOTHING						
1 (S/L/R)	13.86	38.58	70%	12.88	40.42	69%
3 (S/L/R)	11.53	46.83	71%	14.04	38.93	71%
4 (L)	1.55	9.34	12%	1.98	13.88	15%
4 (S/R)	8.07	58.68	71%	5.35	65.27	66%
2026 DO SOMETHING						
1 (S/L/R)	14.50	39.58	72%	13.56	41.57	71%
3 (S/L/R)	12.14	46.74	72%	14.65	39.88	73%
4 (L)	1.58	9.75	12%	1.98	13.88	15%
4 (S/R)	8.32	62.49	74%	5.35	65.27	66%
2041 DO NOTHING						
1 (S/L/R)	17.91	47.46	82%	16.11	46.54	79%
3 (S/L/R)	14.38	54.30	81%	17.77	45.61	81%
4 (L)	1.79	9.49	14%	2.32	14.11	17%
4 (S/R)	9.88	63.91	78%	6.76	75.58	77%
2041 DO SOMETHING						
1 (S/L/R)	20.70	55.09	88%	19.11	52.42	86%
3 (S/L/R)	18.08	62.49	88%	20.25	51.71	87%
4 (L)	1.86	10.31	14%	2.32	14.11	17%
4 (S/R)	10.96	78.17	86%	7.32	87.09	82%

Table 16.13: Existing Junction 2 – TRANSYT Analysis Results.

The TRANSYT analysis results indicate that Junction 2 would operate within capacity for the 2026 DO SOMETHING scenario and would continue to do so for the 2041 DO SOMETHING.

Junction 3

Junction 3 is an existing priority-controlled staggered junction located to the north of the proposed development site. The southern approach of this junction (the Southern Distributor Road) is proposed to provide access to the subject development. This junction was modelled based on its existing layout. The PICADY analysis results are summarised below. The arms of the junction were labelled as follows within the model:

- Arm A: L2228 – Station Road (E)
- Arm B: Southern Distributor Road (S)
- Arm C: L2228 – Station Road (W)
- Arm D: Access Road to Dunboyne Rail Station (N)

Stream	AM Peak Hour			PM Peak Hour		
	Queue (veh)	Delay (sec/veh)	RFC	Queue (veh)	Delay (sec/veh)	RFC
2026 DO NOTHING						
B-ACD	0.1	11.07	0.12	0.1	9.34	0.09
AB-CD	0.0	7.89	0.01	0.0	6.85	0.01
D-AB	0.0	7.74	0.01	0.0	6.66	0.01
D-C	0.1	13.85	0.06	0.0	10.54	0.04
CD-AB	0.0	7.29	0.03	0.0	7.26	0.03
2026 DO SOMETHING						
B-ACD	0.5	15.24	0.32	0.3	11.70	0.22

AB-CD	0.0	7.95	0.01	0.0	6.90	0.01
D-AB	0.0	7.81	0.01	0.0	6.71	0.01
D-C	0.1	14.25	0.06	0.0	10.75	0.04
CD-AB	0.1	7.30	0.06	0.1	7.41	0.06
2031 DO NOTHING						
B-ACD	0.1	11.70	0.12	0.1	9.77	0.10
AB-CD	0.0	8.13	0.02	0.0	6.97	0.01
D-AB	0.0	8.01	0.01	0.0	6.78	0.01
D-C	0.1	15.20	0.06	0.0	11.08	0.05
CD-AB	0.0	7.41	0.03	0.0	7.38	0.03
2031 DO SOMETHING						
B-ACD	6.6	91.13	0.91	0.9	19.72	0.49
AB-CD	0.0	8.30	0.02	0.0	7.16	0.01
D-AB	0.0	8.22	0.01	0.0	6.99	0.01
D-C	0.1	16.86	0.07	0.1	11.86	0.05
CD-AB	0.2	7.42	0.12	0.2	7.95	0.16
2041 DO NOTHING						
B-ACD	0.1	12.42	0.13	0.1	10.21	0.11
AB-CD	0.0	8.39	0.02	0.0	7.08	0.01
D-AB	0.0	8.30	0.02	0.0	6.91	0.01
D-C	0.1	16.83	0.07	0.0	11.68	0.05
CD-AB	0.0	7.52	0.03	0.0	7.50	0.03
2041 DO SOMETHING						
B-ACD	9.6	128.47	0.97	1.0	21.56	0.51
AB-CD	0.0	8.57	0.02	0.0	7.28	0.01
D-AB	0.0	8.53	0.02	0.0	7.12	0.01
D-C	0.1	18.90	0.07	0.1	12.54	0.05
CD-AB	0.2	7.45	0.12	0.2	8.01	0.16

Table 16.14: Existing Junction 3 – PICADY Analysis Results.

The results indicate that Junction 3 would operate within capacity for the 2026 DO SOMETHING scenario with the highest RFC at 0.32 and a corresponding queue of < 1.0 vehicle.

For the 2031 and 2041 DO SOMETHING scenarios, with the inclusion of the overall proposed development, the results indicate that, in terms of RFC, Junction 3 would operate within satisfactory capacity during both peak hours (below 1.00). However, with regards to delays, the recorded values indicated that the vehicles exiting the SDR in the AM are likely to experience a moderate level of delay waiting for a gap on the L2228 Station Road to access both sides of the main road.

It is envisaged that sometime in the near future the northern approach of Junction 3 will be in place (formed by the Eastern Distributor Road (EDR)), and this junction would be upgraded to a 4-armed signalised junction. The layout of the EDR and its tie into Junction 3 is currently being designed and progressed by others on the northern side of the L2228. Considering a worst-case scenario where the construction of the EDR and the 4-armed signalised Junction 3 do not receive planning permission, as part of the assessment carried out in the accompanying TTA, Junction 3 was also modelled as a 3-armed signalised junction – in case it is judged by the Council that this junction requires future signalisation to support the delivery of the proposed development. The 3-armed signalised layout is shown below.

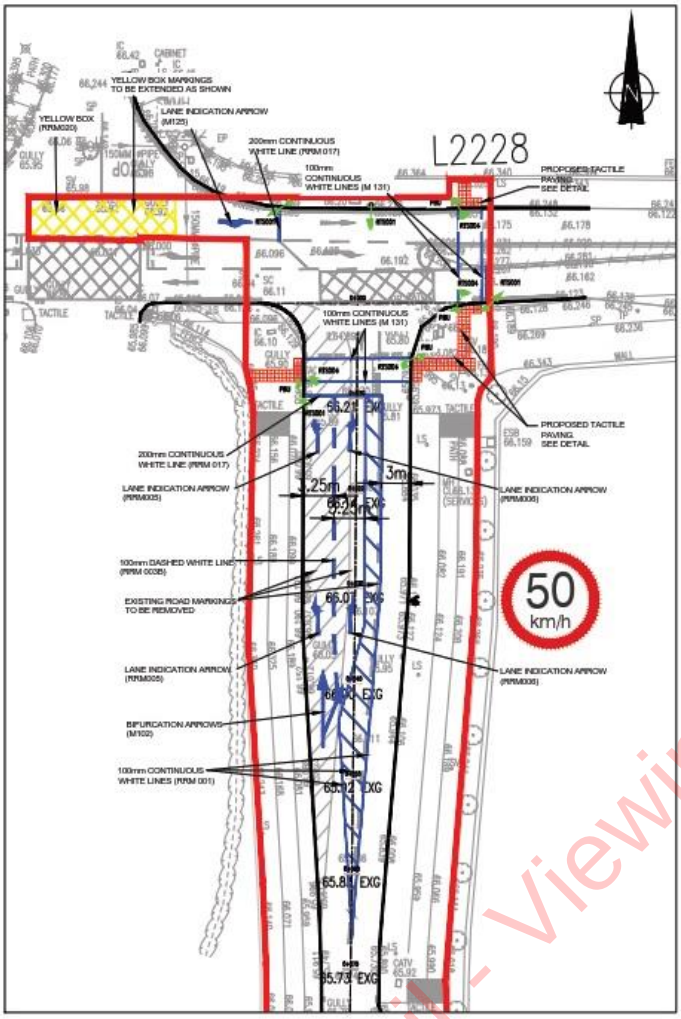


Figure 16.8: Junction 3 – 3-armed Signalised Layout.

The assessment of the 3-armed signalised Junction 3 was carried out for the 2041 DO SOMETHING scenario only. To provide a complete appraisal of the junction and to understand the extent of the blocking back effect resultant of the signalisation of Junction 3 along L2228 Station Road (eastbound), the road links immediately west of the traffic signals were also included in the model:

- Arm A: L2228 Station Road (Westbound) - signalised.
- Arm B: Southern Distributor Road (S) - signalised.
- Arm C: L2228 Station Road (Eastbound) – signalised
- Arm C-1: Right turning pocket lane from L2228 Station Road onto the SDR – signalised giveway.
- Arm D: L2228 Station Road (Westbound) – unsignalized.
- Arm E: L2228 Station Road (Eastbound) – unsignalized.
- Arm F: Access Road to Dunboyne Railway Station Carpark (N) – unsignalized.
- Arm G: Access Road to Dunboyne Herbal Clinic (S) – unsignalized.

Given the restrained queuing space, a queue limit has been set between the traffic signal at Arm C and the access road to the Dunboyne railway station carpark (Arm F). This adjustment to the model was set to simulate/identify any potential blocking back effect along the unsignalized Arm E (L2228 Station Road eastbound).

Arm (Mov)	AM Peak Hour			PM Peak Hour		
	Queue (veh)	Delay (sec/veh)	DOS	Queue (veh)	Delay (sec/veh)	DOS
2041 DO SOMETHING						
A (S/L)	17.11	19.88	74%	16.50	19.32	73%
B (L)	2.06	39.44	28%	1.34	37.90	19%
B (R)	4.90	48.42	60%	2.65	40.89	36%
C (S)	2.56	8.32	80%	1.31	4.43	53%
C-1 (R)	1.00	16.68	19%	1.39	20.91	24%
D (S/L)	0.16	0.75	43%	0.11	0.61	38%
D (R)	0.00	0.25	0%	0.00	0.25	0%
E (S/L)	18.80	20.05	78%	8.79	11.57	50%
E (R)	0.00	0.01	1%	0.00	0.01	1%
F (S/L/R)	0.21	7.32	1%	0.20	6.58	1%
G (S/L/R)	0.21	7.38	1%	0.20	6.63	1%

Table 16.15: Signalised 3-armed Junction 3 – TRANSYT Analysis Results.

The results indicate that Junction 3, as a 3-armed signalised junction, would operate within capacity for the future 2041 DO SOMETHING scenario during both peak hours and the blocking back effect from the signalised Arm C onto the unsignalized Arm E would not be an issue, should the signalisation of this junction be required.

Junction 4

Junction 4 is an existing mini roundabout located to the northeast of the proposed development site. This junction has been modelled based on its existing layout. The ARCADY analysis results are summarised below. The arms of the junction were labelled as follows within the model:

- Arm 1: R147 (S)
- Arm 2: L2228 Station Road (W)
- Arm 3: R147 (N)
- Arm 4: Minor Road (W)

Arm	AM Peak Hour			PM Peak Hour		
	Queue (veh)	Delay (sec/veh)	RFC	Queue (veh)	Delay (sec/veh)	RFC
2026 DO NOTHING						
1	3.6	17.31	0.78	4.9	21.88	0.83
2	4.6	22.43	0.82	1.3	9.76	0.56
3	2.1	20.04	0.68	0.7	8.55	0.41
4	0.0	0.00	0.00	0.0	0.00	0.00
2026 DO SOMETHING						
1	4.4	20.37	0.81	6.2	26.97	0.87
2	6.4	30.02	0.87	1.6	10.73	0.60
3	2.5	23.78	0.72	0.8	9.08	0.43
4	0.0	0.00	0.00	0.0	0.00	0.00
2031 DO NOTHING						
1	5.3	24.10	0.85	7.9	33.51	0.90
2	7.7	35.72	0.90	1.6	11.26	0.61
3	3.3	29.83	0.78	0.9	9.53	0.45
4	0.0	0.00	0.00	0.0	0.00	0.00
2031 DO SOMETHING						
1	11.1	46.75	0.94	29.7	103.09	1.02

2	47.2	158.04	1.08	2.5	15.05	0.71
3	6.2	53.85	0.88	1.1	11.76	0.53
4	0.0	0.00	0.00	0.0	0.00	0.00

Table 16.16: Existing Junction 4 – ARCADY Analysis Results.

The analysis results as summarised above indicate that, for the 2026 DO SOMETHING scenario, Junction 4 would operate within capacity during both peak hours. For the 2031 DO SOMETHING, however, with the inclusion of the overall proposed development, the results indicate that Junction 4 would operate above capacity during both peak hours.

The 'Transportation Study at Dunboyne & Environs' (TSDE) acknowledges that the R147 and its junctions are operating at/or approaching capacity and have proposed interventions to help increase capacity. The interventions proposed include the realignment of the R147 and R149 roundabout, and upgrades to the Clonee West Interchange. However, the TSDE does not mention any specific intervention related to the subject Junction 4 (mini roundabout between R147 and L2228 Station Road) which, as summarised above, is likely to become oversaturated any time in the future with the development of Dunboyne.

In this regard, as part of the subject application and in order to increase Junction 4 capacity to support the proposed development, an improved layout is proposed. The proposed layout consists of the upgrade of the existing mini roundabout to a standard-sized roundabout with two circulating lanes and an ICD of 28 metres, and upgrades to the northern, western and southern approaches to comprise additional entry lanes and increased entry widths. The proposed roundabout and surrounding area to be used for the proposed intervention is shown below. Details of the proposed roundabout are provided on Waterman Moylan Drawing No. 21-061 – P118 accompanying the documentation package.

It was advised by MCC that a pedestrian/cycling infrastructure along the R147 (north of Junction 4), is a work in progress currently being carried out by the Council to improve pedestrian/cycle connectivity in the area. The proposed upgraded Junction 4 has been designed in a way to facilitate this pedestrian/cycling infrastructure.

It is identified that the lands necessary to upgraded Junction 4 are in the public area. The existing access roads to the residential properties surrounding the roundabout are proposed to be retained. The details of the proposed layout and the timeframe for the construction of the proposed roundabout and any other essential local transport infrastructure are to be agree with the local authority.

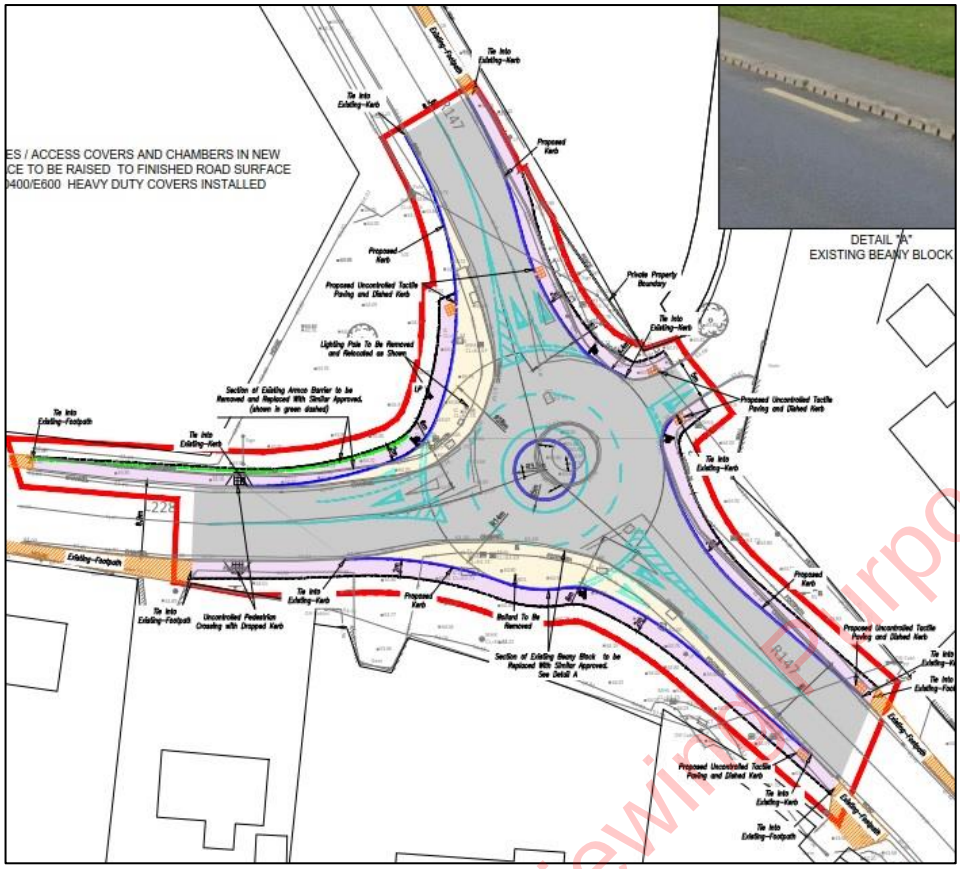


Figure 16.9: Junction 4 – Proposed Roundabout.

The ARCADY analysis results for the upgraded Junction 4 are presented below.

- Arm 1: R147 (S)
- Arm 2: L2228 Station Road (W)
- Arm 3: R147 (N)
- Arm 4: Minor Road (W)

Arm	AM Peak Hour			PM Peak Hour		
	Queue (veh)	Delay (sec/veh)	RFC	Queue (veh)	Delay (sec/veh)	RFC
2031 DO SOMETHING						
1	1.3	5.05	0.55	1.6	5.70	0.60
2	2.5	9.01	0.70	0.9	5.15	0.46
3	0.8	6.36	0.43	0.4	4.17	0.28
4	0.0	0.00	0.00	0.0	0.00	0.00
2041 DO SOMETHING						
1	1.5	5.52	0.59	1.9	6.34	0.64
2	3.1	10.73	0.75	1.0	5.54	0.49
3	0.9	7.13	0.47	0.5	4.40	0.31
4	0.0	0.00	0.00	0.0	0.00	0.00

Table 16.17: Proposed Junction 4 – ARCADY Analysis Results.

The analysis results as summarised above indicate that the proposed roundabout would operate within capacity for the 2031 DO SOMETHING scenario during both peak hours and would continue to do so for the 2041 DO SOMEHING. No high delays or queue lengths were recorded.

Junction 5

Junction 5 is an existing roundabout located to the east of the proposed development site. It has been modelled based on its existing layout and the ARCADY analysis are summarised below. The arms of the junction were labelled as follows within the model:

- Arm 1: R147 (E)
- Arm 2: R147 (S)
- Arm 3: R147 (N)
- Arm 4: M3 northbound on-slip (NE) – exit only

Arm	AM Peak Hour			PM Peak Hour		
	Queue (veh)	Delay (sec/veh)	RFC	Queue (veh)	Delay (sec/veh)	RFC
2026 DO NOTHING						
1	1.7	10.21	0.63	10.4	39.66	0.95
2	1.4	6.33	0.58	1.6	7.86	0.62
3	4.1	16.89	0.82	1.5	8.83	0.60
2026 DO SOMETHING						
1	1.8	10.79	0.64	11.8	44.54	0.97
2	1.5	6.61	0.60	1.8	8.28	0.64
3	4.9	19.52	0.85	1.7	9.40	0.63
2031 DO NOTHING						
1	2.2	12.49	0.69	25.7	94.92	1.05
2	1.7	7.29	0.63	2.1	9.23	0.67
3	6.7	25.57	0.89	1.9	10.41	0.66
2031 DO SOMETHING						
1	2.7	15.35	0.74	41.7	147.17	1.10
2	2.1	8.34	0.68	2.8	11.37	0.74
3	16.7	57.75	1.00	2.5	12.49	0.72
2041 DO NOTHING						
1	2.9	15.70	0.75	60.7	201.59	1.14
2	2.2	8.51	0.69	2.5	10.74	0.72
3	12.4	42.52	0.97	2.5	12.51	0.72
2041 DO SOMETHING						
1	3.6	19.17	0.80	84.0	290.94	1.19
2	2.7	9.96	0.73	3.5	13.55	0.78
3	39.3	125.23	1.08	3.3	15.46	0.78

Table 16.18: Existing Junction 5 – ARCADY Analysis Results.

The analysis results indicate that the existing Junction 5 would operate within satisfactory capacity for the 2026 DO SOMETHING scenario during both peak hours. In comparison with the 2026 DO NOTHING scenario, it can be noted that the proposed development, in 2026, would have a negligible impact on Junction 5.

For the 2031 DO NOTHING scenario, even without the proposed development trips in place, the results indicate that Junction 5 would operate without capacity in the PM peak hour with an RFC at 1.05. With the inclusion of the proposed development (2031 DO SOMETHING), the highest RFC is recorded at 1.10 in the PM peak hour.

As mentioned previously, the 'Transportation Study at Dunboyne & Environs' (TSDE) have proposed interventions to help increase capacity along the R147 and near the M3 interchange west of Clonee. These interventions include the realignment of the junction between R147 and the R149 (the subject Junction 5), and upgrades to the Clonee West Interchange, which include additional entry and exit slips to/from the M3 motorway.

It is considered in the TSDE that the realignment of the junction between the R147 and the R149 (Junction 5) is a short-term intervention (planning needed in 1-3 years with delivery in 3-5 years) and is "*immediately required due to current traffic issues*".

It is estimate, therefore, that these road interventions, subject to planning approval, will be in place any time in the short/medium term period and will help alleviate/mitigate any potential traffic issues arising from the proposed and potential future developments in Dunboyne and in the area. However, should these interventions not take place, in order to increase its operational capacity and support the development of the proposed residential scheme, as part of this application, some interventions to Junction 5 are also proposed. The interventions consist of upgrades to the north-western (R147) and north-eastern (R147) approaches, by increasing road widths, entry widths and flare lengths. The proposed upgrades are shown below. For details, please refer to Waterman Moylan Drawing No. 21-061 – P119 accompanying the documentation package.

It was advised by MCC that improvements to the pedestrian and cycling infrastructure along the M3 overbridge (R147) are currently being progressed by the Transport Infrastructure Ireland (TII). The proposed upgraded Junction 5 has been designed in a way to facilitate this TII intervention.

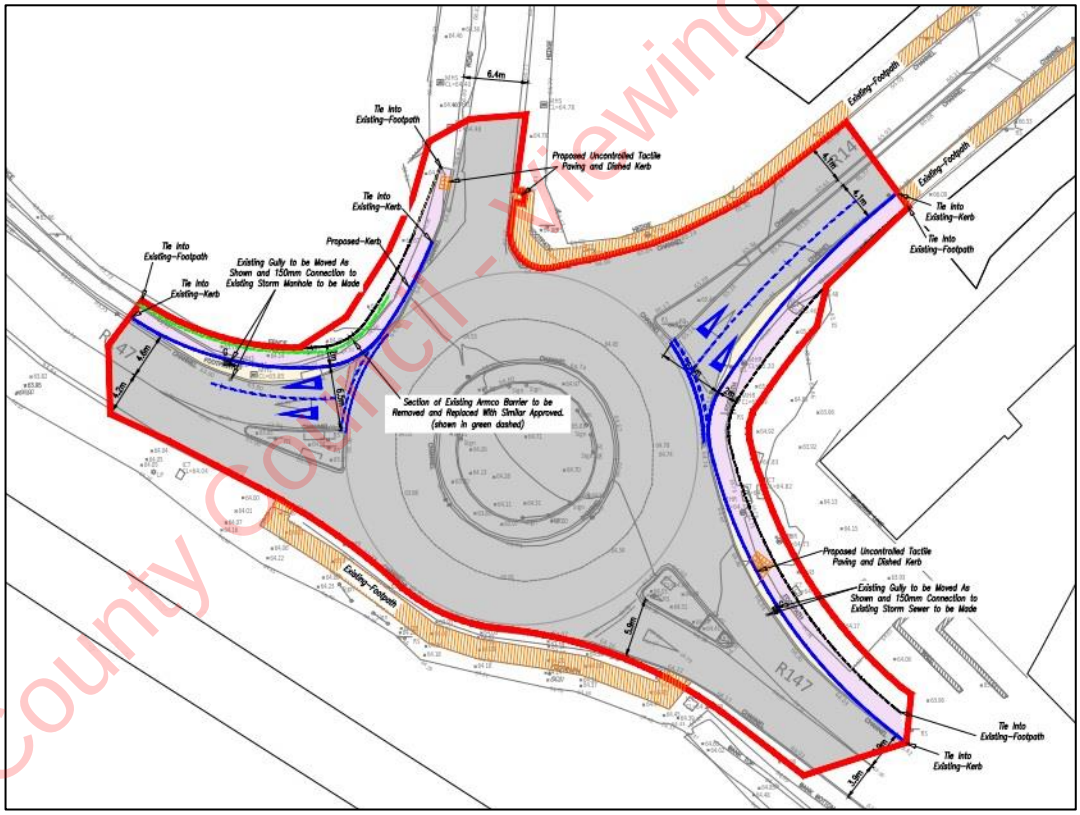


Figure 16.10: Junction 5 – Proposed Roundabout.

The ARCADY analysis results for the upgraded Junction 5 are presented below.

- Arm 1: R147 (E)
- Arm 2: R147 (S)
- Arm 3: R147 (N)
- Arm 4: M3 northbound on-slip (NE) – exit only

Arm	AM Peak Hour			PM Peak Hour		
	Queue (veh)	Delay (sec/veh)	RFC	Queue (veh)	Delay (sec/veh)	RFC
2031 DO SOMETHING						
1	1.3	7.11	0.56	4.6	16.10	0.83
2	2.1	8.35	0.68	3.1	12.66	0.76
3	3.2	10.56	0.77	1.2	6.08	0.55
2041 DO SOMETHING						
1	1.6	8.23	0.61	7.5	24.72	0.91
2	2.7	10.01	0.73	4.4	17.16	0.83
3	4.4	13.82	0.82	1.5	6.92	0.60

Table 16.19: Proposed Junction 5 – ARCADY Analysis Results.

The ARCADY analysis results summarised above indicate that the proposed upgraded Junction 5 would operate within capacity for the 2031 DO SOMETHING scenario during both peak hours and would continue to do so for the 2041 DO SOMETHING scenario.

In summary, it can be determined that the effects of the proposed development during the operational phase with regards to peak hour traffic will be momentary in terms of duration – occurring for less than an hour during the peak periods of the road network, and significant in terms of magnitude, which will alter the baseline condition, requiring upgrades to junctions. Outside the peak hours, however, the effects are likely to be permanent in terms of duration, but imperceptible or not significant in terms of magnitude.

Sensitivity Analysis

A Sensitivity Analysis was also undertaken as part of the TTA carried out for the subject application (accompanying the documentation package under a separate cover) to provide a robust appraisal of the local receiving road network for the future years of 2031 and 2041 (2031 Sensitivity Analysis and 2041 Sensitivity Analysis), and also to understand whether the proposed and potential future junctions would have capacity to accommodate the traffic arising from the potential future housing developments expected to be developed in the residential zoned lands to the north and south of L2228 Station Road.

The Sensitivity Analysis considered:

- The zoned lands to the north and south of the L2228 Station Road set out in the Dunboyne/Clonee/Pace Local Area Plan (2009 – 2015), to be accessed via the Eastern Distributor Road (EDR) and the Southern Distributor Road (SDR).
- The EDR, the Business Park Link and the SDR as set out in the 'Transportation Study at Dunboyne & Environs' (October 2018) and the current Meath County Council Development Plan (2021 – 2027)
- The upgrade of Junction 3 to a 4-armed signalised junction with the northern approach formed by the EDR.
- Reallocation of trips due to the construction of the EDR, the SDR and other road interventions.

In summary, the results for all assessed junctions indicated that they would operate within capacity for both the 2031 and 2041 Sensitivity Analysis scenarios during both peak hours. For additional details please refer to Section 10 of the accompanying TTA.

Walking, Cycling and Public Transport

A Travel Plan has been included in the subject application under a separate cover. The Plan sets out methods to reduce on private car journeys and encourage both residents and visitors of the proposed development to avail of sustainable forms of transport such as walking, cycling and public transport.

In this regard, the proposed development provides connectivity to existing facilities and public transport options, in particular the Dunboyne Railway Station. The proposed extension of the Southern Distributor Road (SDR) will facilitate pedestrian and cyclists' progression, by connecting the proposed cycle lanes and footpaths to the existing facilities.

It can be determined that the effects of the proposed development during the operational phase with regards to walking, cycling and public transport environment will be positive in terms of quality and permanent in terms of duration.

16.7 Residual Impact of the Proposed Development

16.7.1 Proposed Development

The residual impacts of the proposed development from a traffic and transport perspective at both construction and operational phases are outlined below.

16.7.1.1 Construction Stage

Provided the mitigation measures and the management procedures outlined in the Construction Management Plan (CMP) are incorporated during the construction phase, the residual impact upon the local receiving environment is predicted to be medium-term in nature and slight negative in terms of effect – causing noticeable changes in the character of the environment without affecting its sensitivities.

With regards to pedestrian and cycle infrastructure, construction will have a not significant effect – causing noticeable changes in the character of the environment but without significant consequences.

16.7.1.2 Operational Stage

The analysis of the road network has shown that the existing and proposed upgraded junctions would operate within capacity for the 2041 DO SOMETHING scenario during both the AM and PM peak hours. The proposed upgraded junctions would also be able to cater for the additional traffic demand arising from the residential zoned lands in Dunboyne (2041 Sensitivity Analysis).

Whilst the estimated increase in traffic over the baseline conditions is considered moderate, the proposed upgraded junctions would have a positive impact in terms of quality, increasing the capacity of the road network to accommodate the proposed and potential future developments, and would be medium/long-term in terms of duration.

The extension of the Southern Distributor Road and provision of adequate pedestrian and cyclist facilities as part of the proposed development, will results in a positive and permanent effect in terms of sustainable transport options.

16.7.1.3 Worst Case Impact

The 'worst-case' scenario for the construction phase is for the mitigation measures to fail and cause significant and long-term effects on the area. These impacts would include long traffic delays and possible detours along the local road network. The 'worst-case' scenario would also affect the construction timeline and increase the construction programme.

For the operational phase, the 'worst-case' scenario is for slight, permanent effects to the local road network. These would include long delays at nearby junctions due to the impact of the proposed development operational traffic should mitigation measures fail.

16.7.2 Cumulative

16.7.2.1 Construction Stage

There are no predicted cumulative impacts arising from the construction phase of the proposed development.

16.7.2.2 Operational Stage

The traffic impact analysis carried out as part of the accompanying Traffic and Transport Assessment, and summarised in this Chapter, already accounts for the cumulative traffic impacts arising from a committed nearby development and residential zoned lands in Dunboyne.

16.8 Monitoring and Reinstatement

16.8.1 Proposed Development

16.8.1.1 Construction Stage

During the construction phase, the following monitoring is advised. The specific compliance exercises to be undertaken in relation to the range of measures detailed in the final Construction Management Plan (CMP) will be agreed with the planning authority.

- Construction vehicles routes and parking.
- Internal and external road conditions.
- Construction activity hours of work.

16.8.1.2 Operational Stage

Curing the operational phase, the following monitoring is advised in order to further reduce the traffic effects predicted from the proposed development:

- Carparking capacity and associated occupancy.
- Cycle parking capacity and associated occupancy.
- Public transport serving the area, including location of closest bus stops, service frequency and routes, and commuting times from key destinations.

The Travel Plan for the proposed development will be monitored and updated at regular intervals. This will enable tracking in terms of reduction in the dependence on private car journeys and a shift towards sustainable transport options such as walking, cycling and the use of public transport.

16.9 Difficulties Encountered

There were no difficulties encountered compiling this chapter.

17 MATERIAL ASSETS (WASTE)

17.1 Introduction

This chapter evaluates the impacts, if any, which the proposed development may have on Material Assets - Waste as defined in the EIA Directive (Directive 2011/92/EU as amended by Directive 2014/52/EU), the EPA EIA Report Guidelines 2022 during the construction and operational phases of the proposed development, as described in Chapter 5 (Description of the Proposed Development).

This Chapter was prepared by Chonaill Bradley (Bsc ENV AssocCIWM) of AWN Consulting Ltd (AWN). Chonaill Bradley is a Principal Environmental Consultant in the Environment Team at AWN. He holds a BSc in Environmental Science from Griffith University, Australia. He is an Associate Member of the Institute of Waste Management (CIWM). Chonaill has over eight years' experience in the environmental consultancy sector and specialises in waste management.

A site-specific Resource Waste Management Plan (RWMP) has been prepared by AWN Consulting Ltd (ref CB/217501.0292WMR01) to deal with waste generation during the demolition, excavation and construction phases of the proposed Development and has been included as Appendix 17.1. 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).

A separate Operational Waste Management Plan (OWMP) has also been prepared by AWN Consulting Ltd (ref CB/217501.0292WMR02) for the operational phase of the proposed development and is included in Appendix 17.2 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), the EPA Guidelines on the Information to be contained in EIAR (2022) and the EU Commission Notice on changes and extensions to projects (2021).

These documents will ensure the management of wastes arising at the proposed development site in accordance with legislative requirements and best practice standards.

17.2 Assessment 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.

This Chapter is based on the proposed development, as described in Chapter 3 of this EIAR (Description of Project) and considers the following aspects:

- Legislative context;
- Construction phase (including site preparation and excavation works);
- Operational phase; and
- Reinstatement 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 and are included in section 17.4 of this Chapter. The waste types and estimated quantities are based on published data by the EPA in the National Waste Reports and National Waste Statistics and data recorded from similar previous developments.

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 17.6

A detailed review of the existing ground conditions on a regional, local and site-specific scale are presented in Chapter 7 of this EIAR (Land, Soils and Geology).

17.2.1 Legislation and Guidance

Waste management in Ireland is subject to EU, national and regional waste legislation and control, which defines how waste materials must be managed, transported and treated. The overarching EU legislation is the Waste Framework Directive (2008/98/EC) as amended 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 reuse > recycling > recovery > disposal) (Figure 17.1).

Figure 17.1: 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 17.2).

Figure 17.2: 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, 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 waste targets is due to the 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 Circular Economy and Miscellaneous Provisions Act 2022 was signed into law in July 2022. The Act underpins Ireland's shift from a "take-make-waste" linear model to a more sustainable pattern of production and consumption, that retains the value of resources in our economy for as long as possible and that will to significantly reduce our greenhouse gas emissions. The Act defines Circular Economy for the first time in Irish law, incentivises the use of recycled and reusable alternatives to wasteful, single-use disposable packaging, introduces a mandatory segregation and incentivised charging regime for commercial waste, streamlines the national processes for End-of-Waste and By-Products decisions.

The strategy for the management of waste from the construction phase is in line with the requirements of the EPA's *'Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects'* (2021). The guidance documents, *Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects (2006) and Construction and Demolition Waste Management: A Handbook for Contractors and Site Managers* (FÁS & Construction Industry Federation, 2002), were also consulted in the preparation of this assessment.

There are currently no Irish guidelines on the assessment of operational waste generation, and guidance is taken from industry guidelines, plans and reports including the Eastern Midlands Regional (EMR) Waste Management Plan 2015 – 2021, BS 5906:2005 Waste Management in Buildings – Code of Practice, the Meath County Council (MCC) Waste Management (Segregation, Storage & Presentation of Household and Commercial Waste) Bye-Laws (2018), the EPA National Waste Database Reports 1998 – 2020 and the EPA National Waste Statistics Web Resource.

17.2.2 Terminology

Note that the terminology used herein is 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 of the Waste Framework Directive sets out a non-exhaustive list of disposal operations.

17.3 Receiving Environment

In terms of waste management, the receiving environment is largely defined by MCC 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 EMR Waste Management Plan 2015-2021 (currently under review to be replaced in 2022) and the Waste Action Plan for a Circular Economy – Waste Management Policy in Ireland..

The waste management plans set out the following targets for waste management in the region:

- 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 construction and demolition (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 78% material recovery of such waste in 2020, and therefore is currently surpassing the 2025 target (Target 70%). The National Waste Statistics update published by the EPA in November 2022 identifies that Ireland’s current target of “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 54%; however, they are currently not in line with the 2025 target (55%).The Meath County Development Plan 2021 – 2027 (2021) set out objectives and policies for the MCC area which reflect those sets out in the regional waste management plan.

In terms of physical waste infrastructure, MCC no longer operates any municipal waste landfill in the area. There are a number of waste permitted and licensed facilities located in the EMR Waste Region and Ireland for management of waste from the construction industry as well as municipal sources. These include soil recovery facilities, inert C&D waste facilities, municipal waste landfills, material recovery facilities and waste transfer stations.

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.

17.4 Characteristics of the Proposed Development

17.4.1 Proposed Development

Permission is sought for a period of 10 Years for a proposed development on a site of approximately 16.92Ha consisting of 716no. residential units in a mix of houses, duplex and apartment buildings ranging in height from 2 to 7 storeys overall; comprising of 155no. 2 storey houses; 517no. apartments accommodated in 8no. buildings ranging in height from 4 to 7 storeys; 44no. duplex units accommodated in 2no. 3 storey terraces; 1no. childcare facility (c.602sqm) located at ground floor level of Block B1; public open space; communal and private open space; public lighting; car parking, including basement car parking under some of the apartments; secure bicycle parking; and all associated and ancillary site development and infrastructural works, hard and soft landscaping and boundary treatment works, provision of c. 470m of new distributor road; provide a 200mm diameter watermain in existing section of southern distributor road adjacent to recently constructed Castle Farm development; upgrade of junction of southern distributor road and L2228 (Station Road) to provide a signalised junction with pedestrian crossings, including ancillary adjustments to road markings on both roads; provision of foul drainage pumping station; provision of a compensatory storage area adjacent to Castle Stream; ESB Sub-Stations; and improvement works to 2 no. roundabouts on the R147 (Old Navan Road).

17.4.1.1 Demolition Phase

There is no demolition required for this project.

17.4.1.2 Construction Phase

During the construction phase, waste will be produced from surplus materials such as broken or off-cuts of timber, plasterboard, concrete, tiles, bricks, etc. Waste from packaging (cardboard, plastic, timber) and oversupply of materials may also be generated. The appointed Contractor will be contractually required to ensure that oversupply of materials is kept to a minimum and opportunities for reuse of suitable materials is maximised.

There will be topsoil and subsoil excavated to facilitate construction of new foundations and the installation of underground services. The development engineers (Waterman Moylan) have estimated that c. 43,307 m^3 of material will need to be excavated to do so. It is currently envisaged that c. 10,000 m^3 of the material will be able to be retained and reused onsite. When material is to

be removed offsite (c. 33,307 m^3) it will be taken for appropriate offsite reuse, recovery, recycling and / or disposal.

If any material that requires removal from the 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 licence is required for the receiving facility. Alternatively, the material may be classed as by-product under Regulation 27 (By-products), as amended, of S.I. No. 323/2020 - European Union (Waste Directive) Regulations 2011-2020, (previously Article 27 of the European Communities (Waste Directive)). For more information in relation to the envisaged management of by-products, refer to the RWMP (Appendix 17.1).

In order to establish the appropriate reuse, recovery and / or disposal route for the soils and stones to be removed off-site, it will first need to be classified. Waste material will initially need to be classified as hazardous or non-hazardous in accordance with the EPA publication Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous (2018).

Waste will also be generated from construction phase workers e.g. organic / food waste, dry mixed recyclables (waste paper, newspaper, plastic bottles, packaging, aluminium cans, tins and Tetra Pak cartons), mixed non-recyclables and, potentially, sewage sludge from temporary welfare facilities provided on-site during the Construction phase. Waste printer / toner cartridges, waste electrical and electronic equipment (WEEE) and waste batteries may also be generated in small volumes from site offices.

Further detail on the waste materials likely to be generated during the excavation and construction works are presented in the project-specific RWMP (Appendix 17.1). The RWMP provides an estimate (of the main waste types likely to be generated during the Construction phase of the proposed development. These are summarised in Table 17.1.

Waste Type	Tonnes	Reuse/Recycle		Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	517.0	10	51.7	80	413.6	10	51.7
Timber	438.6	40	175.5	55	241.2	5	21.9
Plasterboard	156.7	30	47.0	60	94.0	10	15.7
Metals	125.3	5	6.3	90	112.8	5	6.3
Concrete	94.0	30	28.2	65	61.1	5	4.7
Mixed Waste	235.0	20	47.0	60	141.0	20	47.0
Total	**1566.5**		**355.6**		**1063.7**		**147.3**

Table 17.1: Estimated off-site reuse, recycle and disposal rates for construction waste

17.4.1.3 Operational Phase

As noted in Section 17.1, an OWMP has been prepared for the development and is included as Appendix 17.2. The OWMP provides a strategy for segregation (at source), storage and collection of all wastes generated within the building during the operational phase including dry mixed recyclables, organic waste and mixed non-recyclable waste as well as providing a strategy for management of waste glass, batteries, WEEE, printer/toner cartridges, chemicals, textiles, waste cooking oil and furniture.

The total estimated waste generation for the development for the main waste types based on the AWN waste generation model is presented in Table 17.2 below and is based on the uses and areas

as advised by the project architects (Plus Architecture). Further breakdowns can be found with in Appendix 17.2 OWMP.

Waste Type	m^3 per week	
	Residential Waste (Combined)	Commercial Waste (Combined)
Organic Waste	12.13	0.03
DMR	85.99	1.13
Glass	2.35	<0.01
MNR	45.22	0.50
Total	**145.69**	**1.66**

Table 17.2 Estimated waste generation for the proposed development for the main waste types

The residents and childcare facility (commercial) will be required to provide and maintain appropriate waste receptacles within their units to facilitate segregation at source of these waste types. As required, the residents will need to bring these segregated wastes from their units to their allocated Waste Storage Areas (WSAs). All WSA's can be viewed on the plans submitted with the application and in the OWMP (Appendix 17.2).

The OWMP seeks to ensure the development contributes to the targets outlined in the EMR Waste Management Plan 2015 – 2021 and the MCC waste Bye-laws.

17.5 Potential Impact of the Proposed Development

17.5.1 Proposed Development

17.5.1.1 Construction Stage

The proposed Development will generate a range of non-hazardous and hazardous waste materials during site excavation and construction (see appendix 17.1 for further detail). 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 in the construction site compound or adjacent to it, 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 unauthorised 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 / licenced 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 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 topsoil and subsoil will need to be excavated to facilitate the proposed Development. A detailed review of the existing ground conditions on a regional, local site-specific scale are presented in Chapter 7. It is anticipated that c. 37,307 m^3 of excavated material 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**.

17.5.1.2 Operational Stage

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 indirect, **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 Indirect, **long-term, significant** and **negative**.

It is anticipated that Waste contractors will be required to service the proposed development on a scheduled basis to remove waste. The use of non-permitted waste contractors or unauthorised facilities could give rise to inappropriate management of waste and result in negative environmental impacts or pollution. It is essential that all waste materials are dealt with in accordance with regional and national legislation, as outlined previously, and that time and resources are dedicated to ensuring efficient waste management practices. However, in the absence of mitigation, the effect on the local and regional environment is likely to be **long-term, significant** and **negative**.

17.5.1.3 Do-Nothing Impact

If the proposed development was not to go ahead (i.e. in the Do-Nothing scenario) there would be no excavation or construction at this site. There would continue to be no operational waste generated from the proposed site. There would, therefore, be a **neutral effect** on the environment in terms of waste.

The site is zoned for development, and it is likely that in the absence of this subject proposal that a development of a similar nature would be progressed on the site that accords with national and regional policies and therefore the likely significant effects would be similar to this proposal.

17.6 Mitigation Measures (Ameliorative, Remedial or Reductive Measures)

This section outlines the measures that will be employed in order to reduce the amount of waste produced, manage the wastes generated responsibly and handle the waste in such a manner as to minimise the effects on the environment.

The concept of the 'waste hierarchy' is employed when considering all mitigation measures. The waste hierarchy states that the preferred option for waste management is prevention and minimisation of waste, followed by preparing for reuse and recycling / recovery, energy recovery (i.e. incineration) and, least favoured of all, disposal.

17.6.1 Proposed Development

17.6.1.1 Construction Stage

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 requirements of the EPA 'Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects' (2021) and is included as Appendix 15.1. The mitigation measures outlined in the RWMP will be implemented in full and form part of the mitigation strategy for the site. 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 17.1) in agreement with MCC, or submit an addendum to the RWMP to MCC, 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 implement the RWMP throughout the duration of the proposed excavation and construction phases.

A quantity of topsoil and sub soil will need to be excavated to facilitate the proposed development. The Development Engineers have estimated that 37,307 m^3 of excavated material 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.

In addition, the following mitigation measures will be implemented:

- Building materials will be chosen 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; (alternatively, the waste will be sorted for recycling, recovery or disposal);

- 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 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 Regulation 27 (By-products), as amended, of S.I. No. 323/2020 - European Union (Waste Directive) Regulations 2011-2020. EPA approval will be obtained prior to moving material as a by-product. However, it is not currently anticipated that Regulation 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 also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved and will promote more sustainable consumption of resources.

17.6.1.2 Operational Stage

The following mitigation measures will be implemented during the operational phase of the proposed development:

All waste materials will be segregated into appropriate categories and will be temporarily stored in appropriate bins or other suitable receptacles in a designated, easily accessible areas of the site.

- As previously stated, a project specific OWMP has been prepared and is included as Appendix 17.2. The mitigation measures outlined in the OWMP will be implemented in full and form part of the mitigation strategy for the site. Implementation of this OWMP will ensure a high level of recycling, reuse and recovery at the development. All recyclable materials will be segregated at source to reduce waste contractor costs and ensure maximum diversion of materials from landfill, thus achieving the targets set out in the EMR Waste Management Plan 2015 – 2021, Waste Action Plan for a Circular Economy – Waste Management Policy in Ireland and the MCC waste bye-laws.

- The Operator / Facilities Management of the site during the operational phase 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:

- 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 / Buildings Manager / Residents 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 / Buildings Manager / Residents 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 / Buildings Manager / Residents 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 development is dealt with in compliance with the provisions of the *Waste Management Act 1996*, as amended, associated Regulations, the *Litter Pollution Act 1997*, the *EMR Waste Management Plan (2015 - 2021)* and the MCC waste bye-laws. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved.

17.7 Residual Impact

The implementation of the mitigation measures outlined in Section 17.6 will ensure that targeted rates of reuse, recovery and recycling are achieved at the site of the Proposed Development during the construction and operational phases. 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.

17.7.1 Proposed Development

17.7.1.1 Construction Stage

A carefully planned approach to waste management as set out in Section 17.6 .1 and adherence to the RWMP (which includes mitigation) (Appendix 17.1) during the construction phase will ensure that the predicted effect on the environment will be **short-term, imperceptible** and **neutral.**

17.7.1.2 Operational Stage

During the operational phase, a structured approach to waste management as set out in Section 17.6.2 and adherence to the OWMP (which includes mitigation) (Appendix 17.2) will promote resource efficiency and waste minimisation. When the mitigation measures are implemented and a

high rate of reuse, recycling and recovery is achieved, the predicted impact of the operational phase on the environment will be **long-term, imperceptible** and **neutral.**

17.7.1.3 Worst Case Impact

In a worst-case scenario, if no mitigation measures found in section 17.6 or in Appendixes 17.1 and 17.2 are followed, poor onsite waste management, non-permitted waste contractors or unauthorised waste facilities could give rise to inappropriate management of waste offsite and result in negative environmental impacts or pollution as shown in section 17.5.

17.7.2 Cumulative

Other developments in the area will be required to manage waste in compliance with national and local legislation, policies and plans which will mitigate against any potential cumulative effects associated with waste generation and waste management. As such the effect will be **short-term, imperceptible** and **neutral**.

17.7.2.1 Operational Stage

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**.

17.8 Monitoring

The management of waste during the construction phase will be monitored by the Contactor's appointed Resource Manager to ensure compliance with the above-listed mitigation measures, and relevant waste management legislation and local authority requirements, including maintenance of waste documentation.

The management of waste during the operational phase will be monitored by the Operator / Facilities Management to ensure effective implementation of the OWMP internally and by the nominated waste contractor(s).

Likely Significant Effect	Monitoring Proposals
Litter Pollution	The Contractor will review and maintain waste records and site audits
Unlicensed Waste Collection (Illegal Dumping)	A register will be maintained and reviewed. A copy of all waste collection permits will be maintained.
Insufficient Waste Facilities	A register will be maintained and reviewed. A copy of all waste collection permits will be maintained.
Lack of waste Classification	An appointed Resource Manager will monitor all on-site waste segregation and classification
Unlicensed Waste Collection (Illegal Dumping)	The operator/ facilities management company will maintain waste receipts on-site for a period of 7 years and make available to MCC as requested.

Poor Waste Segregation	Waste generation volumes will be monitored by the operator / facilities management company
Litter Pollution	Waste storage areas will be monitored by the operator / facilities management company

Table 17.3: Monitoring Proposals

17.8.1 Proposed Development

17.8.1.1 Construction Stage

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 works, where there is a potential for waste management objectives to become secondary to other objectives, i.e. progress and meeting construction schedule targets. The mitigation measures in the RWMP specify the need for a Resource Manager to be appointed, who will have responsibility for monitoring the actual waste volumes being generated and ensuring that contractors and sub-contractors are segregating waste as required. Where targets are not being met, the Resource Manager will identify the reasons for this and work to resolve any issues. Recording of waste generation during the construction phase of the proposed development will enable better management of waste contractor requirements and identify trends. The data should be maintained to advise on future developments.

17.8.1.2 Operational Stage

During the operational phase, waste generation volumes will be monitored by the Operator / Facilities Management 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.

17.9 Reinstatement

In the event that the Proposed Development is discontinued, there is not likely to be any significant impacts on waste management at the site.

The Proposed Development may be decommissioned at some stage in the future. At that time, a demolition or refurbishment plan will be formulated for the decommissioning phase of the Proposed Development to ensure no waste nuisance occurs at nearby sensitive receptors.

17.10 Difficulties Encountered

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 waste region, in the surrounding counties, Ireland and within Europe. 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, serviceability, and cost.

18 MATERIAL ASSETS (UTILITIES)

18.1 Introduction

This chapter has been prepared by Waterman Moylan Consulting Engineers as part of a planning submission to Meath County Council for Oakfield Dunboyne.

This section examines the material assets utilities serving the subject which specifically relates relating to surface water drainage, water supply, foul sewerage, electricity, gas and telecommunications.

18.2 Assessment Methodology

The methodology followed for this section is in accordance with the EPA "Guidelines on the information to be contained in Environmental Impact Assessment Reports" Published in 2022. 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 Meath County Council;
- Submission of a Pre-Connection Enquiry Application to Irish Water;
- Review of ESB Network Utility Plans;
- 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);

18.3 Receiving Environment

18.3.1 Existing

Surface Water Drainage

There are no surface water sewers within or in the immediate vicinity of the subject site. There are 2 No. existing streams/watercourses along the boundary of the subject site. The Castle Stream runs from west to east along the northern boundary of the development site. To the southeast there is an existing ditch which the existing site drains to. The EPA Watercourse Maps shows the Castle Stream outfalling to the Tolka River which eventually discharges into the Irish Sea to the north of Dublin Port.

Some surface water from development upstream of the subject site discharges to a 525mm diameter combined sewer which traverses the site along the northern boundary as shown in Figure 18. 2 on the following pages.

Figure 18. 1 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.

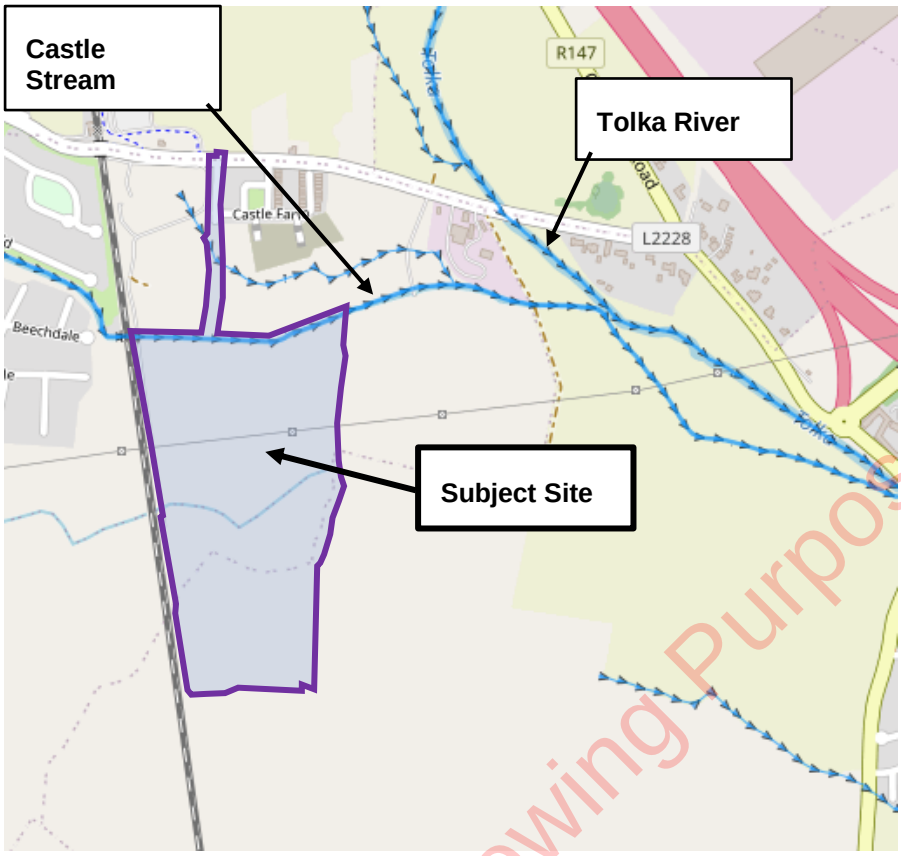


Figure 18. 1: EPA Watercourse Map

For further information on these watercourses please refer to the Water chapter of this EIAR.

There are no existing surface water sewers on site. To the north of the site however there is an existing combined sewer which is discussed further in the paragraph below.

Foul Sewers

As noted above, the Irish Water records show an existing combined sewer running from west to east to the north of the development site which serves the existing surrounding developments. It is proposed as part of this development to divert this existing combined sewer in order to accommodate a more favourable site layout.

Refer to Figure 18. 2 which shows the existing Irish Water combined sewer to the north of the development site.

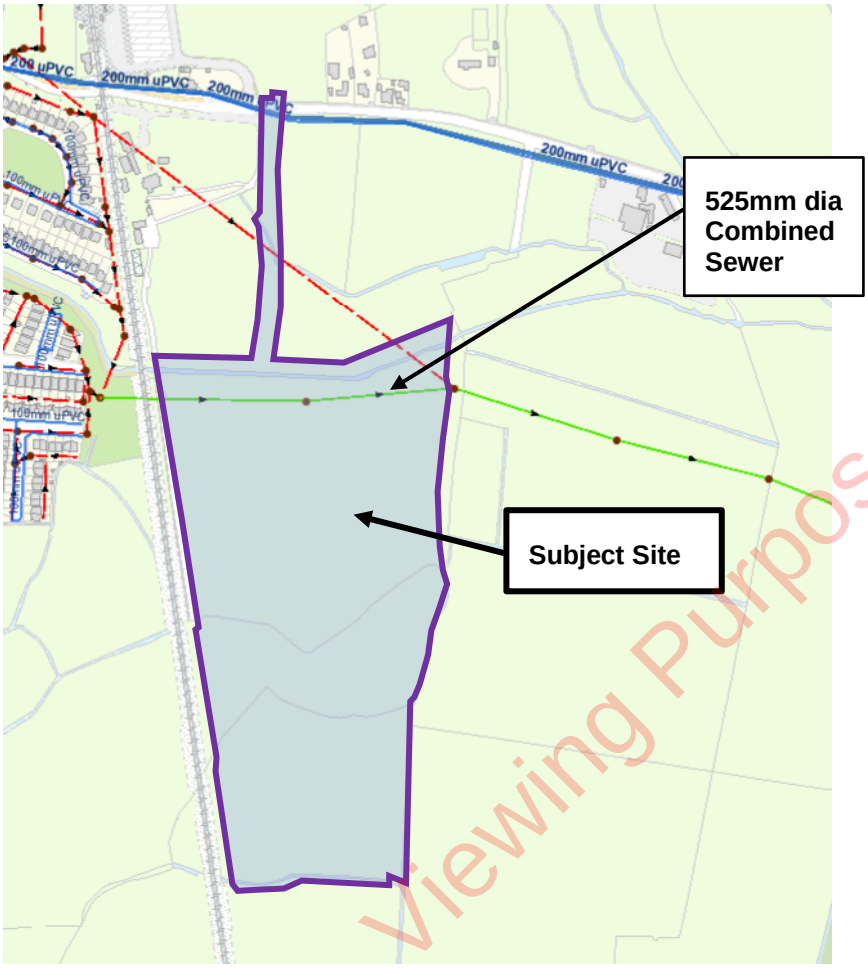


Figure 18. 2: Irish Water Records

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 18. 2 above for details. There is an existing 200mm uPVC watermain on the L2228 to the north of the subject. A Pre-Connection Enquiry was submitted to Irish Water in May 2023 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 in order to connect the proposed development, circa 1100m of existing 200mm uPVC watermain will need to be upsized to a 400mm ID watermain. The COF is included in Appendix A of this document. This work can be carried out without.

Gas

Gas Networks Ireland have been contacted and the gas network map for the area surrounding the site has been obtained, refer to Figure 18. 3 below. There is an existing 180 PE 4 Bar gas line in the L2228 to the north of the development.

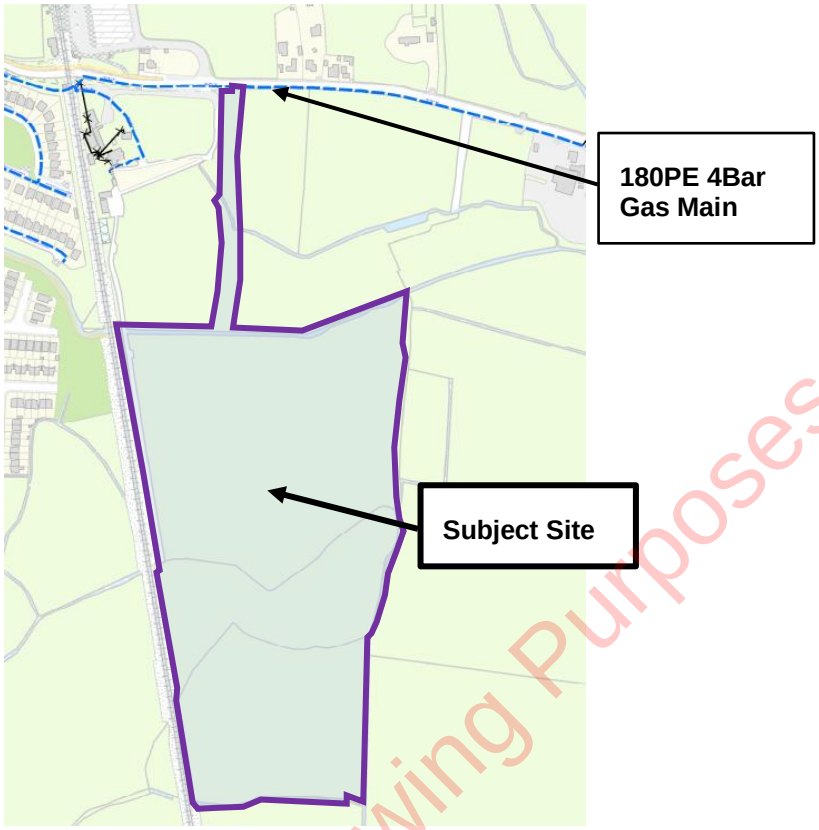


Figure 18. 3: Gas Networks Ireland Map

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. Refer to Figure 18. 4 below for the ESB map showing the existing electrical supply in the vicinity of the site. There are a number of existing ESB lines in the vicinity of the development site. Most notably there are high voltage overhead cables crossing the site east/west.

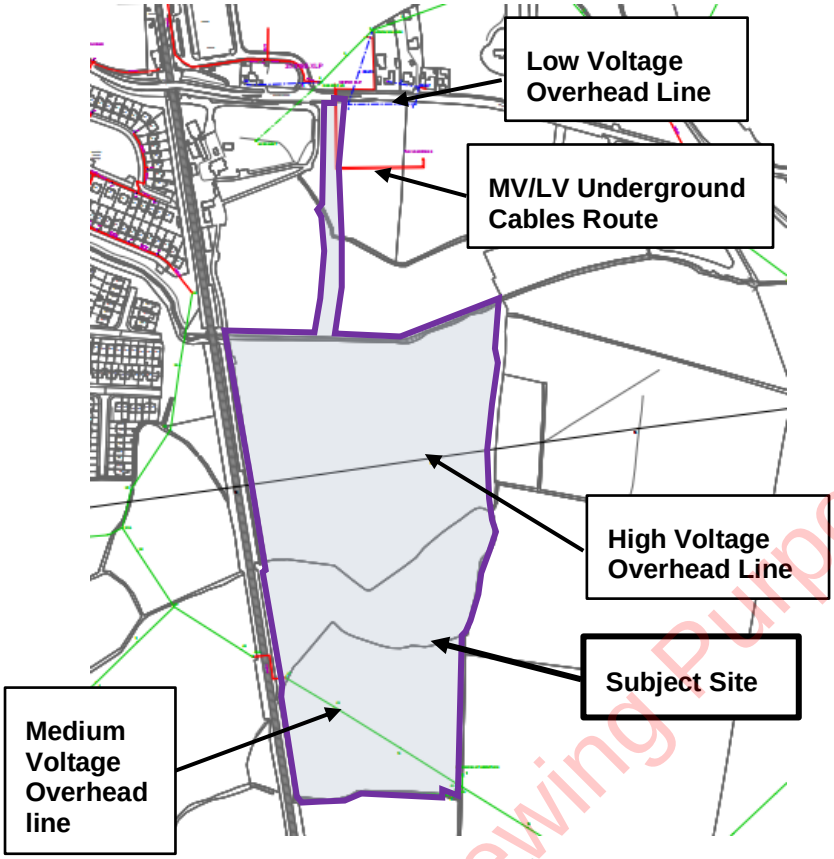


Figure 18. 4: ESB Network Map

Telecommunications – Virgin Media

Virgin Media have been contacted and an existing Virgin Media network map for the area surrounding the proposed development has been obtained refer to Figure 18. 5 below. There are existing Virgin Media services on the L2228 to the north of the site.

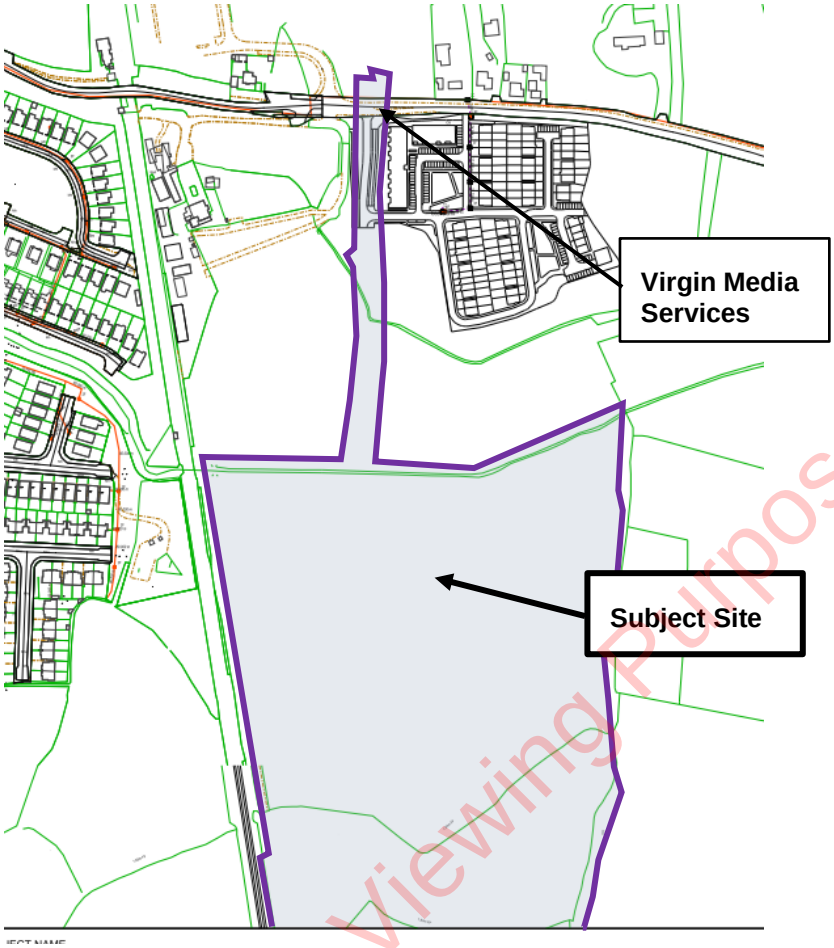


Figure 18. 5: Virgin Media Network Map

18.4 Characteristics of the Proposed Development

18.4.1 Proposed Development

The proposed development, on a site of approximately 16.92Ha, will consist of 716no. residential units in a mix of houses, duplex and apartment buildings ranging in height from 2 to 7 storeys overall; comprising of 155no. 2 storey houses; 517no. apartments accommodated in 8no. buildings ranging in height from 4 to 7 storeys; 44no. duplex units accommodated in 2no. 3 storey terraces; 1no. childcare facility (c.602sqm) located at ground floor level of Block B1; public open space; communal and private open space; public lighting; car parking, including basement car parking under some of the apartments; secure bicycle parking; and all associated and ancillary site development and infrastructural works, hard and soft landscaping and boundary treatment works, provision of c. 470m of new distributor road; provide a 200mm diameter watermain in existing section of southern distributor road adjacent to recently constructed Castle Farm development; upgrade of junction of southern distributor road and L2228 (Station Road) to provide a signalised junction with pedestrian crossings, including ancillary adjustments to road markings on both roads; provision of foul drainage pumping station; provision of a compensatory storage area adjacent to Castle Stream; ESB Sub-Stations; and improvement works to 2 no. roundabouts on the R147 (Old Navan Road).

Surface Water Drainage

Surface water from the proposed development will drain through a new sewer network and SUDS features before surface water is then discharged into the existing watercourses within the site at the existing greenfield run-off rates mimicking the existing conditions on site.

SUDS measures which are proposed and which are detailed on the accompanying engineering drawings include:

- Grass swales;
- Permeable paving;
- Detention basins;
- Underground attenuation;
- Petrol interception;
- Hydrobrakes;

There are 2 No. existing streams/watercourses along the boundary of the subject site. The Castle Stream runs from west to east on the northern boundary of the development site. To the southeast there is an existing ditch which the existing site drains to. The EPA Watercourse Maps shows the Castle Stream which outfalls to the Tolka River and eventually discharges into the Irish Sea to the north of Dublin Port.

The following parameters have been used in greenfield run-off rate calculations:

	Values
Site Area (Catchment) *1 – Ha	16.9
SAAR – mm**2	802
SOIL Index***3	0.3
Climate Change	20%

Table 18. 1: Surface Water Values

*1 – Met Eireann 1981-2010 Annual Average Rainfall Grid for subject site Irish Grid Coordinates

*2 – Flood Studies Report, Section V, Fig. 1.4.18 (I)

*3 – Greater Dublin Strategic Drainage Study Vol2

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. The proposed development is divided into 6 catchment areas and therefore the permitted discharge for each area has been calculated separately as outlined in Table 18.2 below. 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”. A series of Hydrobrakes will be installed at the outfall of each of the networks. Surface water will discharge into the adjacent watercourses mimicking existing conditions.

Site-Catchment	**Total Area (ha)**	**Permitted Outflow (l/s)**
Catchment 1A	2.54	5.5
Catchment 1B	2.75	5.9
Catchment 2	3.722	7.95
Catchment 3	2.569	5.49
Catchment 4	2.249	4.81
Catchment 5	1.832	3.91

Table 18. 2: Surface Water Catchment Details

Foul Sewers

There is an existing 525mm diameter concrete combined sewer traversing the subject site along the northern boundary. As part of the proposed infrastructure works at the subject site, the combined sewer will be diverted. The diversion of the combined sewer will require a diversion agreement from Irish Water.

The site has been divided into two foul drainage catchments, please refer to Figure 2 over and see Waterman Moylan drawing No. 21-061-P208 Foul Catchment Layout.

Catchment 1: The foul drainage has been designed such that the development be served with a series of 150mm, 225mm and 300mm diameter sewer networks in line with Irish Water Code of Practice for Wastewater. This network will ultimately outfall via gravity into the proposed diverted sewer along the northern boundary.

Catchment 2: The foul drainage has been designed to serve the development with a series of 150mm and 225mm diameter sewer network. This catchment is unable to outfall into the proposed diverted sewer by means of gravity alone. Catchment 2 will outfall, via gravity, into a pumping station located within the western side of Catchment 2. The station will pump the foul by means of a rising main, which will then discharge into Catchment 1 and ultimately outfall into the proposed diverted sewer. The detailed design of this pumping station will be subject to future discussions and correspondence with Irish Water.

Based on Irish Waters Code of Practice, the peak foul flow from the proposed development will be as follows:

Description	No. of Units	Population per unit	PE	Flow l/hd/day	Infiltration Factor	Toral Discharge (l/d)
Subject Proposal						
Development	716	2.7	1934	150	1.1	319,110
Total						**319,110**

Table 18. 3: Calculation of Proposed Foul Water Flow

Calculation of Proposed Peak Foul Flow		
Subject Proposal		
Total Daily Discharge (from table 18.2)	319,110	l/d
Dry Weather Flow (DWF)	3.69	l/s
Peak Foul Flow (=3 x DWF)	**11.07**	**l/s**
Total Peak Foul Flow	**11.07**	**l/s**

Table 18. 4: Foul Water Calculation

A Pre-Connection Enquiry was submitted to Irish Water in May 2023 which outlined the proposals for the provision of water supply to the development. Irish Water responded with the Confirmation of Feasibility (COF) on 8th June 2023 stating that in order to connect the proposed development, circa 1100m of existing 200mm uPVC watermain will need to be upsized ID watermain. The COF is included in Appendix A of this document. This work can be carried out without.

Water Supply

The proposed water supply network for the subject lands consists of a series of 100mm, 150mm and 200mm diameter watermains. A Pre-Connection Enquiry was submitted to Irish Water in May 2023 which outlined the proposals for the provision of water supply to the development. Irish Water

responded with the Confirmation of Feasibility (COF) on 8th June 2023 stating that in order to connect the proposed development, circa 1100m of existing 200mm uPVC watermain will need to be upsized ID watermain. The COF is included in Appendix A of this document. This work can be carried out without. To facilitate a connection from site to the Irish Water infrastructure, a watermain upgrade is required to the existing watermain in the L2228. It is proposed that Irish Water will upsize the existing 200mm diameter watermain to a 400mm diameter watermain over a length of 1.1km. This work will be carried out directly by Irish Water as part of the Connection Agreement Process. Which is the normal procedure for Irish Water infrastructure upgrades. These works are undertaken by an approved Contractor from the Irish Water framework who are experienced in working on public roads.

The water demand for the proposed development is calculated according to the Irish Water Code of Practice and can be seen in Table 18.4 below.

The total water requirement from the public supply, for the development, is estimated at 287m^3 per day.

Description	No. of Units	Population per unit	PE	Flow l/hd/day	Toral Discharge (l/d)
Subject Proposal					
Development	716	2.7	1934	150	287,550
Total					**287,550**

Table 18. 5: Water Demand Calculation

A Pre-Connection Enquiry was submitted to Irish Water in May 2023 which outlined the proposals for the provision of water supply to the development. Irish Water responded with the Confirmation of Feasibility (COF) on 8th June 2023 stating that in order to connect the proposed development, circa 1100m of existing 200mm uPVC watermain will need to be upsized ID watermain. The COF is included in Appendix A of this document. This work can be carried out without.

ESB Network

The proposals for the connection of the site to the ESB network will be developed and agreed with ESB Networks at detailed design stage.

The works will comprise the installation of ESB ducting and the construction of a number of ESB sub-station.

Gas

At this time it is not envisaged that the development will be served with a gas supply.

Telecommunications – Virgin Media

The proposals for the connection of the site to the Virgin Media network will be developed and agreed with Virgin Media at detailed design stage.

18.5 Potential Impact of the Proposed Development

18.5.1 Proposed Development

18.5.1.1 Construction Stage

Surface Water

- Significant amounts of site stripping and excavation will be required to construct the development. 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. 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 associated will the surface water drainage network and other construction related traffic.
- Risk of downstream flooding if surface water is discharged unrestricted to existing watercourses.
- Risk of contamination from runoff from site roads especially after periods of dry weather.

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. This risk is particularly relevant to the Irish Water upgrade of the public watermain along the L2228.
- Risk of traffic disruption associated will to upgrade of the public watermain by Irish Water.

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.
- The overhead lines traversing the site will require protection during the construction stage to ensure no contact is made between machinery and the overheadlines.

Gas

- There is the potential for damage to this existing gas main/gas supply when undertaking excavation works for other services associated will the proposed development.

18.5.1.2 Operational Stage

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.

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

- A gas supply to the site is not anticipated so there will be no demand on the gas network.

Telecommunications

- There will be increased demand on existing telecommunications infrastructure.

18.6 Mitigation Measures (Ameliorative, Remedial or Reductive Measures)

18.6.1 Proposed Development

18.6.1.1 Construction Stage

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.
- Provision of silt fencing banners along the boundary of the site where surface water naturally falls towards watercourses/ditches.
- 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.
- Diversion of the existing Combined Sewer on site will be programmed carried out in such a way that disruption to the existing users will be kept to a minimum. For example, the diverted sewer will be constructed in it entirety prior to the connection from the neighbouring sites being made and the existing combined sewer being decommissioned and removed. Any long-term impact will be positive in nature as the sewer will be constructed with new materials.

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.
- The Irish Water contractor will be responsible for minimising disruption through adequate traffic management during construction of the upgraded watermain in the L2228. The impact on the surrounding road network will be short-term in nature.

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.
- The developer has considered the overhead lines and will limit the rotation of cranes and identify safe cranage zones to mitigate against any contact with the overhead lines. Plans for the proposed Cranage arrangements are included in the appendices of this document.

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.

Telecommunications – Virgin Media

- All existing services will be identified using Virgin Media service record maps.
- All connections to the Virgin Media network will be carried out and tested by Virgin Media personnel.

18.6.1.2 Operational Stage

Surface Water

- Flow restrictors with attenuation storage will be used to slowdown and store surface water runoff from discharging and to reduce runoff to the equivalent of the existing agricultural runoff.
- SUDS systems including permeable paving, swales and detention basing will be constructed on-line to intercept the first flush during rainfall events after periods of dry weather. Which will remove contaminants from the surface water runoff.
- 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.
- 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.
- Maintenance of permeable paving areas.

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.
- The pump will be adequately maintained and any dosing required prior to full occupation of the southern part of the site will be carried out to ensure adequate performance of the Foul Pumping station.

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.

18.7 Residual Impact of the Proposed Development

18.7.1 Proposed Development

18.7.1.1 Construction Stage

Surface Water

- Having adopted the mitigation measures proposed, it is not envisaged that there will be any residual impacts of the proposed development during construction.

Foul Water

- Having adopted the mitigation measures proposed, it is not envisaged that there will be any residual impacts of the proposed development during construction.

Water Supply

- Having adopted the mitigation measures proposed, it is envisaged that any residual impacts of the watermain upgrade works during construction will be moderate and short-term.

ESB Network

- Having adopted the mitigation measures proposed, it is envisaged that any residual impacts of the ESB Connection will be slight and short-term.

Gas

- Having adopted the mitigation measures proposed, it is envisaged that any residual impacts of the Gas Connection will be slight and short-term.

Telecommunications – Virgin Media

- Having adopted the mitigation measures proposed, it is envisaged that any residual impacts of the Virgin Media Connection will be slight and short-term.

18.7.1.2 Operational Stage

Surface Water

- A modern, high quality, foul sewer network will serve the subject lands. The foul sewer of the operational development is anticipated to have a slight to moderate, long-term positive impact.

Foul Water

- A modern, high quality, foul sewer network will serve the subject lands. The foul sewer of the operational development is anticipated to have a slight to moderate, long-term positive impact.

Water Supply

- The provision of enhanced watermains infrastructure as part of the proposed development is anticipated to have slight to moderate, long-term positive impacts for the site area and its surrounds as it will allow for increased water supply and allows for the removal / upgrade of the older existing watermains in the L2228.

ESB Network

- Any strengthening of the existing ESB network required as part of the development will result in a slight to moderate, long term positive impact on the local community.

Gas

- Having adopted the mitigation measures proposed, it is envisaged that any residual impacts of the Gas Connection will be slight and short-term.

Telecommunications – Virgin Media

- It shall be ensured that the proposed development will not in any way affect the existing TV infrastructure of the adjacent dwellings. The new development will also generate a more robust Virgin Media distribution network in and around the new development, any upgrade works will enhance the capacity of the existing networks within and around the development. This is expected to give moderate, long-term beneficial effects.

18.7.1.3 Worst Case Impact

No impact.

18.7.2 Cumulative

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. No mitigation required.

18.8 Monitoring

- 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.
- The provision of utility services including electricity, gas and broadband will be monitored by the relevant utility providers.
-

18.9 Reinstatement

18.9.1 Proposed Development

18.9.1.1 Construction Stage

- No impact.

18.9.1.2 Operational Stage

- No impact.

18.10 Difficulties Encountered

No difficulties encountered while writing this report.

19 CULTURAL HERITAGE (ARCHITECTURAL & ARCHAEOLOGICAL HERITAGE)

19.1 Introduction

This chapter assesses the effects of the proposed development, as described in Chapter 3, on the cultural heritage resource. The tangible elements of the cultural heritage resource can be broadly divided into the archaeological resource comprising sites and monuments dating from prehistory to the post-medieval period and the architectural heritage resource, encompassing standing structures and sites of cultural importance often dating to the post-medieval and modern periods. In addition, intangible assets such as local placenames, historical associations, folklore and traditions also form part of the cultural heritage resource.

This chapter was prepared by John Cronin, Dr Caroline McGrath and Tony Cummins of John Cronin and Associates. Mr Cronin holds qualifications in Archaeology (B.A. University College Cork (UCC), 1991), Regional and Urban Planning (MRUP (University College Dublin (UCD) 1993), post-graduate qualifications in Urban and Building Conservation (MUBC (UCD), 1999) and has 29 years' experience. Dr McGrath holds qualifications in Early and Modern Irish (B.A. Trinity College Dublin, 2003), a Doctorate degree in Celtic Studies (University of Ulster, 2007), a post-graduate degree in Professional Archaeology (M.A, Queen's University Belfast, 2015) and has 15 years' experience. Mr Cummins holds primary and post-graduate qualification in archaeology (B.A. and M.A, UCC, 1992 and 1994) and has 28 years' experience.

19.2 Assessment Methodology

The assessment was based on a programme of desktop research combined with field walking and a geophysical survey of the proposed development site which were carried out in order to identify any features of archaeological, architectural, or cultural heritage significance likely to be impacted by the proposed development. The recorded and potential cultural heritage resource within a study area encompassing the lands within the proposed development site and the surrounding lands extending for 1km in all directions, was assessed in order to compile a comprehensive cultural heritage baseline context. The following section presents an overview of relevant legal and planning frameworks, studies carried out as part of the assessment and the methodology applied to determine the nature and significance of potential effects on the cultural heritage resource.

19.2.1 Guidelines Relevant to Discipline

The guidelines relevant to the assessment include the *Architectural Heritage Protection: Guidelines for Planning Authorities* (Department of Arts, Heritage and Gaeltacht 2011) and the *Framework and Principles for the Protection of Archaeological Heritage* (Department of Arts, Heritage, Gaeltacht and the Islands 1999). The assessment was also informed by the Environmental Protection Agency (EPA 2022) *Guidelines for Information to be Contained in EIAR* and the International Council on Monuments and Sites (ICOMOS 2011) *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties.*

19.2.2 Relevant Legislation and Planning Frameworks

The management and protection of the cultural heritage resource in Ireland is achieved through a framework of international conventions and national laws and policies. This framework was established in accordance with the provisions of the 'European Convention on the Protection of the Archaeological Heritage' (the Valletta Convention) and the 'European Convention on the Protection of Architectural Heritage' (Grenada Convention). Both of these conventions were ratified by Ireland in 1997. While there is no current national legislation providing legal protection for the Irish intangible heritage resource it is noted that the UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage, 2003, which seeks to safeguard and promote awareness of this element of cultural heritage, was ratified by Ireland in 2015.

The legislation relevant to this assessment comprise the following:

- National Monuments Act 1930 (as amended)
- Heritage Act 1995 (as amended)
- National Cultural Institutions Act 1997
- Architectural Heritage (National Inventory) and Historic Monuments (Misc.) Provisions Act 1999
- Planning and Development Act 2000 (as amended)

19.2.2.1 Archaeological Heritage

The National Monuments Service (NMS) is currently based in the Department of Housing, Local Government and Heritage and is responsible for the preservation, protection and promotion of Ireland's archaeological heritage. The National Monuments Acts 1930 (as amended), the Heritage Act 1995 (as amended) and the National Cultural Institutions Act 1997 are the primary means of ensuring the satisfactory protection of archaeological remains. There are a number of mechanisms under the National Monuments Acts that are applied to secure the protection of archaeological monuments. These include the designation of National Monument status, the Register of Historic Monuments (RHM), the Sites and Monuments Record (SMR) and the Record of Monuments and Places (RMP) and as well as placing of Preservation Orders and Temporary Preservation Orders on endangered sites.

A National Monument is described as *'a monument or the remains of a monument, the preservation of which is a matter of national importance by reason of the historical, architectural, traditional, artistic or archaeological interest attaching thereto'* (Section 2, National Monument Act, 1930). There are no National Monuments in State Ownership or Guardianship or monuments with Preservation Orders located within the study area.

Between 1984 and 1992, the Archaeological Survey of Ireland (ASI) issued a series of county SMRs which list known archaeological sites and places and this record formed the basis for the statutory RMP established under Section 12 of the National Monuments (Amendment) Act 1994. Similar in format to the SMR (comprising a list and set of maps), the RMP were issued for each county in the State between 1995 and 1998. All archaeological sites listed in the RMP receive statutory protection under the National Monuments (Amendment) Act 1994 and no works can be undertaken at their locations without providing two months advance notice to the National Monuments Service.

The National Monuments Service maintains a Historic Environment Viewer online service which comprises an online interactive map/search facility that provide access to all current records stored on its national database in relation to known archaeological sites, including examples identified and added to the SMR following the publication of the RMP in the 1990s. The Viewer includes designated areas around recorded monuments known as 'zones of notification' which do not comprise buffer zones but are intended to indicate areas of archaeological potential within their environs[1]. There are no recorded archaeological sites within the proposed development site while there are 28 examples within the surrounding 1km study area (see Section 19.2.3). The potential for the presence of hitherto unrecorded, sub-surface archaeological features within the proposed development site was also appraised as part of the assessment.

19.2.2.2 Architectural Heritage

Protection of architectural or built heritage is provided for through a range of legal instruments that include the Heritage Act 1995, the Architectural Heritage (National Inventory) and National Monuments (Misc. Provisions) Act 1999, and the Planning and Development Act 2000 (as amended). Section (2.1) of the Heritage Act 1995, describes architectural heritage as follows:

"All structures, buildings, traditional and designed, and groups of buildings including streetscapes and urban vistas, which are of historical, archaeological, artistic, engineering, scientific, social or

[1] https://www.archaeology.ie/sites/default/files/media/publications/archaeology-planning-process-pl13.pdf

technical interest, together with their setting, attendant grounds, fixtures, fittings and contents, and, without prejudice to the generality of the foregoing, includes railways and related buildings and structures and any place comprising the remains or traces of any such railway, building or structure."

The Planning and Development Act 2000, as amended, requires Planning Authorities to maintain a 'Record of Protected Structures' (PPS) of buildings and other structures that are of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest. All structures listed as Protected Structures in Development Plans require planning permission for any works that would affect their character. Protected Structures also includes the lands and other structures within their curtilage. While the notion of curtilage is not defined by legislation, the *Architectural Heritage Protection Guidelines for Local Authorities* (Department of Arts, Heritage and the Gaeltacht 2011), describes it as the parcel of land immediately associated with a structure and which is (or was) in use for the purposes of the structure. The Planning and Development Act 2000, as amended, also provides for the inclusion of objectives for preserving the character of places, areas, groups of structures or townscapes of special interest designated as Architectural Conservation Areas (ACA). The current Record of Protected Structures and Architectural Conservation Areas for County Meath are published in the Meath County Development Plan 2021-2027.

The Architectural Heritage Act 1999 established the National Inventory of Architectural Heritage (NIAH) and the National Inventory of Architectural Heritage Historic Gardens and Designed Landscapes to create a record of built heritage structures and associated lands within the State. While inclusion in the NIAH does not provide statutory protection to a structure, it does provide an indication of its architectural heritage value and the inventory is intended to advise local authorities on compilation of their Records of Protected Structures.

There are no Protected Structures, or associated curtilage features, located within the proposed development site, which is also not situated within an ACA. In addition, there are no NIAH-listed buildings or gardens located within the proposed development site. The architectural heritage resource within the surrounding 1km study area is detailed in Section 19.2.3.

19.2.2.3 Meath County Development Plan 2021-2027

The *Meath County Development Plan 2021-2027*[2] is the relevant development plan for the area and includes the following objectives in relation to the protection of the archaeological and architectural heritage resources:

"HER POL 2. To protect all sites and features of archaeological interest discovered subsequent to the publication of the Record of Monument and Places, in situ (or at a minimum preservation by record) having regard to the advice and recommendations of the National Monuments Service of the Department of Culture, Heritage and the Gaeltacht and The Framework and Principles for the Protection of the Archaeological Heritage (1999).

HER POL 3. To require, as part of the development management process, archaeological impact assessments, geophysical survey, test excavations or monitoring as appropriate, for development in the vicinity of monuments or in areas of archaeological potential. Where there are upstanding remains, a visual impact assessment may be required.

HER POL 4. To require, as part of the development management process, archaeological impact assessments, geophysical survey, test excavations or monitoring as appropriate, where development proposals involve ground clearance of more than half a hectare or for linear developments over one kilometre in length; or developments in proximity to areas with a density of known archaeological monuments and history of discovery as identified by a suitably qualified archaeologist.

HER POL 5. To seek guidance from the National Museum of Ireland where an unrecorded archaeological object is discovered, or the National Monuments Service in the case of an unrecorded archaeological site."

[2] https://consult.meath.ie/en/consultation/meath-adopted-county-development-plan

"HER POL 16. To protect the setting of Protected Structures and to refuse permission for development within the curtilage or adjacent to a protected structure which would adversely impact on the character and special interest of the structure, where appropriate."

19.2.3 Desktop study

A programme of desktop research was carried out in order to identify all known archaeological sites, designated architectural heritage structures and any potential undesignated cultural heritage receptors within the study area. The principal sources reviewed for this assessment of the known archaeological and architectural heritage resource were the SMR, RMP, RPS and NIAH for County Meath.

In addition, the following sources were consulted as part of the desktop study:

- Meath County Development Plan 2021-2027 – this outlines the Council's policies for the protection of the archaeological and architectural heritage resource within the county and includes the Record of Protected Structures (RPS) and Architectural Conservation Areas (ACAs).
- Archaeological Inventory of County Meath – This publication dates to 1987 and presents summary descriptions of the known archaeological sites within the county at that time. A review of current SMR datasets published on the Historic Environment Viewer was carried out to identify any archaeological sites within the study area identified since the publication of the inventory.
- Database of Irish Excavation Reports – this database presents summary descriptions of the results of archaeological investigations carried out within the country.
- Cartographic Review – Sources examined for the study area included the 17th century Down Survey, the 1st edition of the 6-inch Ordnance Survey (OS) maps (published in 1843) and the 25-inch OS maps (surveyed in 1911).
- Aerial/Satellite/LiDAR imagery – A review of publicly-accessible imagery from the Ordnance Survey Ireland (OSI), Google Earth, Apple maps and Bing map was carried out to appraise whether they reveal evidence for any unrecorded archaeological sites within the proposed development site or its environs. LiDAR datasets published on the Geological Survey Ireland's Open Topographic Viewer website were also consulted.
- Literary Sources: Relevant published literary sources were consulted in order to assess the archaeological, historical, architectural heritage and folklore record of the study area and these are listed in Section 19.11 of this chapter.
- National Museum of Ireland Topographical Files: These files comprise a written and digital database which records known information in relation to the discovery locations of Irish archaeological artefacts, including those held in the museum's collection. The files are archived in the museum's premises in Kildare Street, Dublin and were inspected as part of the desktop study.
- Irish National Folklore Collection: Transcribed material from the National Folklore Collection archive which has been digitised and published online.
- Placenames Database of Ireland: This online database provides a comprehensive management system for data, archival records and place names research conducted by the State.

19.2.4 Field Survey

A field-walking survey of the proposed development site was carried out to assess the lands in terms of modern land use, vegetation cover and the potential for the presence of previously unrecorded archaeological sites or structures of architectural heritage interest. The field survey results are described in Section 19.3.3 of this chapter and extracts from the photographic record are presented in Appendix 19.3.

19.2.5 Geophysical Survey

A geophysical survey of the proposed development site for the distributor road and housing development was carried out by Dr Ger Dowling in April 2023. A fully copy of the report on this non-intrusive survey is presented in Appendix 19.4 and the results are summarised in Section 19.3.4 of this chapter, which includes mapping sourced from the survey report.

19.2.6 Methodology for Assessment of Impacts

The following provides a summary of the criteria used to assess impacts in order to concisely outline the methodology specifically applied to the cultural heritage resource which has been informed by relevant EPA and ICOMOS guidelines (see Section 19.2.1).

19.2.6.1 Duration of Effect

The duration of effects is assessed based on the following criteria, as defined in the EPA (2022) EIAR Guidelines:

- Momentary Effects: Seconds to Minutes.
- Brief Effects: Less than a day.
- Temporary Effects: Less than a year
- 'Short-term Effects: Lasting 1 to 7 years
- Medium-term Effects: Lasting 7 to 15 years
- Long-term Effects: Lasting 15 to 60 years.
- Permanent Effects: Lasting over 60 years.
- Reversible Effects: Effects that can be undone

19.2.6.2 Quality of Effect

The quality of an effect on the cultural heritage resource can be positive, neutral or negative.

- Positive Effect: a change which improves the quality of the cultural heritage environment (e.g., increasing amenity value of a site in terms of managed access, signage, presentation etc. or high-quality conservation and re-use of an otherwise vulnerable derelict structure).
- Neutral Effect: no change or effects that are imperceptible, within the normal bounds of variation for the cultural heritage environment.
- Negative Effect: a change which reduces the quality of the cultural heritage resource (e.g., visual intrusion on the setting of an asset, physical intrusion on features/setting of a site etc.)

19.2.6.3 Type of Effect

The type of effect on the cultural heritage resource can be any of the following, as per the EPA (2022) EIAR Guidelines.

- Indirect Effects (Secondary or Off-site Effects): Effects on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
- Cumulative Effects: The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.

- 'Do-Nothing Effects': The environment as it would be in the future should the subject project not be carried out.
- 'Worst case' Effects: The effect arising from a project in the case where mitigation measures substantially fail.
- Indeterminable Effects: When the full consequences of a change in the environment cannot be described.
- Irreversible Effects: When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
- Residual Effects: The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
- Synergistic Effects: Where the resultant effect is of greater significance than the sum of its constituents

19.2.6.4 Magnitude of Effect

This is based on the degree of change, incorporating any mitigation measures, on a cultural heritage asset and can be negative or positive. The magnitude is ranked without regard to the value of the asset according to the following scale: High; Medium; Low and Negligible and has been informed by criteria published in the International Council on Monuments and Sites *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties* (ICOMOS 2011) (Table 19.1).

Magnitude	Description
High	Most or all key archaeological or architectural materials affected such that the resource is totally altered Comprehensive changes to setting Changes to most or all key historic landscape elements, parcels or components; extreme visual effects; fundamental changes to use or access; resulting in total change to historic landscape character Major changes to area that affect Intangible Cultural Heritage activities or associations or visual links and cultural appreciation
Medium	Changes to many key archaeological or historic building materials/elements such that the resource is clearly/significantly modified. Considerable changes to setting that affect the character of the archaeological asset. Changes to the setting of a historic building, such that it is significantly modified. Change to many key historic landscape elements, parcels or components, visual change to many key aspects of the historic landscape, considerable changes to use or access, resulting in moderate changes to historic landscape character. Considerable changes to area that affect the Intangible Cultural Heritage activities or associations or visual links and cultural appreciation.
Low	Changes to key archaeological materials/historic building elements, such that the resource is slightly altered/slightly different. Slight changes to setting of an archaeological monument. Change to setting of a historic building, such that it is noticeably changed. Change to few key historic landscape elements, parcels or components; slight visual changes to few key aspects of historic landscape; slight changes to use or access; resulting in limited change to historic landscape character Changes to area that affect the Intangible Cultural Heritage activities or associations or visual links and cultural appreciation.
Negligible	Very minor changes to key archaeological materials or setting. Slight changes to historic building elements or setting that hardly affect it. Very minor changes to key historic landscape elements, parcels or components; virtually unchanged visual effects; very slight changes to use or access; resulting in very small change to historic landscape character.

Magnitude	Description
	Very minor changes to area that affect the Intangible Cultural Heritage activities or associations or visual links and cultural appreciation.

Table 0-1: Magnitude of Impact Assessment Indicators for Cultural Heritage Assets

19.2.6.5 Value Assessment

While various national and local authority legal designations exist for elements of the Irish cultural heritage resource (see Section 19.2.2), there are currently no formal criteria for grading the values of individual elements of this resource. The non-statutory NIAH does apply a ranking system (Regional, National and International) to structures included in that inventory and, while these rankings do not confer a graduated level of protection they have been utilised as a value indicator for NIAH-listed structures for the purpose of this assessment.

Given the absence of formal criteria the evaluations used in this assessment have been informed by guidelines presented in the *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties* (ICOMOS 2011). The evaluation of the values of cultural heritage assets is not intended as definitive but rather as an indicator which contributes to a wider judgment based the individual circumstances of receptors. The application of values include a consideration of their legal designations (e.g., National Monuments), condition / preservation; historical significance, group value, rarity, visibility in the landscape, fragility/vulnerability and amenity value on a case-by-case basis. It is noted that archaeological monuments, whether extant or levelled, have the potential to possess sub-surface attributes, such as artefacts, human burials or other archaeological remains, that may possess values that cannot be discerned without recourse to archaeological excavation but are unlikely to be affected in the absence of direct negative impacts. The value of all known or potential assets that may be impacted by development are ranked according to the following scale as defined by ICOMOS: Very High; High; Medium; Low, Negligible, Unknown (Table 19.2). The values assigned to relevant cultural heritage assets within the area were determined following the completion of the desktop research combined with subsequent site inspections and are outlined in Section 19.3.5.

Value	Description
Very High	World Heritage Sites (including Tentative List properties) Sites, buildings or landscapes of acknowledged international importance Intangible associations with individuals or innovations of global significance
High	Nationally designated sites, buildings and landscapes of significant quality, rarity, preservation and importance Undesignated assets of the quality and importance to be designated Assets that can contribute significantly to acknowledged national research objectives Archaeological Landscapes with significant group value Intangible associations with individuals or innovations of national significance
Medium	Designated or undesignated assets that can contribute significantly to regional research objectives, including buildings that can be shown to have exceptional qualities in their fabric or historical associations Conservation Areas and historic townscapes containing buildings that contribute significantly to its historic character Intangible associations with individuals or innovations of regional significance
Low	Assets compromised by poor preservation and/or poor survival of contextual associations Assets of limited value, but with potential to contribute to local research objectives Historic Townscape or built-up areas of limited historic integrity in their buildings and settings Intangible associations with individuals or innovations of local significance
Negligible	Assets with very little or no surviving archaeological interest Landscapes little or no significant historical interest

Value	Description
	Buildings or urban areas of no architectural or historical note; buildings of an intrusive character
Unknown Potential	Assets whose importance has not been ascertained Buildings with some hidden (i.e., inaccessible) potential for historic significance

Table 0-2: Indicative Factors for Assessing the Value of Cultural Heritage Assets (after ICOMOS 2011)

19.2.6.6 Significance of Effects

This is assessed based on a consideration of the Magnitude of effect (graded from High to Negligible, based on a consideration of character, duration, probability and consequences) combined with the Value (graded from High to Negligible, based on a consideration of significance/sensitivity) of the cultural heritage receptor. The Significance of effects can be described as Profound, Very Significant, Significant, Moderate, Slight, Not Significant or Imperceptible (Table 19.3 and Table 19.4).

Significance	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 but 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 0-3: Significance of Effects (per EPA EIAR Guidelines 2022)

Magnitude of Impact	**High**	Not Significant/ Slight	Moderate/ Significant	Significant/ Very Significant	Very Significant/ Profound
	Medium	Not Significant	Slight	Moderate/ Significant	Significant/ Very significant
	Low	Not Significant/ Imperceptible	Slight/ Not Significant	Slight	Moderate
	Negligible	Imperceptible	Not Significant/ Imperceptible	Not Significant/ Slight	Slight
		Negligible	**Low**	**Medium**	**High/Very High**
		Value/Sensitivity of the Asset			

Table 0-4: Significance of Effects Matrix (per EPA EIAR Guidelines 2022)

19.3 Receiving Environment

19.3.1 Proposed Development

The proposed development, as described in Chapter 3, assessed in this chapter would entail the construction of a large-scale residential development within vacant agricultural lands located to the east of the historic core of Dunboyne village. As detailed in following sections, there are no recorded archaeological sites or architectural heritage structures located within the planning boundary or within its immediate environs. The proposed development would also include upgrades to two

existing roundabouts on the R147 (Old Navan Road) which will be confined to previously disturbed localised areas within the road carriageway as well as upgrades and diversions of existing water pipes. While not forming part of the proposed development, potential cumulative effects of a future Distributor Road Bridge which will link with roads within the proposed development are also appraised. Separately, works will be undertaken by Uisce Éireann in upgrading c. 1.1km of watermain along the L2228 local road which will accommodate the development proposed in this case, along with other zoned lands in the vicinity. This is to be undertaken by Uisce Éireann under their exempted development provisions and these works do not form part of this planning application and are, therefore, assessed under cumulative effects.

19.3.2 Desktop Study

19.3.2.1 Archaeological and Historical Context

The following section presents summary details of the main periods within the Irish archaeological record with references to the recorded archaeological sites located within the study area. The dating framework used for each period is based on *Guidelines for Authors of Reports on Archaeological Excavations* published by the National Monuments Service (NMS 2006).

There are no recorded archaeological sites within the proposed development site while there are 28 recorded examples within the surrounding 1km study area (Table 19.5 and Figure 19.1). Five of these sites are included on the Record of Monuments and Places (RMP) and these comprise a tower house in Castlefarm (ME050-021005-), a church and associated graveyard and holy well in Loughsallagh (ME051-006----, ME051-006001- and ME051-006002-) and a 17th/18th century house at Gunnocks (ME051-008----). The remainder of the recorded archaeological sites were identified following the publication of the RMP and these have been added to the SMR. A number of these were subject to archaeological excavation in advance of developments and no longer remain *in situ.* These excavated sites are not scheduled for inclusion in the next edition of the RMP. The SMR sites that do remain *in situ* are scheduled for inclusion in the next revision of the RMP (see Table 19.5).

SMR No.	Class	Townland	ITM E	ITM N	Approx distance from site
ME050-031----	Ring-ditch	DUNBOYNE	702101	742238	580m
ME050-032001-	Enclosure	DUNBOYNE	702197	741986	320m
ME050-032002-	Ring-ditch	DUNBOYNE	702217	741961	220m
ME050-045----	Fulacht fia	BRACETOWN	702423	742565	920m
ME050-046----	Pit-burial	DUNBOYNE	702504	742391	700m
ME050-047----	Road/trackway	LOUGHSALLAGH	702677	742144	550m
ME050-049001-	Fulacht fia	LOUGHSALLAGH	702688	742376	750m
ME050-049002-	Ring-ditch	LOUGHSALLAGH	702689	742348	740m
ME051-006----	Church	LOUGHSALLAGH	702900	741709	460m
ME051-006001-	Graveyard	LOUGHSALLAGH	702899	741703	460m
ME051-006002-	Holy well	LOUGHSALLAGH	702898	741720	460m
ME051-008----	17th/18th century house	GUNNOCKS	702709	742570	940m
ME051-019----	Enclosure	LOUGHSALLAGH	702719	741994	500m
ME051-019001-	Ring-ditch	LOUGHSALLAGH	702721	741959	495m
ME051-019002-	Ring-ditch	LOUGHSALLAGH	702673	741939	445m
ME051-030----	Pit	LOUGHSALLAGH	703046	742100	850m
ME051-031----	Excavation miscellaneous	LOUGHSALLAGH	703015	741995	780m
ME051-040----	Well	CLONEE	703130	741175	700m
ME051-040001-	Fulacht fia	CLONEE	703125	741170	700m

SMR No.	Class	Townland	ITM E	ITM N	Approx distance from site
ME051-041----	Linear earthwork	CLONEE	703360	741145	920m
ME051-042----	Well	CLONEE	703205	740890	780m
ME051-043----	Kiln	CLONEE	703320	740885	890m
ME051-044001-	Building	CLONEE	703390	740860	960m
ME051-044002-	Kiln	CLONEE	703385	740865	960m
ME051-044003-	Structure	CLONEE	703380	740800	960m
ME050-021005-	Tower house	CASTLEFARM	701232	741861	980m
ME050-021008-	Ring-ditch	CASTLEFARM	701243	741840	970m
ME050-021009-	Building	CASTLEFARM	701263	741834	960m

Table 0-5: Recorded archaeological sites within study area. The sites indicated in green are currently listed in RMP, sites indicated in blue have been excavated and are not scheduled for inclusion in next edition of the RMP and sites indicated in yellow remain *in situ* below ground surface and are SMR sites scheduled for inclusion in next edition of the RMP (source: NMS Historic Environment Viewer)

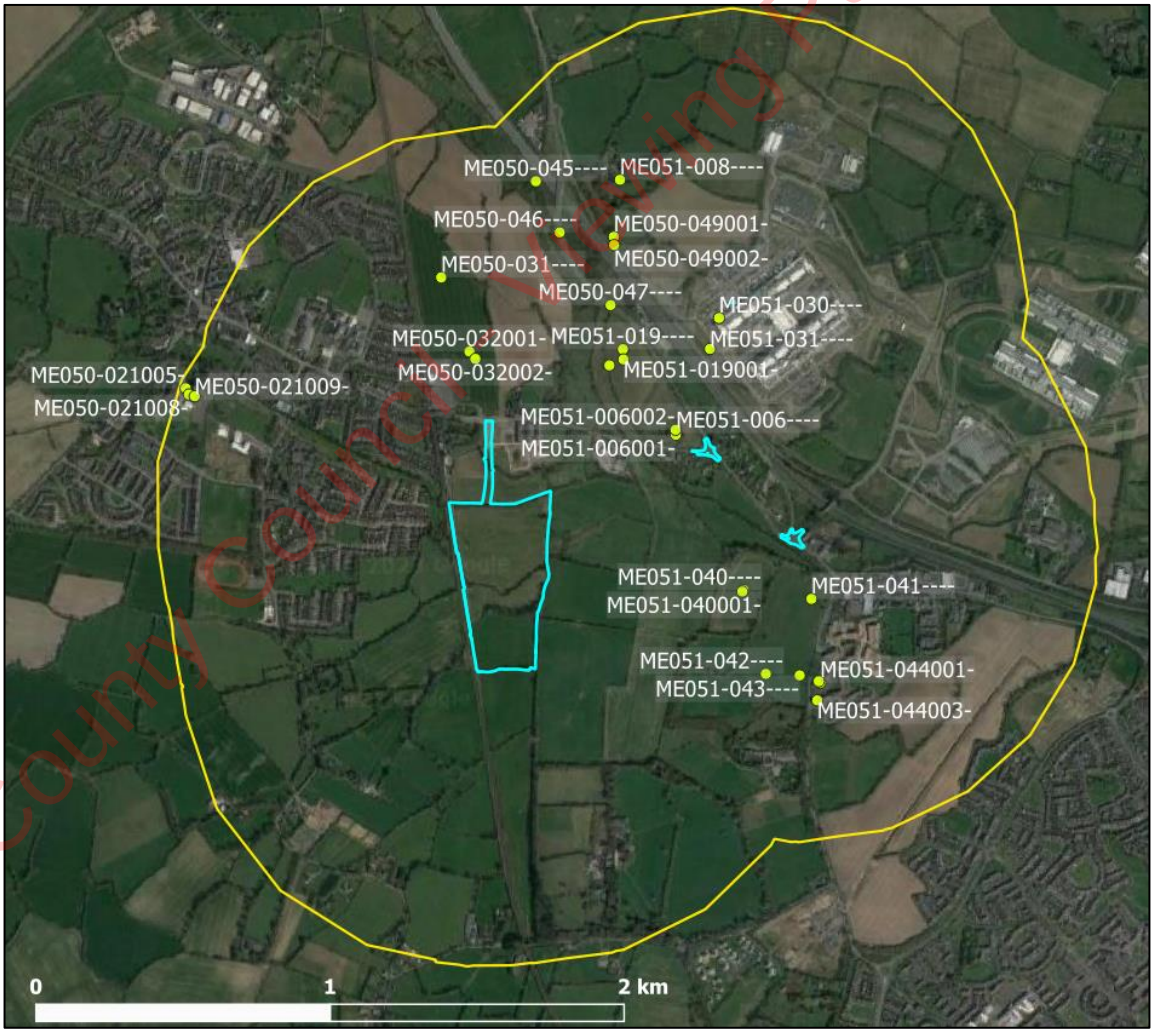


Figure 0-1: Location of approximate site boundary (cyan) in relation to recorded archaeological sites (yellow dots) within the 1km study area (yellow line)

Until the recent identification of human butchery marks on animal bone fragments dating to the Palaeolithic period, the earliest recorded evidence for human settlement in Ireland dated to the Mesolithic period (7000–4000 BC) when hunter-gatherers settled the heavily forested island. While

the Mesolithic settlers did not construct settlements or monuments that have left any above ground traces, their presence can often be identified by scatters of worked flint in ploughed fields or on raised beaches. The Neolithic period (4000-2400 BC) began with the arrival and establishment of agriculture as the principal form of economic subsistence, which resulted in more permanent settlement patterns. As a consequence of the more settled nature of agrarian life, new site-types, such as more substantial rectangular timber houses and various types of megalithic tombs, begin to appear in the archaeological record during this period. There are no recorded Mesolithic or Neolithic archaeological sites located within the study area.

The advent of the Bronze Age period (c. 2400–500 BC) in Ireland saw the introduction of a new artefactual assemblage, including metal and ceramic objects, to the island. This period was also associated with the construction of new monument types such as standing stones, stone rows/circles and burnt mounds known as *fulachta fia*. The development of new burial practices during this period also saw the construction of funerary monuments such as wedge tombs, cairns, barrows, boulder burials and cists. The arrival of iron-working technology in Ireland saw the advent of the Iron Age (600 BC – 400 AD). Relatively little has been known about Iron Age settlement and ritual practices until recent decades when the corpus of evidence has been greatly increased by the discovery of sites dating to this period during development projects. There are six ring-ditches, three *fulachta fia* and a pit-burial recorded within the surrounding study area (see Figure 19.1, Table 19.5 and Appendix 19.1 for details). These sites typically date to the Bronze Age, although Iron Age origins cannot be discounted, and are evidence of late prehistoric settlement and ritual activity within the surrounding study area. Two cut well features (ME051-040---- and ME051-042----) uncovered during archaeological monitoring of topsoil stripping within fields located c.700m to the east of the proposed development were dated to the Bronze and Iron Ages and also attest to the presence of late prehistoric settlement activity within the area.

It is noted that while the prehistoric settlement sites typically leave no above ground remains their foundations and occupation deposits, which may contain artefactual and environmental remains, can often survive below modern ground surfaces. The study area contains two undated archaeological structures (ME051-044001- and ME051-044003-) sub-surface remains of which were identified within a residential development located c. 980m to the east of the proposed development.

The early medieval period began with the introduction of Christianity in Ireland and continued up to the arrival of the Anglo-Normans during the 12th-century (c. 400–1169 AD). In the pre-Norman era, the area encompassing modern Meath, in addition to parts of Dublin and Louth between the Liffey and the Boyne, was known as *Mag Breg* (the plain of Breg). This area became associated with the *Síl nÁedo Sláine*, part of the Southern Uí Néill and descendants of Áed mac Diarmato (d. 603/4). The southern kingdom of Meath, in which the proposed development is located, was controlled by the *Uí Chernaig*, whose centre of power was located in Lagore, Dunshaughlin. While this period saw the emergence of the first phases of urbanisation around the Hiberno-Norse ports, the dominant settlement pattern continued to be rural-based and centred around enclosed earthwork farmsteads known as ringforts. These are the most common early medieval sites within the Irish landscape and comprise circular enclosed farmsteads delimited by earthen banks and cut ditches. Their ubiquity within the Irish landscape is attested to by the fact that their original Gaelic names (rath & lios) still form the elements of some of the most common placenames in the country. The Archaeological Survey of Ireland also designates certain archaeological sites with no diagnostic features which would allow accurate classification as enclosures. While sites assigned this classification can theoretically date from any period from late prehistory onward, the potential exists that many form the remains of ringforts. There are two levelled enclosures (ME051-019---- and ME050-032001-) located within the study area and while these may date to the early medieval period this cannot be ascertained without recourse to archaeological excavation.

The arrival of the Anglo-Normans in the late 12th century broadly marks the advent of the Irish high medieval period which continued to c.1400 and was followed by the late medieval period which extended to c.1550. These periods saw the continuing expansion of Irish urbanisation as many of the port cities developed into international trading centres and numerous villages and towns began to develop throughout the country, often within the environs of Anglo-Norman manorial centres which were defended by masonry castles. By the 15th century the native Irish chieftains and lords began to construct tower-house castles within their landholdings as centres of territorial control. In 1172, the

majority of Meath was granted by King Henry II to Welsh lord Hugh de Lacy. He subsequently granted the barony of Dunboyne to William le Petit and a manorial centre was thereafter established in the area. The borough of Dunboyne was established in the 13th century by Nicholas le Petit, son of William le Petit and was granted rights to hold a market and a fair at this time. The location of the settlement cluster (ME050-021----) around the medieval core of Dunboyne contains the recorded site of a tower house (ME050-021005-), which is within the western outskirts of the 1km study area, and its location is now occupied by the 18th century Dunboyne Castle. The lands containing the proposed development likely formed part of the agricultural hinterland around the settlement during the medieval period. Evidence of medieval activity has been uncovered within the study area during archaeological investigations associated with modern developments. A boundary ditch feature uncovered during archaeological monitoring within a green field area in the east end of the study area was dated to this period (ME051-041----). The recorded alignment of this linear feature was orientated south-west to north-east and a projection of this orientation indicates that, if it continued on a linear course, it did not extend towards the proposed development site.

The centuries following 1550 comprise the post-medieval period which continued into the middle of the 19th century and the period thereafter is often described as early modern. The first century of the post-medieval period was a turbulent time in Ireland history and saw a prolonged period of wars between the 1560s and 1603 which saw the extensive dispossession of forfeited Gaelic lands and the final disintegration of the Gaelic order in the 17th century following the Battle of Kinsale (1601), the conclusion of the Nine Years War (1603), the Flight of the Earls (1607) with further conflict arising during the Cromwellian Wars (1649–53). The period saw the development of high and low status stone-built houses throughout the Irish countryside and rural settlement clusters at this time typically consisted of single-storey thatched cottages with associated farm buildings while two-storey farmhouses became more common as the 19th century progressed. An agricultural boom in the late 18th and early 19th centuries saw a rise in prices for both tillage and dairy produce and resulted in Irish landlords investing in extensive land improvement works within their holdings. This included widespread land drainage works, introduction of soil nutrients, grass planting and the enclosure of open lands into field systems that often survive to the present-day. The popularity and success of potato farming contributed to a population boom during the 18th and early 19th centuries and its failure in the middle of the latter century was to have devasting consequences. The settlement pattern throughout much of the rural landscape was greatly affected by the Famine period and its aftermath which saw the depopulation of many areas. The following decades were marked by an increasing move away from small-scale subsistence farming towards more market-led pasture, assisted by the development of the Co-Op system, which also increased the extent of land reclamation of previously marginal lands.

While Dunboyne village to the west of the study area was extensively burned during the 1798 Rising, the settlement had been largely rebuilt by the early 19th century. The proposed development site extends into the townlands of Castlefarm, Cloonee and Ruskin and a review of 17th century Down Survey records revealed that Castlefarm and Cloonee were in the ownership of Rochford of Killbride and Christopher Plunkett (Catholics) in 1641 while by 1670 areas of both townlands formed part of the extensive landholdings Sir William Petty (Protestant). The surrounding 1km study area contains a number of recorded archaeological sites dating to the post-medieval period and these include the site of a levelled church (ME051-006----) of potential post-medieval date within the townland of Loughsallagh in the north end of the study area. While no upstanding remains of the church survive, an associated graveyard (ME051-006001-) and a holy well (ME051-006002-), dedicated to St. Michael, remain at the location. The proposed development will include improvement works to two existing roundabouts on the R147 (Old Navan Road) to the east of the residential development site and the northwest example is located 80m to the east of the recorded site of graveyard (ME051-006001-) which formerly held a now-levelled church (ME051-006----) (Figure 19.1). These sites are located within the centre of a green field and the historic OS maps do not show any associated features within the environs of the road junction that now contains the existing modern roundabout.

The north end of the study area contains Gunnocks House (ME051-008----) which was originally a 17th century thatched house later modified into a two-storey building during the 18th century. A section of a cobbled road (ME050-047----) was identified during advance archaeological investigations of the line of the M3 motorway in the north end of the study area and was dated to the post-medieval

period. Details on the layout of the proposed development site during the post-medieval and early modern periods, when it continued to form agricultural land outside the village, are provided in the below cartographic review (Section 19.3.2.6).

Samuel Lewis's *Topographical Dictionary of Ireland* (1837) provides descriptions of Irish parishes during the early decades of the 19th century and often provides information on contemporary land use patterns, historical events and the presence of archaeological sites and features of architectural heritage interest such as large country houses. Dunboyne is described as follows in the dictionary:

"DUNBOYNE, a parish and village, (formerly an incorporated town), in the barony of DUNBOYNE, county of MEATH, and province of LEINSTER, on the road from Dublin to Navan; containing, with the post-town of Clonee, 2419 inhabitants, of which number, 470 are in the village. This place, which is on the confines of the county of Dublin, appears to have been an ancient borough. In the reign of Henry VI., a writ was issued, dated July 28th, 1423, ordering "the Provost and Commonalty of the town of Dunboyne to be at Trim with all their power for its defence." The town was burnt down in the disturbances of 1798; the present village contains 82 houses. The manufacture of straw hats is carried on here, and in the neighbourhood; and a fair, chiefly for horses and cattle, is held on July 9th, and is much frequented by the Dublin dealers. The parish is principally grazing land; there are about 50 acres of common, and a bog of about 40 acres, called the "Moor of Meath."

The gentlemen's seats are Wood Park, that of the Rev. J. Auchinleck; Roosk, of— Wilson, Esq.; Ballymacall, of H. Hamilton, Esq.; Hammond, of C. Hamilton, Esq.; Court Hill, of H. Greene, Esq.; Sterling, of 11. Barker, Esq.; Norman's Grove, of J. Shanley, Esq.; and Priestown, of the Rev. J. Butler. The living is a vicarage, in the diocese of Meath, united in 1400 to the chapelry of Kilbride, and in the patronage of the Crown; the rectory is impropriate in Miss E. Hamilton. The tithes amount to £835. 7. 8., of which £535. 7. 8. is payable to the impropriator and £300 to the vicar; and the tithes of the union to £347. 19. The glebe-house was built by aid of a gift of £300, and a loan of £500 from the late Board of First Fruits, in 1.814; the glebe comprises three acres, subject to a rent of £3 per acre.

The church is an ancient edifice, for the repair of which the Ecclesiastical Commissioners have recently granted £159. The R. C. union is co-extensive with that of the Established Church, and in each parish is a chapel. About 40 children are taught in the public schools of the parish; and there are two private schools, in which are about 120 children. A dispensary is supported in the village, and adjoining it are some remains of an ancient castle, which gives the title of Baron of Dunboyne to the family of Butler."

19.3.2.2 National Monuments in State Ownership and UNESCO designated World Heritage Sites

There are no National Monuments in State Ownership or Guardianship located within the study area and the nearest example is Conolly's Folly (National Monument no. 681) in Barrogstown West, Co. Kildare, which is located *c.*7.8km to the south-west. There are no UNESCO designated World Heritage Sites within the study area and the closest example is the archaeological complex at Brú na Bóinne which is *c.*30km north of the proposed development.

19.3.2.3 Previous Archaeological Work in the Study Area

The Database of Irish Excavation Reports contains summary accounts of licensed archaeological investigations carried out in Ireland (North and South) from 1969 onward. The database contains no record of any licensed programmes of archaeological investigation being undertaken within the proposed development site. However, the database does contain 11 entries describing the results of archaeological investigations within the surrounding 1km study area. The full database entries for these investigations are presented in Appendix 19.2. The locations of investigated areas containing sub-surface archaeological remains have been added to the SMR and these are identified in Section 19.3.2.1. Nothing of archaeological significance was uncovered during five of the site investigations, including the Castle Farm development adjacent to the north end of the proposed development where a geophysical survey followed by archaeological monitoring of topsoil stripping during the construction phase revealed no sub-surface archaeological remains (Appendix 19.2; Excavation Licence 19E0525).

19.3.2.4 Topographical Files of the National Museum of Ireland

A review of the Topographical File archive held in the museum premises in Kildare Street, Dublin revealed that a range of archaeological artefacts have been retrieved from the area in recent decades. The majority of these comprise medieval objects recovered within the village with occasional stray finds from ploughed fields in Clonee townland (Table 19.6).

Townland	NMI Ref.	Artefact	Details
Castle Farm	None	N/A	N/A
Bennetstown	None	N/A	N/A
Bracetown	None	N/A	N/A
Clonee	1998:99	Flint round scraper	Surface find in ploughed field. OS 6 Sheet No. 51.
Clonee	1998:100.1	Glazed medieval pottery handle sherd	Surface find in ploughed field. OS 6 Sheet No. 51.This a part of strap handle of a jug, Orange fabric with grey core and external patchy pale green glaze.
Clonee	1998:100:2	Glazed medieval pottery body sherd	Surface find in ploughed field. OS 6 Sheet No. 51.Sherd of thin-walled glazed vessel, orange fabric and external thick green glaze.
Clonee	1998:100.3	Medieval pottery rim sherd	Surface find in ploughed field. OS 6 Sheet No. 51.Rim of wheel-thrown vessel with thumb mark on rim; thick collar.
Dunboyne	1972:10	Bronze-coated iron bell	Iron brazed early medieval hand-bell. Most of the suspension loop is lost and some irregular holes are in evidence in side A and in both daces, although filled in the course of conservation. There are three rivets in each side. Copper alloy survives on inner and outer surfaces and as a cordon inside the lip. There is a probable impression of woven textile above the lips on face B (Bourke 2020, 334). OS6 Sheet 50. Levelling of earthwork enclosure. Possibly a monastic site.
Dunboyne	1972: 13	Glaze red earthen ware	Possible North Devon gravel-tempered pipkin handle. OS 6 Sheet No. 50.
Dunboyne	1988:122	Polished stone axehead	Polished stone axehead of porcellanite. Oblique, chipped butt and flattish oval cross-section; asymmetric cutting edge. Straight narrow sides. OS 6 Sheet No. 50. Building site.
Dunboyne	1995:24	Line impressed tile fragment	Fragment of line impressed tile. OS 6 Sheet No. 50.
Dunboyne	1995:187	Stone mortar	Small limestone mortar, roughly round in outline, with flat base. Outer surface roughly pocked. Four small lugs on rim, one of which is hollowed for pouring. Found in an outhouse in Dunboyne village. OS 6 Sheet No. 50.
Dunboyne	2009:30	Copper alloy stick pin	Copper alloy stick pin with biconical head. Three concentric lines around the head of the pin. Otherwise without decoration and heavily patinated. OS 6 Sheet No. 50.

Townland	NMI Ref.	Artefact	Details
			Spreading redeposited topsoil in back garden of house.
Loughsallagh	None	N/A	N/A
Ruskin	None	N/A	N/A

Table 0-6: NMI Topographical File entries for townlands in study area

19.3.2.5 Architectural Heritage

There are no Protected Structures located within the proposed development site while there are seven examples within the surrounding 1km study area (Figure 19.2 and Table 19.7). The nearest example to the proposed residential site is a post box (RPS MH050-226) located c.580m to the west of the north end of the site access road. These Protected Structures are also included in the NIAH which also lists an additional three structures within the surrounding 1km study area and the nearest of these are a railway water tower (NIAH 14341001) and bridge (NIAH 14341002) which are both located 180m to the west of the north end of the access road within the proposed development site (Figure 19.2).

As previously noted, the proposed development will include improvement works to two existing roundabouts on the R147 (Old Navan Road) to the east of the residential development site. The southeast roundabout is located outside the northwest boundary of a two-storey house, which while not a Protected Structure it is listed in the NIAH (ref. 14342004). This existing roundabout is also located 120m to the northwest of a bridge listed as a Protected Structure (MH051-103) (Figure 19.2). A review of historic OS maps do not show any features associated with these structures at the location of the existing modern roundabout.

In addition, the proposed development site is located c.1.13km outside the south-east end of the Dunboyne Architectural Conservation Area as defined in the *Meath County Development Plan 2021-2027*.

NIAH Ref.	RPS No.	Class	Townland	ITM E	ITM N	Approx. Distance from Site
14341001	-	Water tower	Castlefarm	702066	741754	180m
14341002	-	Bridge	Castlefarm	702070	741769	180m
14341003	MH050-226	Post box	Dunboyne	701695	741922	580m
14341004	MH050-225	Gate lodge	Castlefarm	701570	741949	710m
14341005	MH050-223	House	Dunboyne	701461	742059	850m
14341006	MH050-221	House	Dunboyne	701359	742075	955m
14341007	MH050-224	Church/chapel	Dunboyne	701492	742180	890m
14341008	MH050-222	Presbytery	Dunboyne	701382	742143	950m
14342003	MH051-103	Bridge	Loughsallagh	703414	741249	950m
14342004	-	House	Loughsallagh	703389	741332	925m

Table 0-7: Designated architectural heritage structures within the 1km study area

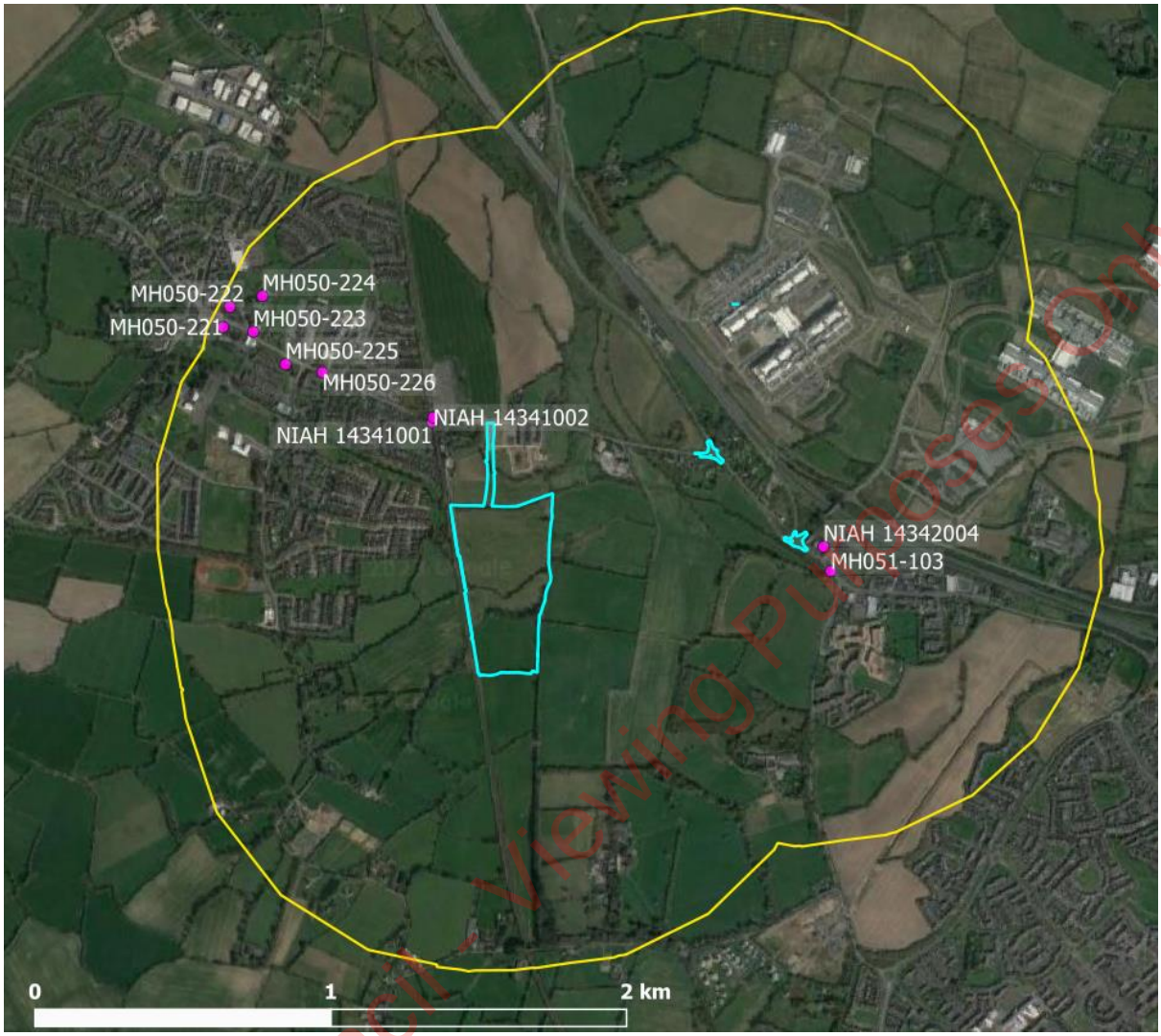


Figure 0-2: Location of approximate site boundary (cyan) in relation to designated architectural heritage structures (pink dots) within the 1km study area (yellow line)

19.3.2.6 Cartographic Review

The cartographic sources examined for the study area include the 17th century Down Survey map (Figure 19.3), the first edition of the 6-inch Ordnance Survey (OS) map (published 1843) (Figure 19.4) and the 25-inch OS map (published 1911) (Figure 19.5).

The parish and barony maps compiled during the 17th-century Down Survey were carried out following the Cromwellian wars in the middle of that century and they include high-level pictorial depictions of major fortifications, churches and houses, settlement centres, roads, bridges and topographical features as well as summary information on existing land use and/or potential agricultural capability. The detail on the mapping shows the settlement at Dunboyne while the townlands to the east, including the location of the study area, are depicted as vacant plots which were potentially in agricultural use.

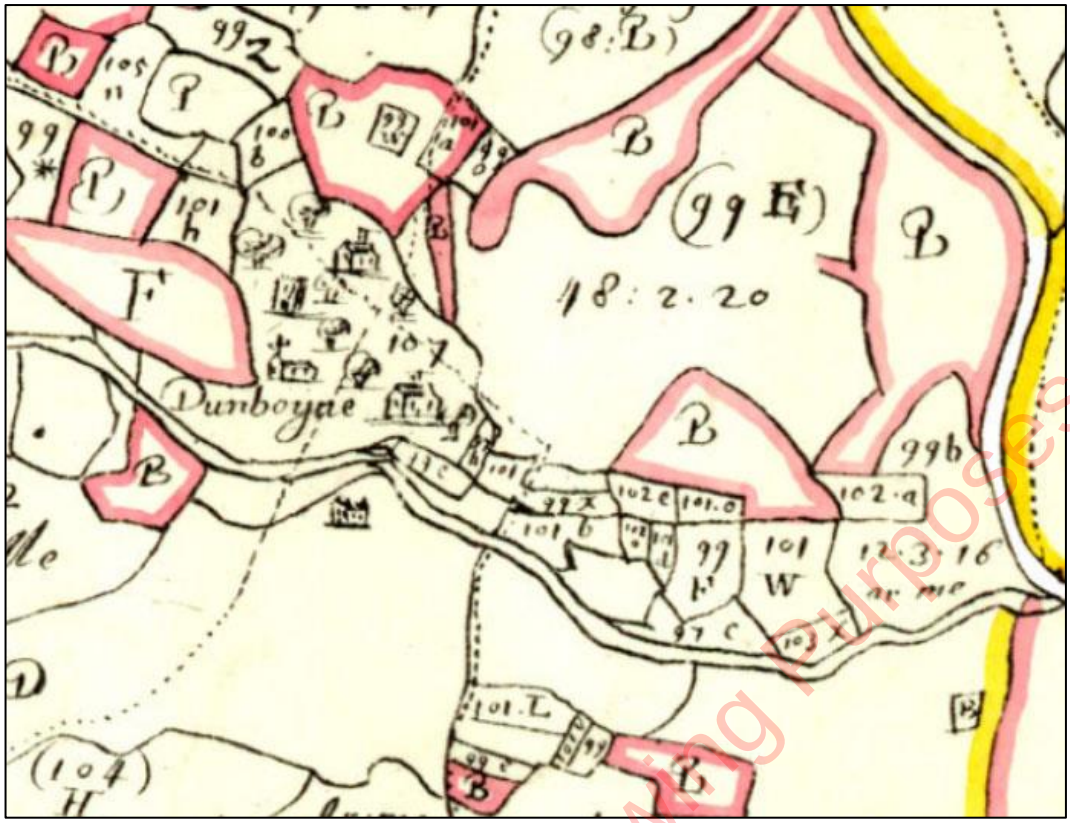


Figure 0. 3: Extract from 17th century Down Survey mapping of Dunboyne village showing open lands to the east

Both of the reviewed OS maps show the proposed development site as largely vacant, enclosed agricultural fields which are similar in layout to the existing fields and also depict a small watercourse extending . The first edition 6-inch OS map of 1843 shows a small rectangular building outside the eastern boundary of the northern field. The building is not labelled and likely comprised a small residence or an agricultural outbuilding. It is absent on the 25-inch edition map of 1911 indicating that it was levelled in the second half of the 19th century. The 6-inch map shows a shaded area extending into the centre of the proposed development site from the west and this appears to indicate lands associated with a residence named Rusk House located c.600m to the southwest. A review of 20th century OS maps indicate that the house was levelled by the 1940s and it is not listed as a Protected Structure and the shaded area depicted extending into the proposed development site, therefore, does not comprise curtilage lands. There are no demesne features such as gardens, follies or ponds indicated within the lands extending into the proposed development site on the OS maps. The 25-inch OS map of 1911 shows Dublin-Navan railway line, which was built as the Dublin and Drogheda railway in 1850, extending outside the west boundary of the site and no associated features, such as bridges, platforms or crossings, are shown along this section. No potential unrecorded archaeological sites were noted within the proposed development site during the cartographic review.

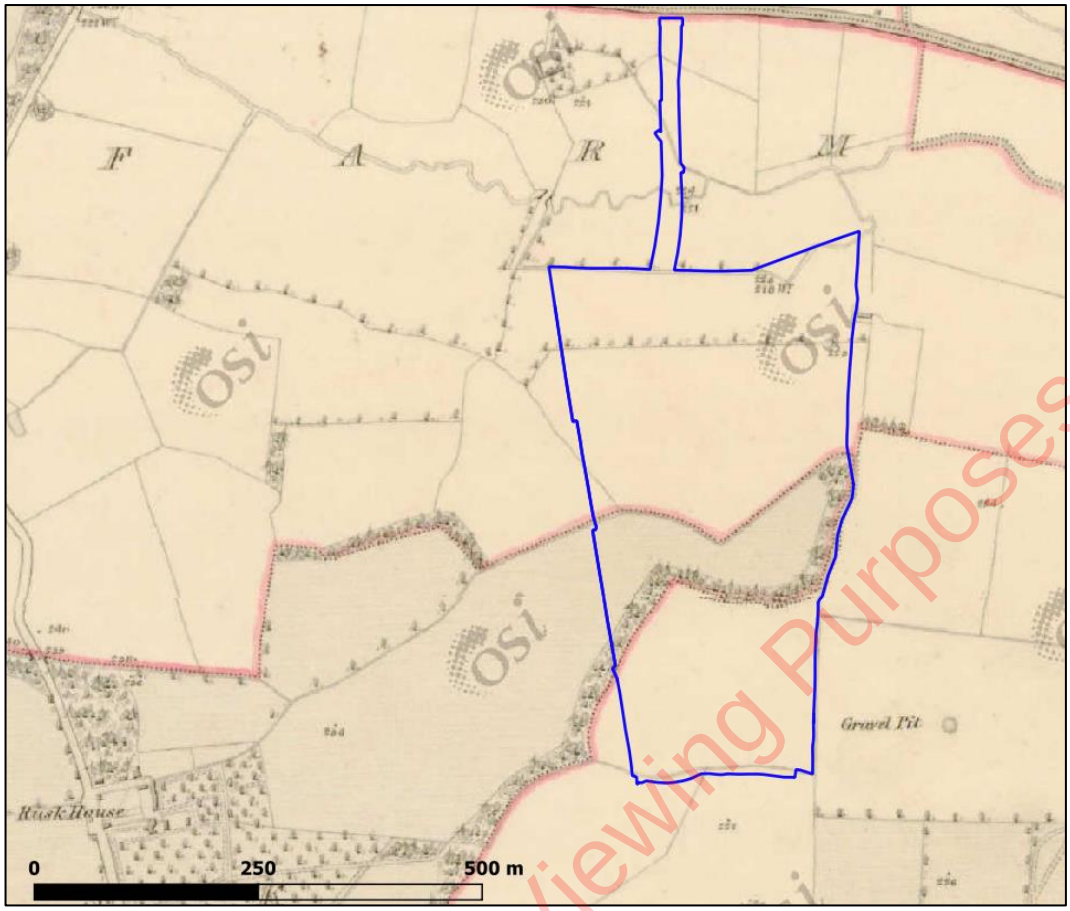


Figure 0-4: Extract from 6-inch OS map published in 1843 showing approximate site boundary (blue) with townland boundaries shown in red (OSI Licence 0003323). This excludes the sites of the two roundabouts on the R147 to be upgraded as part of this development.

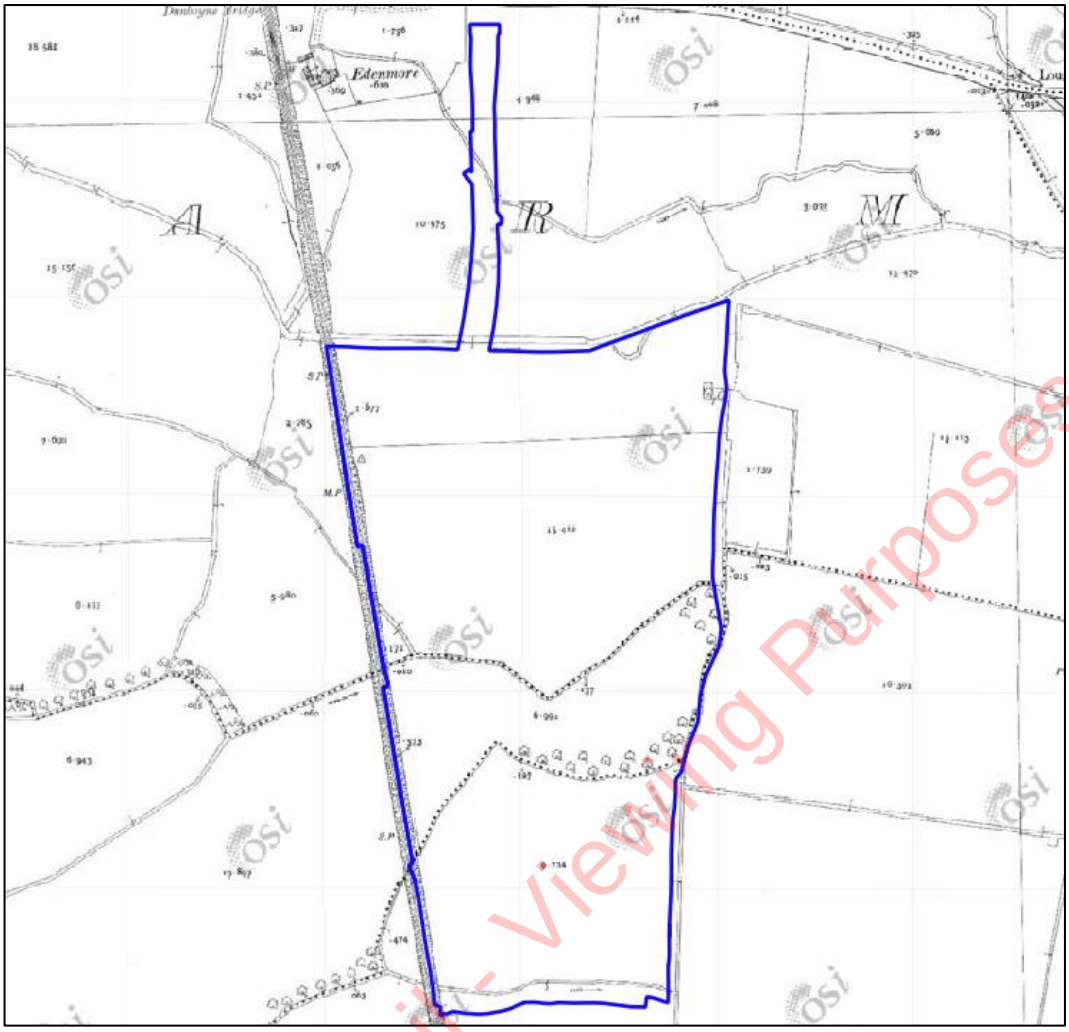


Figure 0-5: Extract from 25-inch OS map published in 1911 (OSI Licence 0003323) showing approximate site boundary (blue). This excludes the sites of the two roundabouts on the R147 to be upgraded as part of this development.

19.3.2.7 Aerial/Satellite/LiDAR imagery

A review of publicly accessible aerial, satellite and LiDAR sources published by the Ordnance Survey of Ireland, Google, Bing Maps and the Geological Survey of Ireland (LiDAR) was undertaken in order to assess if any traces of potential unrecorded archaeological sites were visible within the proposed development site. The reviewed images all show the area within the site boundary occupied by vacant, enclosed fields and no evident traces of any potential unrecorded archaeological sites were noted. The detail on the LiDAR imagery shows a series of regularly spaced linear features extending through the fields which are likely the result of agricultural activity, perhaps ploughing and/or land drains. The reviewed imagery demonstrates the layout of the fields within the proposed development site has not been significantly altered since the publication of the historic OS maps.

Figure 0-6: Bing Maps satellite image showing approximate site boundary (blue). This excludes the sites of the two roundabouts on the R147 to be upgraded as part of this development.

Figure 0-7: LiDAR image showing approximate site boundary (red) (source: Geology Survey Ireland). This excludes the sites of the two roundabouts on the R147 to be upgraded as part of this development.

19.3.2.8 Undesignated Cultural Heritage Assets

While encompassing the archaeological and architectural heritage resources, cultural heritage also includes various undesignated assets such as settlements, demesne features, vernacular structures, townland boundaries, folklore, placenames and historical events. There are no extant vernacular buildings, or structures of any date, located within the proposed development site and it while the central area appears to have been formerly part of the landholding of the levelled Rusk House to the southwest, it was likely severed from that property by the construction of the railway line in 1850. The National Folklore Collection UCD Digitisation Project (www.duchas.ie) has collated various transcripts of folklore and traditions relating to Dunboyne and a review of these revealed that the majority relate to known archaeological sites in the area. There were no entries describing potential unrecorded archaeological sites within the proposed development site or local traditions associated with its location.

The proposed development site extends into three townlands: Castlefarm. Clonee and Rusk and contains sections of the boundaries dividing these areas. Townlands are the smallest unit of land division in the Irish landscape and many preserve early Gaelic territorial boundaries that pre-date the Anglo-Norman conquest. The layout and nomenclature of Irish townlands was recorded and standardised by the work of the Ordnance Survey in the 19th century. The Irish translations of the townlands names often refer to natural topographical features, but name elements may also give an indication of the presence of past human activity within the townland, e.g., dun, lios or rath indicate the presence of a ringfort while temple, saggart, termon or kill record an association with a church site. The Irish origins and translations for the townlands within the study area were sought from the Placenames Database (www.logainm.ie) and none derive from Irish names that may indicate the presence of an unrecorded archaeological site (Table 19.8). The name Castlefarm does indicate that the lands in the northern end of the proposed development site may have formed part of an agricultural landholding associated with the medieval castle within the Dunboyne settlement to the west.

Townland	Irish Root	Translation
Castlefarm	None	None
Clonee	Cluain Aodha	'Aodh's Meadow'
Rusk	Rúscach	Rúsc 'tree bark'

Table 0-8: Townland names and translations (source: logainm.ie)

19.3.3 Field Inspection

The field inspection entail a systematic walkover survey of the lands within the proposed development site which were assessed in terms of existing land use, vegetation cover and the potential for the presence of surface traces of any previously unrecorded archaeological sites or structures of architectural heritage interest. The weather conditions were dry and clear at the time of the survey which allowed for good landscape visibility and grass cover was low which allowed clear visibility of the ground surface. No access difficulties were encountered during the inspection.

The proposed development site is located within an undeveloped parcel of good quality agricultural land. The site does not appear to have been subject to significant past ground disturbance, other than tilling and the erection of electricity pylons in the northern area. While the ground surface within the site is generally level, there was a slight east-west slope in the northern area and a north-south slope evident in the southern area.

The site was accessed from the north from a pathway running north-south along the western edge of the northern area. The site was bounded internally and on all sides by a combination of hedgerows and deciduous trees, and on the west by the Dublin-Navan railway line. The townland boundaries between Castlefarm, Ruskin and Clonee are formed by two east to west orientated, curvilinear field boundaries that are of similar form to the other field boundaries within the site. The southern area was accessed through two gateways in the dividing hedgerow and showed evidence of wet ground with a small watercourse, known as Castle Stream, extending east-west along the field boundary. No features of potential archaeological interest noted during a visual appraisal of this watercourse from its banks. There were also no surface traces of any potential unrecorded archaeological sites or structures of architectural heritage interest noted within the proposed development site during the inspection.

19.3.4 Geophysical Survey

A geophysical survey (Licence No.: 23R0167) of the proposed development site was carried out by Dr Ger Dowling in April 2023 and this comprised a high resolution magnetic gradiometry survey which covered an area of approximately 14 ha. in total size. The results of this survey are summarised in this section and a full copy of the geophysical report is presented in Appendix 19.4. The survey identified a range of potential archaeological features and the reference numbers for these used in the following paragraphs are sourced from the geophysical report (Appendix 19.4). The locations of the features, including their associated reference numbers, are also identified on Figures 19.9 and 19.10 (see below).

An ovaloid enclosure (Geophysical feature 1) was identified in the north-eastern corner of the northern field within the proposed development site. Although seeming to extend under the modern field boundaries to the north and east, the enclosure as mapped by the survey measures at least 70m north–south by 80m east–west. It appears to have a southwest-facing entrance and can be seen to surround a varied array of potential features, including a partition ditch (Geophysical feature 2) and the northern segment of a sub-rectangular structure/building. Numerous curvilinear and 'pit-type' anomalies identified by the survey both inside and immediately outside the enclosure also hint at the existence of other possible archaeological structures and features (e.g., trenches and pits/spreads) at this location.

The survey also revealed evidence a series of long-running 'ditch-type' features (Geophysical features 4–6) which may form field divisions, perhaps associated with the enclosure feature. This putative field system is not recorded on early historical maps and includes what could be a semi-circular structure/enclosure measuring 12m diameter (Geophysical feature 7). Although the survey in the northern field was affected by magnetic disturbance arising from likely buried modern material (Geophysical feature 12), the putative field system can be seen to extend westwards from the enclosure for about 100m, though it may be more extensive. Other potential features of possible archaeological origin comprise a possible burnt spread (Geophysical feature 8) and an adjacent narrow field (Geophysical feature 9); although these interpretations are tentative. Of more recent origin is evidence for two possible former field boundaries (Geophysical features 10 and 11), as well as buried modern material (Geophysical features 12 and 13).

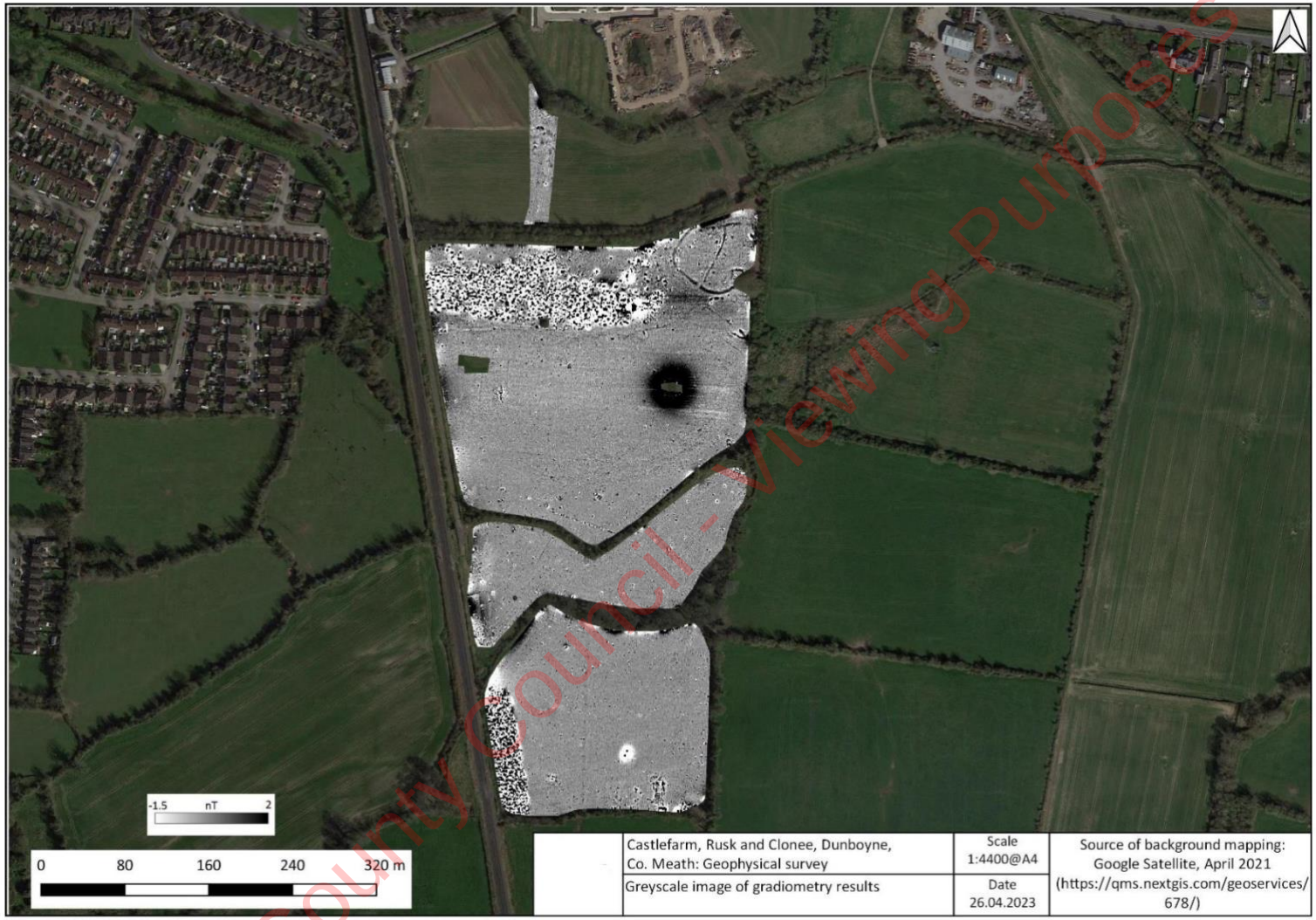


Figure 0-8: Greyscale image of gradiometry results

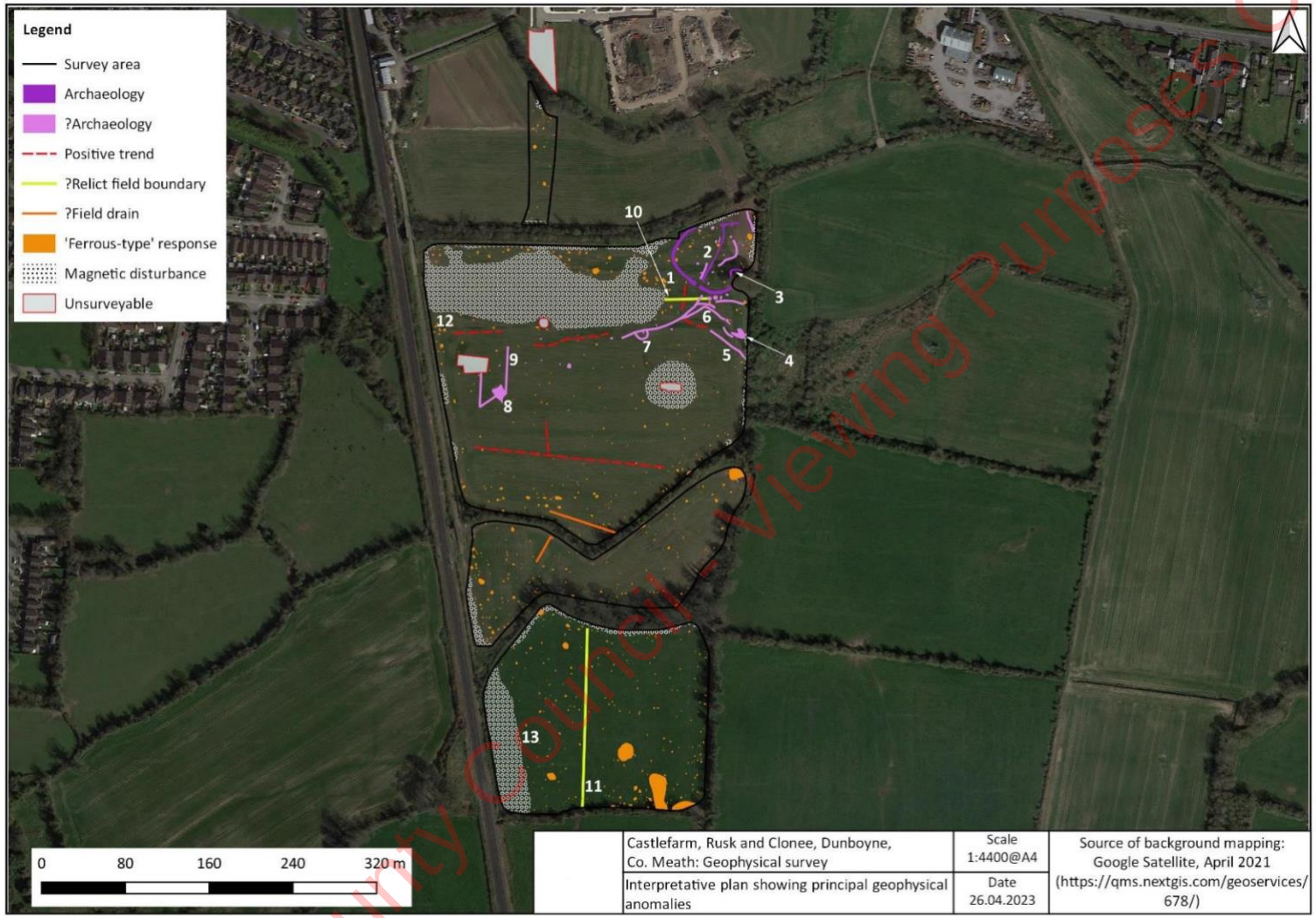


Figure 0-9: Interpretative plan showing principal geophysical anomalies

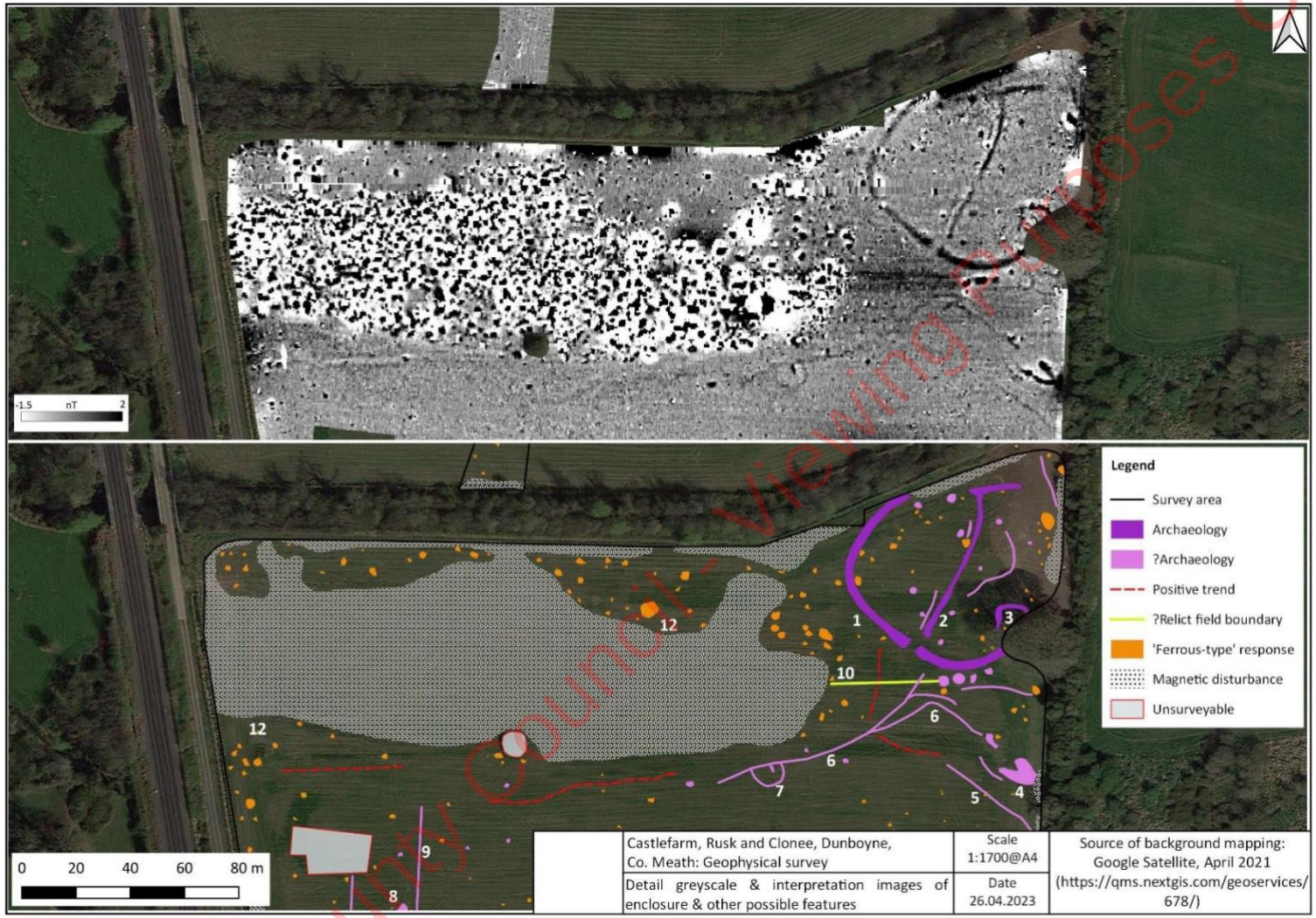


Figure 0-10: Interpretative plan showing principal geophysical anomalies

19.3.5 Summary

There are no recorded archaeological sites, i.e., sites listed in the RMP or SMR, located within the proposed residential development site and no extant examples with above ground expression are located within 480m of its boundary. There are no National Monuments in State Care located within the surrounding 1km study area and the proposed development site is located c.800m outside the zone of notification around the historical centre of Dunboyne village to the west.

The proposed development will include improvement works to two existing roundabouts on the R147 (Old Navan Road) to the east of the proposed residential development site and the northwest example is located 80m to the east of the recorded site of a graveyard (ME051-006001-) which formerly held a now-levelled church (ME051-006----) (Figure 19.1). These are located within the centre of a green field and the historic OS maps do not show any features associated with these sites extending within the environs of the road junction which now contains the existing modern roundabout.

There are 28 recorded archaeological sites within the 1km study area and of these 15 were identified and archaeologically excavated in advance of development projects during recent decades see figure 19.1 and Table 19.5). The fully excavated sites are now of likely negligible value as they retain no remnant archaeological remains at their locations. The remaining archaeological sites within the study area are types common within the Irish landscape and none are designated as National Monuments in State Care or comprise tourist centres. In addition, none are monument types that incorporate visually sensitive, visual ritual alignments that extend beyond their immediate settings such as megalithic tombs or stone circles. The extant archaeological sites within the study area, including examples with no surface expression, all have the potential to possess attributes, such as artefacts, human burials or other archaeological remains, that may be of high value and, while this cannot be discerned without recourse to archaeological excavation, such aspects of their value will not be affected in the absence of direct negative effects.

The field inspection of the proposed development site did not identify any potential unrecorded archaeological sites or architectural heritage structures, including any associated with the section of the Castle Stream which extends through the proposed development site.

The geophysical survey carried out as part of this assessment identified the sub-surface remains of an enclosure of unknown date within the proposed development site, as well as a number of other anomalies which are potentially archaeological in origin (see Appendix 19.4).

The only other features of cultural heritage interest identified within the proposed development site are sections of the townland boundaries between Castlefarm, Ruskin and Clonee which comprise tree-lined field boundaries. These boundaries are undesignated features found throughout the country and comprise receptors of local (low) cultural heritage value.

There are no Protected Structures, curtilage features or NIAH-listed buildings located within the proposed development site. In addition, the proposed development site is located c.1.13km outside the south-east end of the Dunboyne Architectural Conservation Area as defined in the *Meath County Development Plan 2021-2027*. There are a number of Protected Structures, which are each ranked as being of Regional (medium) value by the NIAH , located within the surrounding 1km study area and none are located within 580m of the proposed residential development site (see Figure 19.2 and Table 19.7). As noted above, the proposed development will include improvement works to two existing roundabouts on the R147 (Old Navan Road) to the east of the residential development site. The southeast roundabout is located outside the northwest boundary of a two-storey house, which while this building is not a Protected Structure it is listed in the NIAH (ref. 14342004). The existing roundabout is also located 120m to the northwest of a bridge listed as a Protected Structure (MH051-103) (Figure 19.2). A review of historic OS maps do not show any features associated with these structures at the location of the existing modern roundabout.

19.3.6 Construction Stage

The construction phase of the proposed residential development will require the removal of the topsoil layer and the excavation of foundations and other infrastructure within the underlying natural subsoil which will have the potential to result in direct negative effects on any sub-surface archaeological remains that may exist within the proposed development site. The construction phase will also involve the removal of sections of internal field boundaries, two of which form townland boundaries of low cultural heritage value.

19.3.6.1 Operational Stage

The operational stage of the project will entail the ongoing use of the proposed development site as a residential development.

19.4 Potential Impact of the Proposed Development

19.4.1 Proposed Development

19.4.1.1 Construction Stage

The proposed development would include upgrading works for two roundabouts on the R147 (Old Navan Road) which would be confined to previously disturbed localised areas within the road carriageway, and this would result in no predicted effects on any elements of the cultural heritage resource.

There are no recorded archaeological sites listed in the SMR or RMP located within the boundary of the proposed residential development or within 220m of its boundary. The construction phase of the proposed development would, therefore, have no predicted direct or indirect effects on the known archaeological resource.

The geophysical survey of the green field areas within the proposed development site has identified sub-surface remains of a range of features of unknown date which are of archaeological potential (see Section 19.3.4 and Appendix 19.4). The ground works required for housing construction within the proposed development site would result in permanent, direct, moderate to significant, negative effects on these potential archaeological features and this would require mitigation.

There are no Protected Structures located within the proposed residential development site or within 580m of its boundary and it is not located within an Architectural Conservation Area. There also are no NIAH-listed features within the proposed residential development site or within 200m of its boundary. The construction phase of the proposed development would, therefore, result in no predicted direct or indirect effects on the architectural heritage resource.

There are no undesignated vernacular structures or settlements located within the proposed development site and no intangible attributes, such as historical or folklore associations, were noted during the assessment. Sections of the townland boundaries between Castlefarm, Ruskin and Clonee extend through the interior of the proposed development site and continue outside its boundary. The construction phase of the proposed development would result in a direct, permanent, slight, negative effect on these low value elements of the undesignated cultural heritage resource.

No indirect effects caused by the interaction of environmental aspects during the construction phase are predicted.

19.4.1.2 Operational Stage

There are no archaeological sites listed in the RMP or SMR located within the proposed development site. In addition, given the distances of the recorded sites within the surrounding 1km study area from the proposed development combined with the absence of any examples within this area that possess notable visual sensitivities, the operational phase of the proposed development would, therefore,

have no predicted effects on the recorded archaeological resource. Following the successful implementation of the archaeological mitigation measures presented in Section 19.6, it is predicted that no effects would arise in relation to the potential archaeological resource within the proposed development site during the operational phase.

There are no designated architectural heritage structures located within the proposed development site, it is not located within an Architectural Conservation Area, and it contains no undesignated structures of architectural heritage interest. The proposed development would, therefore, have no predicted effects on the architectural heritage resource during the operational phase.

The only undesignated cultural heritage feature within the proposed development site comprises field boundaries forming sections of the townland boundaries between Castlefarm, Ruskin and Clonee. Following the successful implementation of archaeological mitigation measures presented in Section 19.6, it is predicted that no direct or indirect effects would arise in relation to the undesignated cultural heritage resource during the operational phase.

No indirect effects caused by the interaction of environmental aspects during the operation phase are predicted.

19.4.1.3 Do Nothing Impact

A 'Do Nothing Scenario' would see the continued preservation of the recorded and potential cultural heritage receptors within the study area.

19.5 Mitigation Measures

19.5.1 Proposed Development

19.5.1.1 Construction Stage

There are no recorded archaeological sites listed in the SMR or RMP located within the proposed development site. There are also no Protected Structures or structures/gardens listed in the National of Architectural Heritage located within site and it is not within an Architectural Conservation Area. No mitigation measures for these elements of the cultural heritage resource are, therefore, required.

A programme of targeted archaeological test trenching would be carried out in advance of the construction phase under licence by the National Monuments Service. These site investigation works would include targeted test trenching of all features of archaeological potential identified during the geophysical survey of the proposed development site as well as the sections of the townland boundaries between Castlefarm, Ruskin and Clonee. All features confirmed as archaeological potential during the test trenching investigations would be cordoned off and recorded *in situ* in written, drawn and photographic formats. A report on the test trenching results would then be submitted to the National Monuments Service, per licensing requirements, who would be consulted to determine appropriate additional mitigation measures which may entail total/partial preservation *in situ* by avoidance or preservation by record by systematic archaeological excavation. Any required archaeological excavations works would be carried out under licence by the National Monuments Service and in advance of any construction works at their location.

19.5.1.2 Operational Stage

All required mitigation measures would be completed by the end of the construction phase and, therefore, no cultural heritage mitigation measures during the operational phase of the proposed development would be required.

19.6 Residual impact of the Proposed Development

19.6.1 Proposed Development

19.6.1.1 Construction Stage

The proposed development site and its close environs do not contain any extant recorded archaeological sites or designated architectural heritage structures and no residual effects on these elements of the cultural heritage resource are predicted. The mitigation measures presented in Section 19.6 would provide for either the preservation *in situ* of any unrecorded archaeological features within the proposed development site, including the potential features identified during the geophysical survey, or the proper and adequate recording of such features by full archaeological excavation. Preservation *in situ* would allow for a negligible magnitude of effect resulting in a potential not significant/imperceptible significance of residual effect on the unrecorded archaeological resource. Preservation by record would result in a high magnitude of effect, albeit ameliorated by the creation of a full and detailed archaeological record, the results of which would be publicly disseminated. This would result in a potential moderate significance of effect in the context of residual impacts on the unrecorded archaeological resource.

19.6.1.2 Operational Stage

Following the implementation of the mitigation measures presented in Section 19.6, the operational stage of the proposed development would not result in any residual effects on the cultural heritage resource.

19.6.1.3 Worst Case Impact

If the proposed development were to proceed without the implementation of the archaeological mitigation measures outlined in Section 19.6 then construction works could result in permanent, direct, moderate to significant, negative residual impacts on any unrecorded, sub-surface archaeological features that exist within the proposed development site.

19.6.2 Cumulative

19.6.2.1 Construction Stage

As detailed in Section 19.3, a range of pre-construction and construction stage archaeological site investigations have been previously carried out within the development sites within the 1km study area. Where sub-surface remains of unrecorded archaeological features or sites have been identified at these locations, they were either preserved *in situ* by avoidance where feasible or preserved in record by systematic archaeological excavations licensed by the National Monuments Service. A review of a number of proposed future developments within the study area was also carried out as part of this assessment,

Exempted Development

As part of this development, and other developments within surrounding lands, circa 1,100m of existing 200mm uPVC will need to be upsized to a 400mm ID watermain. The trenching works to install the existing 200mm uPVC likely disturbed ground levels down to sterile natural subsoils and, therefore, the footprint of the proposed upsizing works likely retain negligible archaeological potential and the proposed works will have no predicted impacts on any cultural heritage receptors.

Future Development

The roads within the proposed development site would link to a future Distributor Road Bridge which will extend over the railway track outside the western end of the site. The indicative layout of the road runs in a general north-south direction through the northern portion of the site before it turns westwards across the rail line. There are no recorded archaeological sites or architectural heritage structures located along the section of the railway line that extends adjacent to the western boundary of the proposed development and this future development will have no predicted impacts on any known cultural heritage receptors.

Residential Development Meath County Council Reg. Reg. 22675

The location of a proposed residential development to the northwest of the proposed development (Meath County Council ref. 22625) does not contain any recorded archaeological sites or designated architectural heritage structures. The online planning file for this proposed development does not contain an archaeological or architectural impact assessment report. The file does contain a recommendation by the Development Applications Unit of the Department of Housing, Local Government and Heritage that a condition requiring archaeological monitoring of the construction phase be included in any grant of planning that may be issued for that development.

Dart + West

A railway order has been applied to An Bord Pleanála for a Railway Order for DART+ West Project which will introduce electrified high-capacity trains at increased frequency for all stations within the project area for that development. A review of the Archaeological, Cultural Heritage and Architectural Heritage chapters in the EIAR[3] for this rail scheme revealed that one potential significant impact was predicted to arise within the study area assessed as part of this proposed development. This will arise from the lowering of the track beneath the Dunboyne railway bridge which would have the potential to undermine the foundations of the bridge. Following the implementation of mitigation measures identified in the EIAR for the proposed scheme, the residual effect on this structure is concluded to be imperceptible. This bridge is listed in the NIAH (ref. 14341002) and is located 180m outside the nearest section of the proposed development.

When the completed and proposed developments within the surrounding study area are assessed in combination with the proposed development, no significant cumulative effects upon the archaeological or cultural heritage resource have been identified.

The construction phase of the proposed development will not result in any likely significant residual cumulative effects on the cultural heritage resource. No likely construction stage cumulative effects on the cultural heritage resource are predicted and, therefore, no mitigation measures are required.

19.6.2.2 Operational Stage

The operational phase of the proposed development would not result in any predicted cumulative effects on the cultural heritage of the area.

The operational phase of the proposed development will not result in any likely significant residual cumulative effects on the cultural heritage resource. No likely operational stage cumulative effects on the cultural heritage resource are predicted and, therefore, no mitigation measures are required.

19.6.2.3 Do-Nothing Impact

A 'Do Nothing Scenario' would see the continued preservation of recorded and potential cultural heritage features within the study area.

If the proposed development were to proceed without the implementation of the archaeological mitigation measures outlined in Section 19.6 then construction works could result in permanent, direct, significant, negative impacts on any unrecorded, sub-surface archaeological features that exist within the site.

[3] https://www.dartplus.ie/en-ie/railwayorder/dartwest

19.7 Monitoring

19.7.1 Proposed Development

19.7.1.1 Construction Stage

There are a number of obligatory processes to be undertaken as part of applications to the National Monuments Service for licences to carry out archaeological site investigations and these will allow for monitoring of the successful implementation of mitigation measures. A detailed method statement providing written and mapped details on the proposed strategy for these site investigations is required to be included as part of submitted licence applications. This includes the extent of the archaeological works and details on the processes to be enacted in the event that any archaeological features are encountered. Reports on licensed archaeological site investigations are required to be submitted to the National Monuments Service, the National Museum of Ireland and the Planning Authority which clearly describe the results of all archaeological works in written, mapped and photographic formats.

19.7.1.2 Operational Stage

The operational phase of the proposed development would not require mitigation measures for the cultural heritage resource that would require monitoring.

19.8 Reinstatement

19.8.1 Proposed Development

19.8.1.1 Construction Stage

There are no recorded archaeological sites or architectural heritage structures that would require construction stage reinstatement measures located within the proposed development site or its close environs.

19.8.1.2 Operational Stage

There are no recorded archaeological sites or architectural heritage structures that would require operational stage reinstatement measures located within the proposed development site or its close environs.

19.9 Difficulties Encountered

No difficulties were encountered during the compilation of this chapter.

20 RISK MANAGEMENT (MAJOR ACCIDENTS & DISASTERS)

20.1 Introduction

This chapter describes the Proposed Development in respect of its potential vulnerability to major accidents / disasters, and its potential to give rise to the same.

The assessment is carried out in compliance with the EIA Directive on the assessment of the effects of certain public and private projects on the environment that entered into force on 16 May 2017 which states the need to assess: -

> *"the expected effects deriving from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned"*

The underlying objective of this assessment is to ensure that appropriate precautionary actions are taken for those projects which *"because of their vulnerability to major accidents and/or natural disasters, are likely to have significant adverse effects on the environment."*

This chapter has been prepared by Stephen Little, EIAR Manager, with assistance from Naoise O'Connor, EIAR Co-ordinators of Stephen Little & Associates. Stephen has over 30 years' professional experience of town planning in Ireland, is a Corporate Member of both the Irish Planning Institute and the Royal Town Planning Institute and holds a Diploma in EIA Management (UCD). Naoise has 2 years' professional experience in the planning field, has a MRUP – Masters in Regional and Urban Planning and is a Graduate Member of the Irish Planning Institute.

20.2 Assessment Methodology

The scope and methodology of this assessment is centred on the understanding that the Proposed Development will be designed, built and operated in line with best international current practice. As such, major accidents resulting from the Proposed Development would be very unlikely.

The scope and methodology presented in the following sections are based on the provisions of the EIA Directive, the EPA Guidelines, EU Commission guidance, as well as professional judgement.

A risk analysis-based methodology that covers the identification, likelihood and consequence of major accidents and / or disasters has been used for this assessment (Refer to Section 20.5 for further detail on this approach).

The assessment of the risk of major accidents and/or disasters considers all factors defined in the EIA Directive that have been considered in this EIAR, i.e. population and human health, biodiversity, land, soil, water, air, climate, material assets, cultural heritage and the landscape.

20.2.1 Guidance and Legislation

20.2.1.1 Legislative Requirements

The following paragraphs set out the requirements of the EIA Directive in relation to major accidents and / or disasters. Recital 15 of the EIA Directive states that: -

> *"In order to ensure a high level of protection of the environment, precautionary actions need to be taken for certain projects which, because of their vulnerability to major accidents, and/or natural disasters (such as flooding, sea level rise, or earthquakes) are likely to have significant adverse effects on the environment. For such projects, it is important to consider their vulnerability (exposure and resilience) to major accidents and/or disasters, the risk of those accidents and/or disasters occurring and the implications for the likelihood of significant adverse effects on the environment. In order to avoid duplications, it should be possible to use any relevant information available and obtained through risk assessments carried out pursuant to Union legislation, such as Directive 2012/18/EU of the European Parliament and the Council and Council Directive 2009/71/Euratom, or through relevant assessments carried out pursuant to national legislation provided that the requirements of this Directive are met."*

It is clear from the EIA Directive that a major accident and / or disaster assessment is most readily applied to 'Control of Major Accident Hazards involving Dangerous Substances' (COMAH) sites or

major industrial / energy installations. Notwithstanding, the assessment of major accidents and disasters for the Proposed Development has been carried out for completeness given the nature and extent of the Proposed Development.

Article 3 of the EIA Directive requires that the EIAR shall identify, describe and assess in the appropriate manner, the direct and indirect significant effects on population and human health, biodiversity, land, soil, water, air and climate, material assets, cultural heritage and landscape deriving from (amongst other things) the *"vulnerability of the project to risks of major accidents and / or disasters that are relevant to the project concerned".*

The information relevant to major accidents and/or disasters to be included in the EIAR is set out in Section 8 of Annex IV of the EIA Directive as follows: -

> *"(8) A description of the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to Union legislation such as Directive 2012/18/EU of the European Parliament and of the Council or Council Directive 2009/71/Euratom or relevant assessments carried out pursuant to national legislation may be used for this purpose provided that the requirements of this Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies."*

20.2.1.2 Guidance Documents

A number of guidance documents and published plans have been reviewed and considered in order to inform this assessment, as described in the following sections.

- European Commission – Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report (2017).
- Environmental Protection Agency Guidelines (2022).
- Guidance on Assessing and Costing Environmental Liabilities (2014).
- A Framework for Major Emergency Management Guidance Document 1-A Guide to Risk Assessment in Major Emergency Management (2010).
- National Risk Assessment 2021/2022; Overview of Strategic Risks.
- A Guide to Risk Assessment in Major Emergency Management (2010).

20.3 Receiving Environment

The subject site of this intended planning application, as outlined in red in Figure 1 below, lies approximately 1Km east of the centre of Dunboyne. The subject site measures approximately 16.69Ha and can be generally described as greenfield and agricultural in nature. The majority of the lands encapsulated within the red line are zoned 'A2' for residential development, a portion of the distributor road is located on lands zoned F1 – Open Space.

The lands are located in the townlands of Castle Farm, Ruskin and Clonee, in Dunboyne, Co. Meath.

The site is located east of Dunboyne and bounded generally to the east and south by agriculturally zoned lands, to the west by the Iarnród Éireann rail line, and to the north by residential development permitted under Meath County Council (MCC) Reg. Ref. RA180561. The development permitted under Reg. Ref. RA180561 is accessed from Station Road/Clonee Road (L2228) by a length of distributor road which shall provide future access to the proposed scheme.

20.4 Characteristics of the Proposed Development

20.4.1 The Proposed Development

Permission is sought for a period of 10 Years for a proposed development on a site of approximately 16.92Ha consisting of 716no. residential units in a mix of houses, duplex and apartment buildings ranging in height from 2 to 7 storeys overall; comprising of 155no. 2 storey houses; 517no. apartments accommodated in 8no. buildings ranging in height from 4 to 7 storeys; 44no. duplex units accommodated in 2no. 3 storey terraces; 1no. childcare facility (c.602sqm) located at ground floor level of Block B1; public open space; communal and private open space; public lighting; car parking, including basement car parking under some of the apartments; secure bicycle parking; and all associated and ancillary site development and infrastructural works, hard and soft landscaping and boundary treatment works, provision of c. 470m of new distributor road; provide a 200mm diameter watermain in existing section of southern distributor road adjacent to recently constructed Castle Farm development; upgrade of junction of southern distributor road and L2228 (Station Road) to provide a signalised junction with pedestrian crossings, including ancillary adjustments to road markings on both roads; provision of foul drainage pumping station; provision of a compensatory storage area adjacent to Castle Stream; ESB Sub-Stations; and improvement works to 2 no. roundabouts on the R147 (Old Navan Road).

20.4.2 Exempted Development

In order to accommodate this development and other developments in and around the Dunboyne area, Irish Water will be required to upgrade c. 1,100m of existing 200mm uPVC watermain so as to provide a 400mm ID watermain in its place.

This is to be undertaken by Irish Water under their exempted development provisions and these works do not form part of this planning application as a result. The approximate location of this watermain to be upgraded is identified by Irish Water in their Confirmation of Feasibility dated 08 June 2023.

20.4.3 Future Development

As part of this development we are providing c. 450m of the future Distributor Road that runs through the application site. This proposed road extension southwards and then eastwards over the railway line shall, in future, form part of the overall Dunboyne Distributor Road; an objective of the Meath County Development Plan 2021-2027. The design for this future extension/bridge has been included in this submission as evidence that it provides a viable workable solution, however permission for same is not being sought for this at this time.

The design of this road and bridge has been the subject of discussion with the Planning Authority, including Roads Department and also Irish Rail to ensure that their respective requirements are factored in to the design. In the case of Irish Rail, the road design, including the bridge that will ultimately span the rail line to Dunboyne has taken in to account the planned electrification of this rail line as now proposed under the DART+West project, including the columns required to hold the overhead power lines along the rail line.

Adequate working space during the construction phase of this future length of road and bridge have also been provided. We refer the Planning Authority to Drg. No. P100 prepared by Waterman Moylan, Consulting Engineers which highlights the extent of the distributor road being proposed as part of this proposed planning application and those lands identified for the future road across the lands in the Applicant's control. Drg. No. P101 prepared by Waterman Moylan, Consulting Engineers shows the length of distributor road being proposed in this case connects with the already permitted/existing distributor road to the north and the future road and bridge to the south and west. It is envisaged that the lands required for this future road in the control of the Applicant will be made available to Meath County Council. The lands to be made available to the Council are those marked 'Future Road' on Drg. No. P100 prepared by Waterman Moylan, Consulting Engineers.

The potential for the proposed development to impact on a future environment that includes the continuation of the future distributor road has been carefully considered, by the Applicant and the Planning Authority. The distributor road has been designed and incorporated to the proposed development to ensure that it is not prejudicial to, the future distributor road project including the bridge that is to be constructed by Meath County Council. It follows that the proposed development is not likely to have any significant impact on the future distributor road project to report within this EIAR.

This chapter will assess the proposed development only (as described in section 20.4.1 above).

20.5 Potential Impact of the Proposed Development

20.5.1 Proposed Development

As discussed above, the scope and methodology of this assessment is centred on the understanding that the Proposed Development would be designed, built and operated in line with best international current practice and, as such, the vulnerability of the Proposed Development to risks of major accidents and / or disasters is considered low.

Current EIA practice already includes an assessment of some potential accidents and disaster scenarios such as pollution incidents to ground and watercourses as well as assessment of flooding events. These are described in detail in the relevant EIAR assessment Chapters (refer to Chapter 8: Water and Chapter 7: Land, Soil and Geology for further detail).

20.5.1.1 Site Specific Risk Assessment

A site-specific risk assessment identifies and quantifies risks focusing on: unplanned, but possible and plausible events occurring during the construction and operation of the Proposed Development. The approach to identifying and quantifying risks associated with the Proposed Development by means of a site-specific risk assessment is derived from the EPA guidance.

The criteria for categorising impact is derived from the DoEHLG guidance (Refer to below tables). The following steps were undertaken as part of the site-specific risk assessment: -

- Risk identification.
- Risk classification, likelihood and consequence.
- Risk evaluation.

Risk Identification

The identification of plausible risks has been carried out in consultation with relevant specialists. A Risk Register which was prepared during the design of the Proposed Development was also reviewed in order to inform the identification of risks for this assessment. The identification of risks has focused on non-standard but plausible incidents that could occur at the Proposed Development during the Construction and Operation.

In accordance with the European Commission Guidance risks are identified in respect of the developments: -

1) Potential vulnerability to disaster risks.

2) Potential to cause accidents and / or disasters.

Risk Classification

Having identified the potential risks, the likelihood of occurrence of each risk has been assessed. An analysis of safety procedures and proposed environmental controls was considered when estimating

likelihood of identified potential risks occurring. Table 20.1 defines the likelihood ratings that have been applied.

The approach adopted has assumed a 'risk likelihood' where one or more aspects of the likelihood description are met, i.e. any risk to the Proposed Development less than extremely unlikely to occur has been excluded from the assessment. The likelihood rating assigned to each risk has assumed that all proposed mitigation measures and/or safety procedures are in place and have succeeded in reducing or preventing the major accident and/or disaster occurring.

Rating	Classification	Effect Description
1	Extremely Unlikely	May occur only in exceptional circumstances; once every 500 or more years.
2	Very Unlikely	Is not expected to occur; and/or no recorded incidents or anecdotal evidence; and/or very few incidents in associated organisations, facilities or communicates; and / or little opportunity, reason or means to occur. May occur once every 100-500 years.
3	Unlikely	May occur at some time; and /or few, infrequent, random recorded incidents or little anecdotal evidence; some incidents in associated or comparable organisations worldwide; some opportunity, reason or means to occur; May occur once per 10-100 years.
4	Likely	Likely to or may occur; regular recorded incidents and strong anecdotal evidence and will probably occur once per 1-10 years.
5	Very Likely	Very likely to occur; high level of recorded incidents and/or strong anecdotal evidence. Will probably occur more than once a year.

Table 20.1: Risk Classification Table – Likelihood.

Classification of Consequence

The consequence rating assigned to each risk has assumed that all proposed mitigation measures and / or safety procedures have failed to prevent the major accident and / or disaster occurring. The consequence of the impact if the event occurs has been assigned as described in Table 17.2.

The consequence of a risk to the Proposed Development has been determined where one or more aspects of the consequence description are met, i.e. risks that have no consequence have been excluded from the assessment.

Ranking	Consequence	Impact	Description
1	Minor	Life, Health, Welfare Environment Infrastructure Social	Small number of people affected; no fatalities and small number of minor injuries with first aid treatment. No contamination, localised effects <€0.5M. Minor localised disruption to community services or infrastructure (<6 hours).
2	Limited	Life, Health, Welfare Environment Infrastructure Social	Single fatality; limited number of people affected; a few serious injuries with hospitalisation and medical treatment required. Localised displacement of a small number of people for 6-24 hours. Personal support satisfied through local arrangements.

Ranking	Consequence	Impact	Description
			Simple contamination, localised effects of short duration €0.5-3M Normal community functioning with some inconvenience.
3	Serious	Life, Health, Welfare Environment Infrastructure Social	Significant number of people in affected area impacted with multiple fatalities (<5), multiple serious or extensive injuries (20), significant hospitalisation. Large number of people displaced for 6-24 hours or possibly beyond; up to 500 evacuated. External resources required for personal support. Simple contamination, widespread effects or extended duration. €3-10M. Community only partially functioning, some services available.
4	Very Serious	Life, Health, Welfare Environment Infrastructure Social	5 to 50 fatalities, up to 100 serious injuries, up to 2000 evacuated. Heavy contamination, localised effects or extended duration €10-25M. Community functioning poorly, minimal services available.
5	Catastrophic	Life, Health, Welfare Environment Infrastructure Social	Large numbers of people impacted with significant numbers of fatalities (>50), injuries in the hundreds, more than 2000 evacuated. Very heavy contamination, widespread effects of extended duration >€25M. Serious damage to infrastructure causing significant disruption to, or loss of, key services for prolonged period. Community unable to function without significant support.

Table 20.2: Risk Classification Table – Likelihood.

Risk Evaluation

In accordance with the DoEHLG 2010 Guidelines, the evaluated major accidents and natural disasters (MANDs) will be subject to a risk matrix to determine the level of significance of each risk for each scenario. These have been grouped according to 3 categories: -

- **High Risk**

  Scenarios that have an evaluation score of 12 – 25, as indicated by the Red Zones in Table 17.3.

- **Medium Risk**

  Scenarios that have an evaluation score of 8 – 11 as indicated by the Amber Zone in Table 17.3.

- **Low Risk**

  Scenarios that have an evaluation score 1 – 7, of as indicated by the Green Zones in Table 17.3.

Likelihood						
	5 – V. Likely					
	4 – Likely					
	3 – Unlikely					
	2 – V. Unlikely					

	Ext. Unlikely					
		1 Minor	2 – Limited	3 Serious	4 – V. Serious	5 – Catastrophic
	Consequence of Impact					

Table 20.3: Levels of Significance.

Significant effects resulting from MANDs are adverse effects that are described as 'Significant', 'Very Significant' or 'Profound' under the EPA Guidelines (2022) and Volume 2, Section 2: The EIA Process of this report. Consequently, MANDs that fall within Amber or Red Zones ('Medium' or 'High' Risk Scenarios) are brought forward for further consideration and assessment for further mitigation.

20.5.1.2 Construction Phase

Risk ID	Potential Risk	Possible Cause	Requirement for Further Assessment?
Potential Vulnerability to Accidents and / or Disasters			
A	Flooding of site.	River Tolka and Castle Stream.	No. The site is not at risk of flooding. The modelling confirms that the footprint of the northern entrance road (the distributor road) is partially located in Flood Zone B. There are drainage channels within the site which remain in-bank throughout. The channels contain both Flood Zone A/B and are diverted and culverted only to facilitate the development and road access. Compensatory storage has been designed for the site which compensates for the loss of Flood Zone B as a result of the proposed northern road entrance and ensures existing water levels and extents are managed appropriately in the area. Refer to the findings of the Flood Risk Assessment, prepared by JBA Consulting Engineers for further detail relating to the Proposed Development.
Potential to Cause Major Accidents and / or Disasters			
B	Fire / Explosion.	• Damage to unmapped services / utilities during earth works. • Vehicle and vehicle collision.	No. The Construction Phase of the Proposed Development will be carried out in accordance with all relevant health and safety guidance and legislation, as well as the provisions of the Construction Environmental Management Plan (CEMP), prepared by Waterman Moylan Consulting Engineers.
C	Unplanned outages / disruption to services.	Damage to unmapped services / utilities during earth works.	No. Disruption to services not considered to constitute a 'major accident or disaster' for the purposes of this assessment.
D	Road traffic accidents resulting from construction phase	• Driver error. • Object on road.	No. The Construction Phase of the Proposed Development will be carried out in

	traffic or temporary construction traffic management measures.	• Failure of vehicle control systems. • Public confusion.	accordance with all relevant health and safety guidance and legislation, as well as the provisions of the Construction Environmental Management Plan, prepared by Waterman Moylan Consulting Engineers. Any works to the junction of Station Road (L2228) or the roundabouts on the R147 (Old Navan Road) will be carefully managed and subject to traffic management measures that will be agreed with Meath County Council and An Garda Siochana in advance. It is envisaged that the works to be undertaken by Uisce Eireann/Irish Water in upgrading c. 1.1km of watermain along the public road will also be carefully managed and subject to traffic management measures that will be agreed with Meath County Council and An Garda Siochana in advance.
E	Contamination of the groundwater / surface water.	Construction phase spills or leakages.	No. The Construction Phase of the Proposed Development will be carried out in accordance with construction best-practise and provisions of the Construction Environmental Management Plan, prepared by Waterman Moylan Consulting Engineers.
F	Falling debris from construction vehicles / cranes or cranes striking rail overhead cables or poles.	• Inadequate securing. • Overloading of vehicles.	No. The Construction Phase of the Proposed Development will be carried out in accordance with construction best-practise and provisions of the Construction Environmental Management Plan, prepared by Waterman Moylan Consulting Engineers. In that regard, no oversailing of the adjoining rail line by cranes involved in the construction of the proposed apartment buildings is proposed.
G	Release of asbestos fibres to atmosphere or surface water.	• Inadequate handling and removal of Asbestos Containing Materials (ACMs). • Removal of un-surveyed ACM.	No. No demolition of structures containing asbestos is proposed as part of this development. The Construction Phase of the Proposed Development will be carried out in accordance with construction best-practise and provisions of the Construction Environmental Management Plan, prepared by Waterman Moylan Consulting Engineers.

Table 20.4: Risk Register – Construction Phase.

None of the potential Construction Phase risks considered have been identified as requiring further assessment.

20.5.1.3 Operational Phase

Risk ID	Potential Risk	Possible Cause	Requirement for Further Assessment?
Potential Vulnerability to Disaster Risks			
H	Flooding of site.	River Tolka and Castle Stream.	No. The site is not at risk of flooding. The Proposed Development will have no impact on floodplain storage and conveyance. Risk to the site is managed by setting floor levels to the 1% AEP climate change water level, plus a freeboard allowance of at least 500mm, this the case for both MFRS and HEFS scenarios. Further, the finished floor level provides a minimum of 150mm above surrounding ground levels to provide protection against pluvial flooding. All residential buildings have also been located in Flood Zone C, further minimising the risk of inundation. The post-development modelling also confirms there is no increase in flood risk to the site or surrounding lands as a result of the proposed development. Refer to findings of the Flood Risk Assessment, prepared by JBA Consulting Engineers for the proposed development.
I	Incident at nearby SEVESO site resulting in off-site environmental impact.	• Fire / Explosion. • Equipment / Infrastructure failure.	No. A "consultation distance" is very broadly defined under Regulation 2 of the COMAH Regulations as *"a distance or area relating to an establishment, within which there are potentially significant consequences for human health or the environment from a major accident at the establishment. The consultation distance for some types of COMAH facility ranges from 300m for establishments where the risk is from flammable non-pressurised materials, to 1 km for establishments where chemical processing involving flammable or toxic substances takes place, to 2km for establishments with bulk storage of pressurised or toxic substances, triggering an obligation on the Planning Authority to notify the HSA."* The consultation distance is included in *italics* after each listed SEVESO site. **Nearest Upper Tier Sites: -** • Guerbet Ireland ULC Damastown Industrial Mullhuddart Estate (*1,000m from perimeter*) – c. 2.36 km from proposed development. • Chemco (Ireland) Limited (t/a Chemsour ce Logistics) Macetown North Damastown Industrial Estate, Mulhuddart (*1,000m from perimeter*) – c. 3.5 km from proposed development. **Nearest Lower Tier Sites:-**

Risk ID	Potential Risk	Possible Cause	Requirement for Further Assessment?
			• Clarochem Ireland Ltd Damastown, Mullhuddart (*1,000m from perimeter*) – c. 2.5km from proposed development. • Aestellas Ireland Co. Ltd Damastown Industrial Mullhuddart Park (*1,000m from perimeter*) – c. 3.8km from proposed development. As can been seen from the list above, the closest COMAH sites are c. 2.5km and c. 2.36km from the Residential Site and the consultation distance in both cases is 1km. The works to the roundabouts on the R147 are also outside of this consultation zone.
Potential to Cause Accidents and / or Disasters			
J	Fire / Explosion.	• Equipment or infrastructure failure. • Act of terrorism. • Electrical problems.	No. The Proposed Development will be designed, built and operated in line with best international current practice, and will be compliant with all relevant Health and Safety and Fire regulation and guidance.
K	Collision of Aircraft.	• Failure of air traffic control systems. • Act of terrorism.	No. The Proposed Development does not include buildings in excess of 7 storeys. Dublin Airport is located approximately 13km of the site to the east. The application site is situated outside the flight path/outer public safety zone for the southern runway at Dublin Airport.
M	Vehicle collisions on site.	• Public negligence. • Failure of vehicular operations.	No. The internal road network and car parking areas have been subject to a Road Safety Audit and have been designed in accordance with the Design Manual for Urban Roads and Streets (2013). Private car use is also minimised by a reduced car parking provision and ready access to high quality public transport. Further, individual accidents / incidents are not considered to constitute a 'major accident / disaster' for the purposes of this assessment.
N	Incident at nearby Dunboyne Train Station.	• Act of terrorism. • Explosion / Fire.	Yes.
O	Collision of Train	• Derailment causing impact with buildings	No The rail corridor is adequately protected in line with Irish Rail safety requirements. The trains will be travelling slower than usual as they will be entering or existing the Dunboyne Rail Station.

Table 20.5: Risk Register – Operational Phase.

The potential Operational Phase risks identified for further assessment is **N** 'Incident at nearby Dunboyne Train Station'.

21 RISK ASSESSMENT

Risk ID	Potential Risk	Possible cause	Environmental Effect	Likelihood Rating	Consequence Rating	Risk Score (Consequence x Likelihood)
N	Incident on Train at Dunboyne Train Station	• Fire / explosion. • Act of terrorism .	• Illness, injury or death • Air quality effects	1	5	5
Basis of Likelihood: Whilst the *National Risk Assessment 2021/2022* has identified the risk to Ireland from both domestic and international terrorism, such an incident is considered 'very unlikely' in that there are no similar 'recorded incidents or anecdotal evidence' of an attack of this magnitude in Ireland. The location of the station is not within the city centre and therefore makes location less of a potential target. **Basis of Consequence:** Such an attack in Ireland could have significant impact in terms of public safety and security in the short term. Likewise, a breakdown in international peace and security arising from inter-state wars or other armed conflicts could have significant repercussions for Ireland and the EU, including potential impacts on energy supplies, transport routes or the environment**.** Thus, a 'very serious' consequence is identified in that such an even would result in numerous injuries and possibly fatalities, and there would be 'localised effects for an extended duration.' In this regard, it is noted that the Proposed Development is not located immediately adjacent to the Rail Station, but is rather further than 0.5km away and as such is unlikely to be directly adversely affected by such a catastrophic event.						

Table 20.1: Risk Assessment – Operational Phase.

This risk assessment in Table 20.6 categorises each of the potential risks by their 'risk score'. A corresponding risk matrix is provided in Table 20.7 which is colour coded in order to provide an indication of the critical nature of each risk. As outlined in Section 20.5.1.1, the red zone represents 'high risk scenarios', the amber zone represents 'medium risk scenarios' and the green zone represents 'low risk scenarios'.

Likelihood	5 – V. Likely					
	4 – Likely					
	3 – Unlikely					
	2 – V. Unlikely					
	1 – Ext. Unlikely					
		1 – Minor	2 – Limited	3 – Serious	4 – V. Serious	5 – Catastrophic
		Consequence of Impact				

Table 20.2: Levels of Significance.

21.1.1.1 Do-Nothing Impact

In the event that the Proposed Development does not proceed, the site would remain in its current undeveloped, greenfield state. In absence of an increased number of people residing, working or visiting the site, there would be no increase in the risk of major accidents occurring due to human interaction, should a disaster take place.

21.1.1.2 Construction Phase

None of the potential risks to be noted during the Construction Phase were identified as requiring further assessment.

21.1.1.3 Operational Phase

From examining the plausible risks presented in Table 20.6, the scenario with the highest risk score in terms of a major accident and / or disaster was identified as being 'Incident on Train at Dunboyne Train Station'.

This risk was given a score of 5, indicating a scenario that is **'extremely unlikely'** to occur, but which would have **'catastrophic'** consequences should it do so. According to the risk matrix in Table 17.7, this indicates a **'low risk scenario'**.

The Global Terrorism Index (GTI) is a comprehensive study analysing the impact of terrorism for 163no. countries and which covers 99.7 per cent of the world's population. In 2018, Ireland ranked as the 65th country most impacted by terrorism of the 163no. countries. Whilst the National Risk Assessment 2019 has identified the risk to Ireland from both domestic and international terrorism, there are no similar 'recorded incidents or anecdotal evidence' of attacks of this magnitude in Ireland.

21.1.2 Cumulative

As outlined in sections 17.5.1.6 and 17.5.1.7 above, no likely risks of a major accident / disaster occurring are identified during the Construction Phase. A medium risk of major accident / disaster in respect of the Proposed Development during the Operational Phase. No cumulative effects are identified.

21.1.3 Proposed Development

21.1.3.1 Construction Phase

The potential risk during the Construction Phase of the Proposed Development is the same as described under 20.5.1.6.

21.1.3.2 Operational Phase

The potential risk during the Operational Phase of the Proposed Development is the same as described under 20.5.1.6.

21.1.3.3 Do-Nothing Impact

The 'do-noting' impact of the Proposed Development will be the same as described under 20.5.1.5.

21.2 Mitigation Measures (Ameliorative, Remedial or Reductive Measures)

21.2.1 Rating of Major Accidents and Disasters Without Mitigation

21.2.1.1 Construction Phase

The mitigation measures relevant to each environmental factor outlined in chapters 5 – 19 of the EIAR, as well as the CEMP, will be implemented during the Construction Phase of the development and will collectively mitigate the risk of major accidents and disasters during this time.

The Construction Phase of the Proposed Development will be carried out in accordance with best practice site management measures relating to health and safety and emergency response. These measures are described in the CEMP.

21.2.1.2 Operational Phase

No mitigation or monitoring measures are proposed specific to reducing the risk of major accident / disaster during operation.

21.3 Residual Impact of the Proposed Development

The risk of a major accident and / or disaster during the Construction Phase of the Proposed Development is considered low.

The risk of a major accident and / or disaster during the Operational Phase of the Proposed Development is considered medium.

21.4 Monitoring

No monitoring associated with risks of major accidents and / or disaster is proposed during Construction or Operational Phases.

21.5 Reinstatement

No reinstatement measures are necessary during the Construction or Operational Phases of this development.

21.6 Difficulties Encountered

No difficulties were encountered during the assessment process.

20 RISK MANAGEMENT (MAJOR ACCIDENTS & DISASTERS)

20.1 Introduction

This chapter describes the Proposed Development in respect of its potential vulnerability to major accidents / disasters, and its potential to give rise to the same.

The assessment is carried out in compliance with the EIA Directive on the assessment of the effects of certain public and private projects on the environment that entered into force on 16 May 2017 which states the need to assess: -

> *"the expected effects deriving from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned"*

The underlying objective of this assessment is to ensure that appropriate precautionary actions are taken for those projects which *"because of their vulnerability to major accidents and/or natural disasters, are likely to have significant adverse effects on the environment."*

This chapter has been prepared by Stephen Little, EIAR Manager, with assistance from Naoise O'Connor, EIAR Co-ordinators of Stephen Little & Associates. Stephen has over 30 years' professional experience of town planning in Ireland, is a Corporate Member of both the Irish Planning Institute and the Royal Town Planning Institute and holds a Diploma in EIA Management (UCD). Naoise has 2 years' professional experience in the planning field, has a MRUP – Masters in Regional and Urban Planning and is a Graduate Member of the Irish Planning Institute.

20.2 Assessment Methodology

The scope and methodology of this assessment is centred on the understanding that the Proposed Development will be designed, built and operated in line with best international current practice. As such, major accidents resulting from the Proposed Development would be very unlikely.

The scope and methodology presented in the following sections are based on the provisions of the EIA Directive, the EPA Guidelines, EU Commission guidance, as well as professional judgement.

A risk analysis-based methodology that covers the identification, likelihood and consequence of major accidents and / or disasters has been used for this assessment (Refer to Section 20.5 for further detail on this approach).

The assessment of the risk of major accidents and/or disasters considers all factors defined in the EIA Directive that have been considered in this EIAR, i.e. population and human health, biodiversity, land, soil, water, air, climate, material assets, cultural heritage and the landscape.

20.2.1 Guidance and Legislation

20.2.1.1 Legislative Requirements

The following paragraphs set out the requirements of the EIA Directive in relation to major accidents and / or disasters. Recital 15 of the EIA Directive states that: -

> *"In order to ensure a high level of protection of the environment, precautionary actions need to be taken for certain projects which, because of their vulnerability to major accidents, and/or natural disasters (such as flooding, sea level rise, or earthquakes) are likely to have significant adverse effects on the environment. For such projects, it is important to consider their vulnerability (exposure and resilience) to major accidents and/or disasters, the risk of those accidents and/or disasters occurring and the implications for the likelihood of significant adverse effects on the environment. In order to avoid duplications, it should be possible to use any relevant information available and obtained through risk assessments carried out pursuant to Union legislation, such as Directive 2012/18/EU of the European Parliament and the Council and Council Directive 2009/71/Euratom, or through relevant assessments carried out pursuant to national legislation provided that the requirements of this Directive are met."*

It is clear from the EIA Directive that a major accident and / or disaster assessment is most readily applied to 'Control of Major Accident Hazards involving Dangerous Substances' (COMAH) sites or

major industrial / energy installations. Notwithstanding, the assessment of major accidents and disasters for the Proposed Development has been carried out for completeness given the nature and extent of the Proposed Development.

Article 3 of the EIA Directive requires that the EIAR shall identify, describe and assess in the appropriate manner, the direct and indirect significant effects on population and human health, biodiversity, land, soil, water, air and climate, material assets, cultural heritage and landscape deriving from (amongst other things) the *"vulnerability of the project to risks of major accidents and / or disasters that are relevant to the project concerned".*

The information relevant to major accidents and/or disasters to be included in the EIAR is set out in Section 8 of Annex IV of the EIA Directive as follows: -

> *"(8) A description of the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to Union legislation such as Directive 2012/18/EU of the European Parliament and of the Council or Council Directive 2009/71/Euratom or relevant assessments carried out pursuant to national legislation may be used for this purpose provided that the requirements of this Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies."*

20.2.1.2 Guidance Documents

A number of guidance documents and published plans have been reviewed and considered in order to inform this assessment, as described in the following sections.

- European Commission – Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report (2017).
- Environmental Protection Agency Guidelines (2022).
- Guidance on Assessing and Costing Environmental Liabilities (2014).
- A Framework for Major Emergency Management Guidance Document 1-A Guide to Risk Assessment in Major Emergency Management (2010).
- National Risk Assessment 2021/2022; Overview of Strategic Risks.
- A Guide to Risk Assessment in Major Emergency Management (2010).

20.3 Receiving Environment

The subject site of this intended planning application, as outlined in red in Figure 1 below, lies approximately 1Km east of the centre of Dunboyne. The subject site measures approximately 16.69Ha and can be generally described as greenfield and agricultural in nature. The majority of the lands encapsulated within the red line are zoned 'A2' for residential development, a portion of the distributor road is located on lands zoned F1 – Open Space.

The lands are located in the townlands of Castle Farm, Ruskin and Clonee, in Dunboyne, Co. Meath.

The site is located east of Dunboyne and bounded generally to the east and south by agriculturally zoned lands, to the west by the Iarnród Éireann rail line, and to the north by residential development permitted under Meath County Council (MCC) Reg. Ref. RA180561. The development permitted under Reg. Ref. RA180561 is accessed from Station Road/Clonee Road (L2228) by a length of distributor road which shall provide future access to the proposed scheme.

20.4 Characteristics of the Proposed Development

20.4.1 The Proposed Development

Permission is sought for a period of 10 Years for a proposed development on a site of approximately 16.92Ha consisting of 716no. residential units in a mix of houses, duplex and apartment buildings ranging in height from 2 to 7 storeys overall; comprising of 155no. 2 storey houses; 517no. apartments accommodated in 8no. buildings ranging in height from 4 to 7 storeys; 44no. duplex units accommodated in 2no. 3 storey terraces; 1no. childcare facility (c.602sqm) located at ground floor level of Block B1; public open space; communal and private open space; public lighting; car parking, including basement car parking under some of the apartments; secure bicycle parking; and all associated and ancillary site development and infrastructural works, hard and soft landscaping and boundary treatment works, provision of c. 470m of new distributor road; provide a 200mm diameter watermain in existing section of southern distributor road adjacent to recently constructed Castle Farm development; upgrade of junction of southern distributor road and L2228 (Station Road) to provide a signalised junction with pedestrian crossings, including ancillary adjustments to road markings on both roads; provision of foul drainage pumping station; provision of a compensatory storage area adjacent to Castle Stream; ESB Sub-Stations; and improvement works to 2 no. roundabouts on the R147 (Old Navan Road).

20.4.2 Exempted Development

In order to accommodate this development and other developments in and around the Dunboyne area, Irish Water will be required to upgrade c. 1,100m of existing 200mm uPVC watermain so as to provide a 400mm ID watermain in its place.

This is to be undertaken by Irish Water under their exempted development provisions and these works do not form part of this planning application as a result. The approximate location of this watermain to be upgraded is identified by Irish Water in their Confirmation of Feasibility dated 08 June 2023.

20.4.3 Future Development

As part of this development we are providing c. 450m of the future Distributor Road that runs through the application site. This proposed road extension southwards and then eastwards over the railway line shall, in future, form part of the overall Dunboyne Distributor Road; an objective of the Meath County Development Plan 2021-2027. The design for this future extension/bridge has been included in this submission as evidence that it provides a viable workable solution, however permission for same is not being sought for this at this time.

The design of this road and bridge has been the subject of discussion with the Planning Authority, including Roads Department and also Irish Rail to ensure that their respective requirements are factored in to the design. In the case of Irish Rail, the road design, including the bridge that will ultimately span the rail line to Dunboyne has taken in to account the planned electrification of this rail line as now proposed under the DART+West project, including the columns required to hold the overhead power lines along the rail line.

Adequate working space during the construction phase of this future length of road and bridge have also been provided. We refer the Planning Authority to Drg. No. P100 prepared by Waterman Moylan, Consulting Engineers which highlights the extent of the distributor road being proposed as part of this proposed planning application and those lands identified for the future road across the lands in the Applicant's control. Drg. No. P101 prepared by Waterman Moylan, Consulting Engineers shows the length of distributor road being proposed in this case connects with the already permitted/existing distributor road to the north and the future road and bridge to the south and west. It is envisaged that the lands required for this future road in the control of the Applicant will be made available to Meath County Council. The lands to be made available to the Council are those marked 'Future Road' on Drg. No. P100 prepared by Waterman Moylan, Consulting Engineers.

The potential for the proposed development to impact on a future environment that includes the continuation of the future distributor road has been carefully considered, by the Applicant and the Planning Authority. The distributor road has been designed and incorporated to the proposed development to ensure that it is not prejudicial to, the future distributor road project including the bridge that is to be constructed by Meath County Council. It follows that the proposed development is not likely to have any significant impact on the future distributor road project to report within this EIAR.

This chapter will assess the proposed development only (as described in section 20.4.1 above).

20.5 Potential Impact of the Proposed Development

20.5.1 Proposed Development

As discussed above, the scope and methodology of this assessment is centred on the understanding that the Proposed Development would be designed, built and operated in line with best international current practice and, as such, the vulnerability of the Proposed Development to risks of major accidents and / or disasters is considered low.

Current EIA practice already includes an assessment of some potential accidents and disaster scenarios such as pollution incidents to ground and watercourses as well as assessment of flooding events. These are described in detail in the relevant EIAR assessment Chapters (refer to Chapter 8: Water and Chapter 7: Land, Soil and Geology for further detail).

20.5.1.1 Site Specific Risk Assessment

A site-specific risk assessment identifies and quantifies risks focusing on: unplanned, but possible and plausible events occurring during the construction and operation of the Proposed Development. The approach to identifying and quantifying risks associated with the Proposed Development by means of a site-specific risk assessment is derived from the EPA guidance.

The criteria for categorising impact is derived from the DoEHLG guidance (Refer to below tables). The following steps were undertaken as part of the site-specific risk assessment: -

- Risk identification.
- Risk classification, likelihood and consequence.
- Risk evaluation.

Risk Identification

The identification of plausible risks has been carried out in consultation with relevant specialists. A Risk Register which was prepared during the design of the Proposed Development was also reviewed in order to inform the identification of risks for this assessment. The identification of risks has focused on non-standard but plausible incidents that could occur at the Proposed Development during the Construction and Operation.

In accordance with the European Commission Guidance risks are identified in respect of the developments: -

1) Potential vulnerability to disaster risks.

2) Potential to cause accidents and / or disasters.

Risk Classification

Having identified the potential risks, the likelihood of occurrence of each risk has been assessed. An analysis of safety procedures and proposed environmental controls was considered when estimating

likelihood of identified potential risks occurring. Table 20.1 defines the likelihood ratings that have been applied.

The approach adopted has assumed a 'risk likelihood' where one or more aspects of the likelihood description are met, i.e. any risk to the Proposed Development less than extremely unlikely to occur has been excluded from the assessment. The likelihood rating assigned to each risk has assumed that all proposed mitigation measures and/or safety procedures are in place and have succeeded in reducing or preventing the major accident and/or disaster occurring.

Rating	Classification	Effect Description
1	Extremely Unlikely	May occur only in exceptional circumstances; once every 500 or more years.
2	Very Unlikely	Is not expected to occur; and/or no recorded incidents or anecdotal evidence; and/or very few incidents in associated organisations, facilities or communicates; and / or little opportunity, reason or means to occur. May occur once every 100-500 years.
3	Unlikely	May occur at some time; and /or few, infrequent, random recorded incidents or little anecdotal evidence; some incidents in associated or comparable organisations worldwide; some opportunity, reason or means to occur; May occur once per 10-100 years.
4	Likely	Likely to or may occur; regular recorded incidents and strong anecdotal evidence and will probably occur once per 1-10 years.
5	Very Likely	Very likely to occur; high level of recorded incidents and/or strong anecdotal evidence. Will probably occur more than once a year.

Table 20.1: Risk Classification Table – Likelihood.

Classification of Consequence

The consequence rating assigned to each risk has assumed that all proposed mitigation measures and / or safety procedures have failed to prevent the major accident and / or disaster occurring. The consequence of the impact if the event occurs has been assigned as described in Table 17.2.

The consequence of a risk to the Proposed Development has been determined where one or more aspects of the consequence description are met, i.e. risks that have no consequence have been excluded from the assessment.

Ranking	Consequence	Impact	Description
1	Minor	Life, Health, Welfare Environment Infrastructure Social	Small number of people affected; no fatalities and small number of minor injuries with first aid treatment. No contamination, localised effects <€0.5M. Minor localised disruption to community services or infrastructure (<6 hours).
2	Limited	Life, Health, Welfare Environment Infrastructure Social	Single fatality; limited number of people affected; a few serious injuries with hospitalisation and medical treatment required. Localised displacement of a small number of people for 6-24 hours. Personal support satisfied through local arrangements.

Ranking	Consequence	Impact	Description
			Simple contamination, localised effects of short duration €0.5-3M Normal community functioning with some inconvenience.
3	Serious	Life, Health, Welfare Environment Infrastructure Social	Significant number of people in affected area impacted with multiple fatalities (<5), multiple serious or extensive injuries (20), significant hospitalisation. Large number of people displaced for 6-24 hours or possibly beyond; up to 500 evacuated. External resources required for personal support. Simple contamination, widespread effects or extended duration. €3-10M. Community only partially functioning, some services available.
4	Very Serious	Life, Health, Welfare Environment Infrastructure Social	5 to 50 fatalities, up to 100 serious injuries, up to 2000 evacuated. Heavy contamination, localised effects or extended duration €10-25M. Community functioning poorly, minimal services available.
5	Catastrophic	Life, Health, Welfare Environment Infrastructure Social	Large numbers of people impacted with significant numbers of fatalities (>50), injuries in the hundreds, more than 2000 evacuated. Very heavy contamination, widespread effects of extended duration >€25M. Serious damage to infrastructure causing significant disruption to, or loss of, key services for prolonged period. Community unable to function without significant support.

Table 20.2: Risk Classification Table – Likelihood.

Risk Evaluation

In accordance with the DoEHLG 2010 Guidelines, the evaluated major accidents and natural disasters (MANDs) will be subject to a risk matrix to determine the level of significance of each risk for each scenario. These have been grouped according to 3 categories: -

- **High Risk**

  Scenarios that have an evaluation score of 12 – 25, as indicated by the Red Zones in Table 17.3.

- **Medium Risk**

  Scenarios that have an evaluation score of 8 – 11 as indicated by the Amber Zone in Table 17.3.

- **Low Risk**

  Scenarios that have an evaluation score 1 – 7, of as indicated by the Green Zones in Table 17.3.

Likelihood						
	5 – V. Likely					
	4 – Likely					
	3 – Unlikely					
	2 – V. Unlikely					

	Ext. Unlikely					
		1 Minor	2 – Limited	3 Serious	4 – V. Serious	5 – Catastrophic
	Consequence of Impact					

Table 20.3: Levels of Significance.

Significant effects resulting from MANDs are adverse effects that are described as 'Significant', 'Very Significant' or 'Profound' under the EPA Guidelines (2022) and Volume 2, Section 2: The EIA Process of this report. Consequently, MANDs that fall within Amber or Red Zones ('Medium' or 'High' Risk Scenarios) are brought forward for further consideration and assessment for further mitigation.

20.5.1.2 Construction Phase

Risk ID	Potential Risk	Possible Cause	Requirement for Further Assessment?
Potential Vulnerability to Accidents and / or Disasters			
A	Flooding of site.	River Tolka and Castle Stream.	No. The site is not at risk of flooding. The modelling confirms that the footprint of the northern entrance road (the distributor road) is partially located in Flood Zone B. There are drainage channels within the site which remain in-bank throughout. The channels contain both Flood Zone A/B and are diverted and culverted only to facilitate the development and road access. Compensatory storage has been designed for the site which compensates for the loss of Flood Zone B as a result of the proposed northern road entrance and ensures existing water levels and extents are managed appropriately in the area. Refer to the findings of the Flood Risk Assessment, prepared by JBA Consulting Engineers for further detail relating to the Proposed Development.
Potential to Cause Major Accidents and / or Disasters			
B	Fire / Explosion.	• Damage to unmapped services / utilities during earth works. • Vehicle and vehicle collision.	No. The Construction Phase of the Proposed Development will be carried out in accordance with all relevant health and safety guidance and legislation, as well as the provisions of the Construction Environmental Management Plan (CEMP), prepared by Waterman Moylan Consulting Engineers.
C	Unplanned outages / disruption to services.	Damage to unmapped services / utilities during earth works.	No. Disruption to services not considered to constitute a 'major accident or disaster' for the purposes of this assessment.
D	Road traffic accidents resulting from construction phase	• Driver error. • Object on road.	No. The Construction Phase of the Proposed Development will be carried out in

	traffic or temporary construction traffic management measures.	• Failure of vehicle control systems. • Public confusion.	accordance with all relevant health and safety guidance and legislation, as well as the provisions of the Construction Environmental Management Plan, prepared by Waterman Moylan Consulting Engineers. Any works to the junction of Station Road (L2228) or the roundabouts on the R147 (Old Navan Road) will be carefully managed and subject to traffic management measures that will be agreed with Meath County Council and An Garda Siochana in advance. It is envisaged that the works to be undertaken by Uisce Eireann/Irish Water in upgrading c. 1.1km of watermain along the public road will also be carefully managed and subject to traffic management measures that will be agreed with Meath County Council and An Garda Siochana in advance.
E	Contamination of the groundwater / surface water.	Construction phase spills or leakages.	No. The Construction Phase of the Proposed Development will be carried out in accordance with construction best-practise and provisions of the Construction Environmental Management Plan, prepared by Waterman Moylan Consulting Engineers.
F	Falling debris from construction vehicles / cranes or cranes striking rail overhead cables or poles.	• Inadequate securing. • Overloading of vehicles.	No. The Construction Phase of the Proposed Development will be carried out in accordance with construction best-practise and provisions of the Construction Environmental Management Plan, prepared by Waterman Moylan Consulting Engineers. In that regard, no oversailing of the adjoining rail line by cranes involved in the construction of the proposed apartment buildings is proposed.
G	Release of asbestos fibres to atmosphere or surface water.	• Inadequate handling and removal of Asbestos Containing Materials (ACMs). • Removal of un-surveyed ACM.	No. No demolition of structures containing asbestos is proposed as part of this development. The Construction Phase of the Proposed Development will be carried out in accordance with construction best-practise and provisions of the Construction Environmental Management Plan, prepared by Waterman Moylan Consulting Engineers.

Table 20.4: Risk Register – Construction Phase.

None of the potential Construction Phase risks considered have been identified as requiring further assessment.

20.5.1.3 Operational Phase

Risk ID	Potential Risk	Possible Cause	Requirement for Further Assessment?
Potential Vulnerability to Disaster Risks			
H	Flooding of site.	River Tolka and Castle Stream.	No. The site is not at risk of flooding. The Proposed Development will have no impact on floodplain storage and conveyance. Risk to the site is managed by setting floor levels to the 1% AEP climate change water level, plus a freeboard allowance of at least 500mm, this the case for both MFRS and HEFS scenarios. Further, the finished floor level provides a minimum of 150mm above surrounding ground levels to provide protection against pluvial flooding. All residential buildings have also been located in Flood Zone C, further minimising the risk of inundation. The post-development modelling also confirms there is no increase in flood risk to the site or surrounding lands as a result of the proposed development. Refer to findings of the Flood Risk Assessment, prepared by JBA Consulting Engineers for the proposed development.
I	Incident at nearby SEVESO site resulting in off-site environmental impact.	• Fire / Explosion. • Equipment / Infrastructure failure.	No. A "consultation distance" is very broadly defined under Regulation 2 of the COMAH Regulations as *"a distance or area relating to an establishment, within which there are potentially significant consequences for human health or the environment from a major accident at the establishment. The consultation distance for some types of COMAH facility ranges from 300m for establishments where the risk is from flammable non-pressurised materials, to 1 km for establishments where chemical processing involving flammable or toxic substances takes place, to 2km for establishments with bulk storage of pressurised or toxic substances, triggering an obligation on the Planning Authority to notify the HSA."* The consultation distance is included in *italics* after each listed SEVESO site. **Nearest Upper Tier Sites: -** • Guerbet Ireland ULC Damastown Industrial Mullhuddart Estate (*1,000m from perimeter*) – c. 2.36 km from proposed development. • Chemco (Ireland) Limited (t/a Chemsour ce Logistics) Macetown North Damastown Industrial Estate, Mulhuddart (*1,000m from perimeter*) – c. 3.5 km from proposed development. **Nearest Lower Tier Sites:-**

Risk ID	Potential Risk	Possible Cause	Requirement for Further Assessment?
			• Clarochem Ireland Ltd Damastown, Mullhuddart (*1,000m from perimeter*) – c. 2.5km from proposed development. • Aestellas Ireland Co. Ltd Damastown Industrial Mullhuddart Park (*1,000m from perimeter*) – c. 3.8km from proposed development. As can been seen from the list above, the closest COMAH sites are c. 2.5km and c. 2.36km from the Residential Site and the consultation distance in both cases is 1km. The works to the roundabouts on the R147 are also outside of this consultation zone.
Potential to Cause Accidents and / or Disasters			
J	Fire / Explosion.	• Equipment or infrastructure failure. • Act of terrorism. • Electrical problems.	No. The Proposed Development will be designed, built and operated in line with best international current practice, and will be compliant with all relevant Health and Safety and Fire regulation and guidance.
K	Collision of Aircraft.	• Failure of air traffic control systems. • Act of terrorism.	No. The Proposed Development does not include buildings in excess of 7 storeys. Dublin Airport is located approximately 13km of the site to the east. The application site is situated outside the flight path/outer public safety zone for the southern runway at Dublin Airport.
M	Vehicle collisions on site.	• Public negligence. • Failure of vehicular operations.	No. The internal road network and car parking areas have been subject to a Road Safety Audit and have been designed in accordance with the Design Manual for Urban Roads and Streets (2013). Private car use is also minimised by a reduced car parking provision and ready access to high quality public transport. Further, individual accidents / incidents are not considered to constitute a 'major accident / disaster' for the purposes of this assessment.
N	Incident at nearby Dunboyne Train Station.	• Act of terrorism. • Explosion / Fire.	Yes.
O	Collision of Train	• Derailment causing impact with buildings	No The rail corridor is adequately protected in line with Irish Rail safety requirements. The trains will be travelling slower than usual as they will be entering or existing the Dunboyne Rail Station.

Table 20.5: Risk Register – Operational Phase.

The potential Operational Phase risks identified for further assessment is **N** 'Incident at nearby Dunboyne Train Station'.

21 RISK ASSESSMENT

Risk ID	Potential Risk	Possible cause	Environmental Effect	Likelihood Rating	Consequence Rating	Risk Score (Consequence x Likelihood)
N	Incident on Train at Dunboyne Train Station	• Fire / explosion. • Act of terrorism .	• Illness, injury or death • Air quality effects	1	5	5
Basis of Likelihood: Whilst the *National Risk Assessment 2021/2022* has identified the risk to Ireland from both domestic and international terrorism, such an incident is considered 'very unlikely' in that there are no similar 'recorded incidents or anecdotal evidence' of an attack of this magnitude in Ireland. The location of the station is not within the city centre and therefore makes location less of a potential target. **Basis of Consequence:** Such an attack in Ireland could have significant impact in terms of public safety and security in the short term. Likewise, a breakdown in international peace and security arising from inter-state wars or other armed conflicts could have significant repercussions for Ireland and the EU, including potential impacts on energy supplies, transport routes or the environment**.** Thus, a 'very serious' consequence is identified in that such an even would result in numerous injuries and possibly fatalities, and there would be 'localised effects for an extended duration.' In this regard, it is noted that the Proposed Development is not located immediately adjacent to the Rail Station, but is rather further than 0.5km away and as such is unlikely to be directly adversely affected by such a catastrophic event.						

Table 20.1: Risk Assessment – Operational Phase.

This risk assessment in Table 20.6 categorises each of the potential risks by their 'risk score'. A corresponding risk matrix is provided in Table 20.7 which is colour coded in order to provide an indication of the critical nature of each risk. As outlined in Section 20.5.1.1, the red zone represents 'high risk scenarios', the amber zone represents 'medium risk scenarios' and the green zone represents 'low risk scenarios'.

Likelihood	5 – V. Likely					
	4 – Likely					
	3 – Unlikely					
	2 – V. Unlikely					
	1 – Ext. Unlikely					
		1 – Minor	2 – Limited	3 – Serious	4 – V. Serious	5 – Catastrophic
		Consequence of Impact				

Table 20.2: Levels of Significance.

21.1.1.1 Do-Nothing Impact

In the event that the Proposed Development does not proceed, the site would remain in its current undeveloped, greenfield state. In absence of an increased number of people residing, working or visiting the site, there would be no increase in the risk of major accidents occurring due to human interaction, should a disaster take place.

21.1.1.2 Construction Phase

None of the potential risks to be noted during the Construction Phase were identified as requiring further assessment.

21.1.1.3 Operational Phase

From examining the plausible risks presented in Table 20.6, the scenario with the highest risk score in terms of a major accident and / or disaster was identified as being 'Incident on Train at Dunboyne Train Station'.

This risk was given a score of 5, indicating a scenario that is **'extremely unlikely'** to occur, but which would have **'catastrophic'** consequences should it do so. According to the risk matrix in Table 17.7, this indicates a **'low risk scenario'**.

The Global Terrorism Index (GTI) is a comprehensive study analysing the impact of terrorism for 163no. countries and which covers 99.7 per cent of the world's population. In 2018, Ireland ranked as the 65th country most impacted by terrorism of the 163no. countries. Whilst the National Risk Assessment 2019 has identified the risk to Ireland from both domestic and international terrorism, there are no similar 'recorded incidents or anecdotal evidence' of attacks of this magnitude in Ireland.

21.1.2 Cumulative

As outlined in sections 17.5.1.6 and 17.5.1.7 above, no likely risks of a major accident / disaster occurring are identified during the Construction Phase. A medium risk of major accident / disaster in respect of the Proposed Development during the Operational Phase. No cumulative effects are identified.

21.1.3 Proposed Development

21.1.3.1 Construction Phase

The potential risk during the Construction Phase of the Proposed Development is the same as described under 20.5.1.6.

21.1.3.2 Operational Phase

The potential risk during the Operational Phase of the Proposed Development is the same as described under 20.5.1.6.

21.1.3.3 Do-Nothing Impact

The 'do-noting' impact of the Proposed Development will be the same as described under 20.5.1.5.

21.2 Mitigation Measures (Ameliorative, Remedial or Reductive Measures)

21.2.1 Rating of Major Accidents and Disasters Without Mitigation

21.2.1.1 Construction Phase

The mitigation measures relevant to each environmental factor outlined in chapters 5 – 19 of the EIAR, as well as the CEMP, will be implemented during the Construction Phase of the development and will collectively mitigate the risk of major accidents and disasters during this time.

The Construction Phase of the Proposed Development will be carried out in accordance with best practice site management measures relating to health and safety and emergency response. These measures are described in the CEMP.

21.2.1.2 Operational Phase

No mitigation or monitoring measures are proposed specific to reducing the risk of major accident / disaster during operation.

21.3 Residual Impact of the Proposed Development

The risk of a major accident and / or disaster during the Construction Phase of the Proposed Development is considered low.

The risk of a major accident and / or disaster during the Operational Phase of the Proposed Development is considered medium.

21.4 Monitoring

No monitoring associated with risks of major accidents and / or disaster is proposed during Construction or Operational Phases.

21.5 Reinstatement

No reinstatement measures are necessary during the Construction or Operational Phases of this development.

21.6 Difficulties Encountered

No difficulties were encountered during the assessment process.

21 SUMMARY OF MITIGATION MEASURES

21.1 Introduction

This Chapter of the EIAR collates and summarise the mitigation measures recommended for each of the environmental topics examined in Chapters 5 – 19 of this EIAR.

These mitigation measures and any associated monitoring comprise what would be implemented during the Construction and Operational Phase to reduce the potential for significant adverse impact of the proposed development on the environment.

This chapter does not expand on the reasoning or expected effectiveness of the proposed mitigation or monitoring measures. For such descriptions, we refer to each of the individual chapters of the EIAR.

A number of the recommended mitigation measures would be expected to be required as a condition of any grant of permission by Meath County Council.

21.2 Proposed Mitigation Measures

21.2.1 Population and Human Health (Chapter 5)

Construction Stage

The mitigation measures to address the potential impacts on population and human health from the proposed development have been assessed within the corresponding specialist chapters; Chapter 7 (Soils, Geology and Hydrogeology); Chapter 8 (Hydrology); Chapter 11 Air Quality and Climate, Chapter 14 (Noise and Vibration); Chapter 15 (Landscape and Visual); 16 Material Assets (Transportation).

Businesses and Residences

There are no potential likely significant impacts on Businesses and Residences therefore additional measures are not required. Any impact will be further mitigated by the use of binding hours of construction as well as the measures set out in Chapter 7 (Soils, Geology and Hydrogeology); Chapter 8 (Hydrology); Chapter 11 Air Quality, Chapter 14 (Noise and Vibration); Chapter 15 (Landscape and Visual); 16 Material Assets (Transportation).

Landscape Amenity and Tourism

With reference to Chapter 15 (Landscape and Visual), the proposed development will entail significant groundworks to facilitate construction of the residential properties. The subsoils and topsoil are to be retained on site and reused to ensure no requirement for moving material off site.

The hedgerows will be managed to remove dead, dying and dangerous branches and any colonising scrub or brier. For retained trees, the recommendations given in BS5837:2012 Guide for trees in relation to construction will be adopted to ensure site and tree safety.

The area to the south of the site towards the proposed bridge and crossing of the railway line will be graded out and retained as a grassed field with stock-proof boundary fencing. Access will be provided via a gate to the south of the proposed development. Once the grass has grown, this area will - for the period of time until bridge construction – be returned to a character that is visually comparable with the adjacent fields in the south Dunboyne area.

Land and Water Emissions

All mitigation measures outlined within the Chapter 7, and 8 will be implemented alongside a *Construction Environmental Management Plan (CEMP)*, as well as any additional measures required pursuant to planning conditions which may be imposed. The construction phase mitigation

measures set out in the CEMP, these will be implemented by the construction Contractor to ensure that pollution and nuisances arising from site clearance and construction activities is prevented where possible and managed in accordance with best practice environmental protection.

Air Emissions

Mitigation measures proposed to minimise the potential effects on human health in terms of air quality during the construction phase are set out in Chapter 11, Section 11.6.1.1. These include measures for dust control at the site is to ensure that no significant nuisance occurs at nearby sensitive receptors. In order to ensure that no dust nuisance occurs a series of measures will be implemented, drawing on best practice guidance from Ireland, the UK and the USA.

Noise and Vibration Emissions

Mitigation measures proposed to minimise the potential effects on human health in terms of noise and vibration during the construction phase are set out in Chapter 14.

Provided that the mitigation measures detailed in Chapter 14 (Noise and Vibration) are put in place, such as limiting the number of high-noise activities at the closest boundary at the nearest NSLs, and best practice noise and vibration control measures will be employed by the contractor during the construction phase such as: Selection of quiet plant, noise control at source, screening, and liaison with the Public. The likelihood of a significant impact will be reduced sufficiently.

Traffic and Transportation

With reference to 16 Material Assets (Transportation) Section 16.6.2.1, a detailed Construction Environmental Management Plan (CEMP) will be prepared by the contractor. The plan will include measures to minimise the impacts associated with the construction phase upon the peak periods on the surrounding road network.

HGV trips are anticipated to arrive and depart the site at a uniform rate throughout the day, to avoid pressure on the morning and evening peak hour periods.

Care will be taken to ensure existing pedestrian and cycling routes are suitably maintained or appropriately diverted as necessary and contractors' vehicles will be facilitated to park within the development site area, in order to mitigate the impact of traffic movements on the surrounding road network. It is likely that construction will have a not significant effect on pedestrian and cycle infrastructure – causing noticeable changes in the character of the environment but without significant consequences.

Major Accident Hazards and/or Natural Disasters

The potential effect is imperceptible, and unlikely, in respect of Major Accident Hazards or Natural Disasters on Population and Human Health during the Construction Phase of the Proposed Development. Therefore, no specific mitigation measures are required.

Operational Stage

The mitigation measures to address the potential impacts on population and human health from the proposed development have been assessed within the corresponding specialist chapters; Chapter 7 (Soils, Geology and Hydrogeology); Chapter 8 (Hydrology); Chapter 11 Air Quality, Chapter 14 (Noise and Vibration); Chapter 15 (Landscape and Visual); 16 Material Assets (Transportation).

Businesses and Residences

There are no potential likely significant negative impacts on Businesses and Residences therefore additional measures are not required.

Amenity and Tourism

With reference to Chapter 15 (Landscape and Visual), the main mitigation measures will be: street trees in broad grass verges planted to create a strong green link through the development for motorists, cyclists and pedestrians, Public and Communal Open Space including extensive planting with a mix native and ornamental tree species, 10m wide buffer / riparian corridors free from new development alongside the watercourses and streams for biodiversity and habitats creation and enhancement, planting of semi-mature trees, green links, provision of playgrounds, Western boundary augmented with native planting, planting a mix of native tree species and shrub planting to create a natural and welcoming environment for residents, open spaces designed with consideration given to long-term management and Sustainable Urban Drainage Systems (SuDS) with the landscape designs working around required swales, compensation areas and retained watercourses or culverts.

Land and Water Emissions

The proposed development will provide an improvement to the local drainage catchment as it is proposed to introduce SUDs measures in compliance with the requirements of the Greater Dublin Strategic Drainage Study (GDSDS). A number of design measures (refer to Section 8.4.1.4 of Chapter 8) will be put in place to minimise the likelihood of any spills entering the water environment to include ditches, detention basins, attenuation tank and flow control devices. In the event of an accidental leakage of oil from the parking areas, this will be intercepted by the drainage infrastructure proposed and any releases to drainage will be mitigated through hydrocarbon interceptors.

Air Emissions

There is no mitigation required for the operational phase of the development as impacts to air quality are predicted to be neutral and imperceptible.

Noise and Vibration Emissions

Changes to traffic flows will not result in a perceptible increase in noise level in the surrounding environment. Therefore, no mitigation measures are necessary in this case.

The selection and location of plant items within the development buildings at the design stage will ensure that noise emissions from any mechanical and electrical building services plant do not exceed the relevant internal noise criteria for residential dwellings, therefore no further mitigation is required. Once operational noise emissions are controlled within the development site, there will be no perceptible noise impact at sensitive receivers off-site.

Traffic and Transportation

With reference to 16 Material Assets (Transportation) Section 16.6.2.2, In order to understand the traffic impact and to determine suitable mitigation measures, a `Traffic and Transport Assessment' (TTA) has been prepared by Waterman Moylan.

Regarding Junction 3, if in the future the junction doesn't be upgraded to a 4-armed signalised junction and remains as a 3-armed junction, it will require future signalisation to support the delivery of the proposed development in order to avoid delays. The results indicate that Junction 3,

as a 3-armed signalised junction, would operate within capacity for the future 2041 DO SOMETHING scenario and while avoiding delays.

Regarding Junction 4, the traffic impact estimated that for the 2026 DO SOMETHING scenario would operate within capacity during both peak hours, however for the 2031 DO SOMETHING, with the inclusion of the overall proposed development, the results indicate that Junction 4 would operate above capacity during both peak hours becoming oversaturated any time in the future.

As a mitigation measure, in order to increase Junction 4 capacity to support the proposed development, an improved layout is proposed. The changes consist of the upgrade of the existing mini roundabout to a standard-sized roundabout with two circulating lanes and an ICD of 28 metres, and upgrades to the northern, western and southern approaches to comprise additional entry lanes and increased entry widths. The proposed upgraded Junction 4 has also been designed in a way to facilitate this pedestrian/cycling infrastructure. The analysis results indicate that the proposed upgraded roundabout would operate within capacity for the 2031 DO SOMETHING scenario during both peak hours and would continue to do so for the 2041 DO SOMEHING with no high delays or queue lengths expected.

Regarding Junction 5, for the 2031 DO NOTHING scenario, even without the proposed development trips in place, the results indicate that Junction 5 would operate without capacity in the PM peak hour. The 'Transportation Study at Dunboyne & Environs' (TSDE) have proposed interventions to help increase capacity along the R147 and near the M3 interchange west of Clonee, such as realignment of the junction between R147 and the R149 (the subject Junction 5), and upgrades to the Clonee West Interchange, which include additional entry and exit slips to/from the M3 motorway. The assessment considers however that the if these interventions do not take place, in order to increase the operational capacity and support the development of the proposed residential scheme, upgrades to the north-western (R147) and north-eastern (R147), by increasing road widths, entry widths and flare lengths, may take place as part of this application.

As part of the proposed mitigation measures, a Travel Plan has been included in the subject application, describing on how to reduce car journeys, and encouraging population to walk, cycle and use public transport rather than driving. The proposed development provides connectivity to existing facilities and public transport options and the proposed extension of the Southern Distributor Road (SDR) will also facilitate pedestrian and cyclists' progression, by connecting the proposed cycle lanes and footpaths to the existing facilities.

Major Accident Hazards and/or Natural Disasters

The potential effect is imperceptible, and unlikely, in respect of Major Accident Hazards or Natural Disasters on Population and Human Health during the Operational Phase of the Proposed Development. Therefore, no specific mitigation measures are required.

21.2.2 Biodiversity (Chapter 6)

Construction Stage

- A project ecologist will be appointed to oversee all works.
- The watercourses onsite and drains will be protected from dust, silt and surface water throughout the works.
- Local silt traps established throughout site.
- Mitigation measures on site include dust control, stockpiling away from watercourse and drains
- Stockpiling of loose materials will be kept to a minimum of 40m from watercourses and drains.
- Stockpiles and runoff areas following clearance will have suitable barriers to prevent runoff of fines into the drainage system and watercourses.

- Fuel, oil and chemical storage will be sited within a bunded area. The bund will be at least 50m away from drains, ditches or the watercourse, excavations and other locations where it may cause pollution.
- Bunds will be kept clean and spills within the bund area will be cleaned immediately to prevent groundwater contamination. Any water-filled excavations, including the attenuation tank during construction, that require pumping will not directly discharge to the stream. Prior to discharge of water from excavations adequate filtration will be provided to ensure no deterioration of water quality.
- Petrochemical interception and bunds in refuelling area
- On-site inspections to be carried out by project ecologist prior to commencement of works on site. This will include mammal, amphibian and tree inspections for bats. Should the resting or breeding places of any mammals or amphibians be noted during the on site inspections NPWS will be informed and relevant licences will be acquired from NPWS prior to works commencing in these areas in compliance with legislation and NPWS guidelines.
- All instream and drainage ditch works will be carried out in consultation with Inland Fisheries Ireland under an approved methodology submitted to Inland Fisheries Ireland prior to commencement.
- Daily turbidity, oxygen and photographic monitoring of watercourses (upstream, within & downstream of works) will take place during works and the results supervised by the project ecologist. This would be particularly important following high rainfall events and works within the riparian zone. It is recommended that sufficient baseline readings are made prior to construction commencing to understand the existing turbidity on site. This will be carried out in consultation with the project ecologist and linked to areas of work on site. All records will be kept for inspection by Inland Fisheries Ireland if required.
- Prior to site clearance the ecologist and arborist will assess the site works and oversee habitat protection measures. These would include tree protection measures in the vicinity of the oak treeline and riparian corridor.
- Mitigation measures outlined in the bat survey report will be followed this include the control of light spillage on site into adjacent habitats to avoid light contamination of the surrounding treelines and woodlands. Lighting on site will be subject to approval of the ecologist and during construction will not involve the lighting of the treelines and bat foraging corridor.
- Relevant guidelines and legislation (Section 40 of the Wildlife Acts, 1976 to 2012) in relation to the removal of trees and timing of nesting birds will be followed e.g. do not remove trees or shrubs during the nesting season (1st March to 31st August). Should this not be possible, vegetation will be inspected by an ecologist for nesting birds prior to removal.
- Frog habitat will be protected from on site works in consultation with the project ecologist.

Operational Stage

- A project ecologist will be appointed to oversee completion of all landscape, lighting and drainage works.
- Petrochemical interception will be inspected by the project ecologist to ensure compliance with Water Pollution Acts.
- Post Construction assessment/compliance with proposed lighting strategy Mitigation During Operation
- Mitigation measures will be in place to comply with Water Pollution Acts.
- No external lighting will be in place on the apartments facing the treeline.

- Any internal lighting from stairwells within buildings proximate to the oak treeline will comply with bat lighting guidelines and will have shields in place where possible and in discussion with the ecologist, to prevent external spill to the treeline.
- Upon moving in, residents within the apartment blocks will be provided with an information pack in relation to the sensitivities of the treeline and bat foraging. This will outline measures in relation to ensure lighting spill is contained and recommendations for enhancing biodiversity including the use of scented plants for attracting insects.

21.2.3 Land, Soils, Geology & Hydrogeology (Chapter 7)

The design has taken account of the potential impacts of the development on the soils, geology and hydrogeology environment local to the area where construction is taking place and containment of contaminant sources during operation. Measures have been incorporated in the design to mitigate the potential effects on the surrounding soils, geology and hydrogeology. These are described below.

Due to the inter-relationship between soils, geology, hydrogeology and hydrology, the following mitigation measures discussed will be considered applicable to all. Waste Management is also considered an interaction in some sections.

Construction Phase

Construction Environmental Management Plan (CEMP)

In advance of work starting on site, the works Contractor will prepare a detailed Construction Environmental Management Plan (CEMP). The detailed CEMP will set out the overarching vision of how the construction of the Proposed Development will be managed in a safe and organised manner by the Contractor. The CEMP will be a live document and it will go through a number of iterations before works commence and during the works. It will set out requirements and standards which must be met during the construction stage and will include the relevant mitigation measures outlined in the EIA Report and any subsequent planning conditions relevant to the Proposed Development.

As a minimum, the CEMP should be formulated in accordance with best international practice including but not limited to:

- CIRIA, (2001), Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors, (C532) Construction Industry Research and Information Association;
- CIRIA (2002) Control of water pollution from construction sites: guidance for consultants and contractors (SPI56) Construction Industry Research and Information Association
- CIRIA (2005), Environmental Good Practice on Site (C650); Construction Industry Research and Information Association
- BPGCS005, Oil Storage Guidelines;
- Eastern Regional Fisheries Board, (2006), Fisheries Protection Guidelines: Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites;
- CIRIA 697, The SUDS Manual, 2007; and
- UK Pollution Prevention Guidelines (PPG) UK Environment Agency, 2004.

In order to reduce impacts on the soil, geological and hydrogeological environment, a number of mitigation measures will be adopted as part of the construction works on site as outlined below.

Control of Soil Excavation

Site preparation, excavations and levelling works required to facilitate construction of foundations, access roads and the installation of services will require imported material. Suitable soils will be reused on site as backfill in the grassed areas, where possible. Contractors shall be required to submit and adhere to a method statement indicating the extent of areas likely to be affected and demonstrating that this is the minimum disturbance necessary to achieve the required works.

According to onsite investigations, the bedrock vulnerability is 'High' to 'Extreme'. However, removal and reinstatement of subsoil cover will not alter the vulnerability category of the underlying bedrock. The deposition of infill soil would increase the overburden thickness and thus may even decrease the groundwater vulnerability.

Temporary storage of soil will be carefully managed in such a way as to prevent any potential negative impact on the receiving environment and the material will be stored away from any open surface water drains. Movement of material will be minimised in order to reduce degradation of soil structure and generation of dust.

Although there is no evidence of historical contamination in the proposed development area, all excavated materials will be visually assessed for signs of possible contamination such as staining or strong odours. Site investigations classified the subsoils as 'inert'. Should any unusual staining or odour be noticed, samples of this soil will be analysed for the presence of possible contaminants in order to ensure that historical pollution of the soil has not occurred. Should it be determined that any of the soil excavated is contaminated, this will be disposed of by a licensed waste disposal contractor.

Stockpiles have the potential to cause negative impacts on air and water quality. The effects of soil stripping and stockpiling will be mitigated against through the implementation of appropriate earthworks handling protocol during construction. It is anticipated that any stockpiles will be formed within the boundary of the site and there will be no direct link or pathway from this area to any surface water body. Overburden material will be protected from exposure to wind by storing the material in sheltered parts of the site, where possible.

Fuel and Chemical Handling

To minimise any impact on the underlying subsurface strata from material spillages, all oils, solvents and paints used during construction will be stored within temporary bunded areas. Oil and fuel storage tanks shall be stored in designated areas, and these areas shall be bunded to a volume of 110% of the capacity of the largest tank/container within the bunded area(s) (plus an allowance of 30 mm for rainwater ingress). Drainage from the bunded area(s) shall be diverted for collection and safe disposal.

Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles will take place in a designated area (or where possible off the site) which will be away from surface water gulleys or drains. In the event of a machine requiring refuelling outside of this area, fuel will be transported in a mobile double skinned tank. An adequate supply of spill kits and hydrocarbon adsorbent packs will be stored in this area. All relevant personnel will be fully trained in the use of this equipment. Guidelines such as "Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors" (CIRIA 532, 2001) will be complied with.

Where feasible all ready-mixed concrete will be brought to site by truck. A suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline wastewaters or contaminated storm water to the underlying subsoil. Wash down and washout of concrete transporting vehicles will take place at an appropriate facility offsite.

In the case of drummed fuel or other chemical which may be used during construction, containers should be stored in a dedicated internally bunded chemical storage cabinet and labelled clearly to allow appropriate remedial action in the event of a spillage.

Control of Water during Construction

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.

Should any discharge of construction water be required during the construction phase, discharge will be to foul sewer. Pre-treatment and silt reduction measures on site will include a combination of silt fencing, settlement measures (silt or sediment traps, 20 m buffer zone between machinery and watercourses, refuelling of machinery off site) and hydrocarbon interceptors. All water runoff from designated refuelling areas will be channelled to an oil interceptor or an alternative treatment system prior to discharge.

Any minor ingress of groundwater and collected rainfall in the excavation will be pumped out during construction. It is estimated that the inflow rate of groundwater will be low and limited to the northeast of the site. It is therefore proposed that the water be discharged via the existing stormwater sewer network. Extensive monitoring will be adopted to ensure that the water is of sufficient quality to discharge to the sewer. The use of slit traps and an oil interceptor (if required) will be adopted if the monitoring indicates the requirements for the same with no silt or contaminated water permitted to discharge to the sewer. There may be localised pumping of surface run-off from the excavations during and after heavy rainfall events to ensure that the excavations are kept relatively dry. Due to the very low permeability of the Dublin Boulder Clay and the relative shallow nature for excavations, infiltration to the underlying aquifer is not anticipated.

Monitoring Measures

Daily visual inspection will be undertaken by the contractor at the silt trap/ settlement tank to ensure adequate internal settlement is occurring. Where the visual assessment highlights elevated suspended sediments higher than expected, the water will be re-circulated for further settlement.

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 10 m from surface water receptors. Regular inspection of surface water run-off and any sediment control measures (will be carried out during the construction phase.

Regular auditing of construction / mitigation measures will be undertaken, e.g. concrete pouring, refuelling in designated areas, etc. A log the regular 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 occur.

Operational Phase

The proposed development will provide full attenuation for increase in hardstand area in compliance with the requirements of the Greater Dublin Strategic Drainage Study. A number of measures will be put in place to minimise the likelihood of any spills entering the groundwater environment to include the design of the car park, fitting of refuelling areas with hydrocarbon interceptors and on-site speed restrictions. Refer to Chapter 8 for further details.

The design includes hardstand cover and permeable paving across the site prior to discharge into the attenuation system. Therefore, the risk of accidental discharge has been adequately addressed through design.

Petrol interceptors will be installed as part of the SuDS measures to capture any potential oil or hydrocarbon contamination prior to discharge into the attenuation system on site (refer to Chapter 8 for further details). This together with hardstand cover and permeable paving will minimise the potential for any impact to the hydrogeological environment.

21.2.4 Water (Chapter 8)

The design of the proposed development has taken account of the potential impacts of the development on the hydrological environment local to the area where construction is taking place and containment of contaminant sources during operation. Measures have been incorporated in the design to mitigate the potential effects on hydrology , including SuDS measures, as detailed above.

The site would have an indirect hydrological connection with the Dublin Bay through the proposed surface water drainage system, the Dunboyne Stream and the River Tolka.

As stated above, no impacts are expected on Natura 2000 Sites within South Dublin Bay, given the potential loading, tenuous hydrological connectivity and the distance from source to the Natura 2000 site. The potential risk is considered to be imperceptible as potential contaminant would be attenuated, diluted and dispersed below statutory guidelines (i.e., S.I. European Communities Environmental Objectives Regulations, 2009 [S.I. No. 272 of 2009 as amended by SI No. 77 of 2019]).

Due to the inter-relationship between soils, geology, hydrogeology and hydrology, the following mitigation measures discussed will be considered applicable to all. Waste Management is also considered an interaction in some sections.

Construction Phase

Construction Environmental Management Plan (CEMP)

In advance of work starting on site, the works Contractor will prepare a detailed Construction Environmental Management Plan (CEMP). The detailed CEMP will set out the overarching vision of how the construction of the Proposed Development will be managed in a safe and organised manner by the Contractor. The CEMP will be a live document and it will go through a number of iterations before works commence and during the works. It will set out requirements and standards which must be met during the construction stage and will include the relevant mitigation measures outlined in the EIA Report and any subsequent planning conditions relevant to the Proposed Development.

A Preliminary Construction Environmental Management Plan has been prepared and accompanies the planning application in this case.

As a minimum, the CEMP should be formulated in accordance with best international practice including but not limited to:

- CIRIA, (2001), Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors, (C532) Construction Industry Research and Information Association;
- CIRIA (2002) Control of water pollution from construction sites: guidance for consultants and contractors (SPI56) Construction Industry Research and Information Association
- CIRIA (2005), Environmental Good Practice on Site (C650); Construction Industry Research and Information Association
- BPGCS005, Oil Storage Guidelines;
- Eastern Regional Fisheries Board, (2006), Fisheries Protection Guidelines: Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites;
- CIRIA 697, The SUDS Manual, 2007; and
- UK Pollution Prevention Guidelines (PPG) UK Environment Agency, 2004.

In order to reduce impacts on the soil, geological and hydrogeological environment, a number of mitigation measures will be adopted as part of the construction works on site as outlined below.

Surface Water Run-Off

As there is potential for run-off to enter current stormwater systems and indirectly discharge to a watercourse, mitigations will be put in place to manage run-off during the construction phase. 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.

Should any discharge of construction water be required during the construction phase, discharge will be to foul sewer. Pre-treatment and silt reduction measures on site will include a combination of silt fencing, settlement measures (silt or sediment traps, 20 m buffer zone between machinery and watercourses, refuelling of machinery off site) and hydrocarbon interceptors.

Any minor ingress of groundwater and collected rainfall in the excavation will be pumped out during construction. It is estimated that the inflow rate of groundwater will be low and limited to the northeast of the site. It is therefore proposed that the water be discharged via the existing stormwater sewer network. Extensive monitoring will be adopted to ensure that the water is of sufficient quality to discharge to the sewer. The use of slit traps and an oil interceptor (if required) will be adopted if the monitoring indicates the requirements for the same with no silt or contaminated water permitted to discharge to the sewer. There may be localised pumping of surface run-off from the excavations during and after heavy rainfall events to ensure that the excavations are kept relatively dry. Due to the very low permeability of the Dublin Boulder Clay and the relative shallow nature for excavations, infiltration to the underlying aquifer is not anticipated.

Run-off water containing silt will be contained on site via settlement tanks and treated to ensure adequate silt removal. Silt reduction measures on site will include a combination of silt fencing and settlement measures (silt traps, silt sacks and settlement tanks/ponds).

The temporary storage of soil will be carefully managed. Stockpiles will be tightly compacted to reduce runoff and graded to aid in runoff collection. This will prevent any potential negative impact on the stormwater drainage and the material will be stored away from any surface water drains. Movement of material will be minimised to reduce the degradation of soil structure and generation of dust.

Excavations will remain open for as little time as possible before the placement of fill. This will help to minimise the potential for water ingress into excavations. Soil from works will be stored away from existing drainage features to remove any potential impact.

Weather conditions will be considered when planning construction activities to minimise the risk of run-off from the site and the suitable distance of topsoil piles from surface water drains will be maintained.

Fuel and Chemical Handling

To minimise any impact on the underlying subsurface strata from material spillages, all oils, solvents and paints used during construction will be stored within temporary bunded areas. Oil and fuel storage tanks shall be stored in designated areas, and these areas shall be bunded to a volume of 110% of the capacity of the largest tank/container within the bunded area(s) (plus an allowance of 30 mm for rainwater ingress). Drainage from the bunded area(s) shall be diverted for collection and safe disposal.

Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles will take place in a designated area (or where possible off the site) which will be away from surface water gulleys or drains. In the event of a machine requiring refuelling outside of this area, fuel will be transported in a mobile double skinned tank. An adequate supply of spill kits and hydrocarbon adsorbent packs will be stored in this area. All relevant personnel will be fully trained in the use of this equipment. Guidelines such as “Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors” (CIRIA 532, 2001) will be complied with.

Where feasible all ready-mixed concrete will be brought to site by truck. A suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline wastewaters or contaminated storm water to the underlying

subsoil. Wash down and washout of concrete transporting vehicles will take place at an appropriate facility offsite.

In the case of drummed fuel or other chemical which may be used during construction, containers should be stored in a dedicated internally bunded chemical storage cabinet and labelled clearly to allow appropriate remedial action in the event of a spillage.

Soil Removal and Compaction

Temporary storage of soil will be carefully managed in such a way as to prevent any potential negative impact on the receiving environment. The material will be stored away from any surface water drains (see Surface Water Run-off section above). Movement of material will be minimised to reduce degradation of soil structure and generation of dust.

All excavated materials will be visually assessed for signs of possible contamination such as staining or strong odours. Should any unusual staining or odour be noticed, samples of this soil will be analysed for the presence of potential contaminants to ensure that historical pollution of the soil has not occurred. Should it be determined that any of the soil excavated is contaminated, this will be segregated and appropriately disposed of by a suitably permitted/licensed waste disposal contractor.

No contamination is expected within the site due to its current greenfield condition. Nonetheless, all excavated materials will be visually assessed for signs of possible contamination such as staining or strong odours. Should any unusual staining or odour be noticed, samples of this soil will be analysed for the presence of potential contaminants to ensure that historical pollution of the soil has not occurred. Should it be determined that any of the soil excavated is contaminated, this will be segregated and appropriately disposed of by a suitably permitted/licensed waste disposal contractor.

Monitoring Measures

Daily visual inspection will be undertaken by the contractor at the silt trap/ settlement tank to ensure adequate internal settlement is occurring. Where the visual assessment highlights elevated suspended sediments higher than expected, the water will be re-circulated for further settlement.

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 10 m from surface water receptors. Regular inspection of surface water run-off and any sediment control measures (will be carried out during the construction phase.

Regular auditing of construction / mitigation measures will be undertaken, e.g. concrete pouring, refuelling in designated areas, etc. A log the regular 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 occur.

Operational Phase

The proposed development will provide full attenuation for increase in hardstand area in compliance with the requirements of the Greater Dublin Strategic Drainage Study. A number of measures will be put in place to minimise the likelihood of any spills entering the water environment to include the design of the car park, fitting of refuelling areas with hydrocarbon interceptors and on-site speed restrictions. Refer to the Engineering Assessment Report for further details (Waterman Moylan, 2022).

It is proposed to ultimately discharge surface water from the proposed development, post attenuation and outflow restrictions into the existing local drainage. No further mitigation measures are to be required during the operational phase.

Maintenance of the surface water drainage system and foul sewers as per normal urban developments is recommended to minimise any accidental discharges to ground.

21.2.5 Wind (Chapter 9)

Construction Stage

No mitigation measures are required.

Operational Stage

The landscaping proposed for the development has been considered within the wind analysis carried out and its effect has been beneficial in reducing the wind speed around the development and creating calmer wind condition in areas such the parks and landscaped areas where pedestrian can be comfortable for sitting.

21.2.6 Climate (Air Quality) (Chapter 10)

Construction Stage

The proactive 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 monitoringof 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 10.1. These measures will be incorporated into the Construction Environmental Management Plan (CEMP) prepared for the site. An outline CEMP has been prepared and is enclosed separately.

The Dust Management Plan notes the following measures in summary:

- The Principal Contractor or equivalent must monitor the contractors' performance to ensure that the proposed mitigation measures are implemented and that dust impacts and nuisance are minimised;
- 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;
- Drop heights from conveyors, loading shovels, hoppers and other loading equipment will be minimised, if necessary fine water sprays should be employed.

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.

Operational Stage

There is no mitigation required for the operational phase of the development as impacts to air quality are predicted to be neutral and imperceptible.

21.2.7 Climate (Climate Change) (Chapter 11)

Construction Phase

Embodied carbon of materials and construction activities will be the primary source of climate impacts during the construction phase. Measures to reduce the embodied carbon of the construction works include:

- Creating a construction program which allows for sufficient time to determine reuse and recycling opportunities for demolition wastes;
- Appointing a suitably competent contractor who will undertake waste audits detailing resource recovery best practice and identify materials can be reused/recycled;
- Materials will be reused on site within the new build areas where possible;
- 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; and
- Sourcing materials locally where possible to reduce transport related CO_2 emissions.

Operational Phase

A number of measures have been incorporated into the design of the development to mitigate against the impacts of future climate change. For example, adequate attenuation and drainage have been incorporated into the design of the development to avoid potential flooding impacts as a result of increased rainfall events in future years. These measures have been considered when assessing the vulnerability of the proposed development to climate change (see Section 11.3.2.2).

The proposed development has been designed to reduce the impact on climate as a result of energy usage during operation. The Energy Analysis Report prepared by IN2 Engineering Design Partnership and submitted under separate cover with this planning application details a number of incorporated design mitigation measures that have been incorporated into the design of the development to reduce the impact on climate wherever possible. Such measures included in the proposed development to reduce the impact to climate from energy usage are:

- A2/A3 BER rating;
- Compliance for the Apartments to Part L 2021/ NZEB;
- Energy Performance Coefficient (EPC) < 0.30 for apartments;
- Carbon Performance Coefficient (CPC) < 0.35 for apartments;
- Achieve air tightness standards of 3 $m^3/m^2/hr$;
- Ensure thermal bridging details are designed to achieve thermal bridging factors of 0.15W/m^2K (Apartments) or less;
- Building fabric u-value and g-value calculations will be completed to at least meet the requirements of NZEB in relation to thermal performance;
- The proposed development is designed with a high percentage of dual aspect units, to achieve cross ventilation. This along with the building fabric, assists with the thermal control of temperatures;
- Exceed the minimum U-Value standards identified in *Part L 2022 Dwellings;*
- Provide an appropriate combination of technologies to ensure energy consumption is in line with *Part L 2022 Dwellings* requirements (Renewable Energy Ratio (RER) > 0.20);
- All in-curtilage parking spaces will be capable of being fitted with EV charging points. All off-curtilage spaces will be ducted for EV charging, with 20% fitted out from the outset; and
- The project architects and landscape architects worked together to produce a plan that includes for green infrastructure (links) across the site for pedestrian and cycle use and

minimised the requirement for removal or import of any soils off this site necessitating additional traffic and transport.

These above identified measures will aid in reducing the impact to climate during the operational phase of the proposed development in line with the goals, relevant policies and objectives of the Meath Development Plan 2021-2027, including climate mitigation measures.

21.2.8 Climate (Daylight) (Chapter 12)

No significant adverse effects will be experienced from the completion of the proposed development. No mitigation measures will be required.

Construction Stage

No significant adverse effects will be experienced during the construction of the proposed development. No mitigation measures will be required.

Operational Stage

The effect on daylight to neighbouring buildings is not projected to change over the operational phase of the development. No mitigation measures will be required.

21.2.9 Climate (Sunlight) (Chapter 13)

No significant adverse effects will be experienced from the completion of the proposed development. No mitigation measures will be required.

Construction Stage

No significant adverse effects will be experienced during the construction of the proposed development. No mitigation measures will be required.

Operational Stage

The effect on sunlight and overshadowing to neighbouring sites and buildings is not projected to change over the operational phase of the development. No mitigation measures will be required.

21.2.10 Air (Noise & Vibration) (Chapter 14)

Construction Stage

Construction Noise

The assessment detailed in Section 11.5.1 has determined that construction activities can operate within the adopted construction noise threshold levels at the closest off-site NSLs due to the distance from the works and the construction activities involved. At the closest NSLs to the Improvement works to Two no. Roundabouts on the R174, the CNT values are likely to be exceeded over temporary periods during surface breaking works for lane widening.

Vibration levels at the closest neighbouring buildings are expected to be orders of magnitude below the limits set out in Table 11.3 to avoid any cosmetic damage to buildings.

Best practice noise and vibration control measures will be employed by the contractor during the construction phase in order to avoid exceedance of the adopted construction noise threshold values at the nearest NSLs. The best practice measures set out in BS 5228 (2009 +A1 2014) Parts 1 and 2

will be complied with. This includes guidance on several aspects of construction site mitigation measures, including, but not limited to:

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

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

Selection of Quiet Plant

This practice is recommended in relation to static plant such as compressors, generators and breakers. It is recommended that these units be supplied with manufacturers' proprietary acoustic enclosures or attenuated models. The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site.

Noise Control at Source

The following best practice mitigation measures relate to controlling noise at source:

- Site compounds will be located away from noise sensitive boundaries within the site constraints.
- For mobile plant items such as cranes, dump trucks, excavators and loaders, maintaining enclosure panels closed during operation can reduce noise levels over normal operation. Mobile plant will be switched off when not in use and not left idling.
- For steady continuous noise, such as that generated by diesel engines, it may be possible to reduce the noise emitted by fitting a more effective exhaust silencer system and avoid idling of engines when not in use.
- For percussive tools such as pneumatic breakers, a number of noise control measures include fitting muffler or sound reducing equipment to the breaker tool and ensuring any leaks in the air lines are sealed.
- Erecting localised screens around breaker or drill bit when in operation in close proximity to noise sensitive boundaries.
- For all materials handling, ensure that materials are not dropped from excessive heights, lining drops chutes and dump trucks with resilient materials.
- For compressors, generators and pumps, these can be surrounded by acoustic lagging or enclosed within acoustic enclosures providing air ventilation.
- All items of plant 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

Screening is an effective method of reducing the noise level at a receiver location and can be used successfully as an additional measure to all other forms of noise control. Standard construction site hoarding (2.4 m in height) with a mass per unit of surface area greater than 7 kg/m2 can provide adequate sound insulation. This is recommended, as a minimum around the north and western site boundaries of the proposed development site.

Liaison with the Public

A designated Community Liaison Officer (CLO) will be appointed to site during construction works. Any noise complaints will be logged and followed up in a prompt fashion by the CLO. In addition, prior to particularly noisy construction activity, the CLO will inform the nearest noise sensitive locations of the time and expected duration of the noisy works.

Project Programme

The phasing programme will be arranged so as to control the amount of disturbance in noise and vibration sensitive areas at times that are considered of greatest sensitivity. This will be reviewed in relation to other potential cumulative works occurring on adjacent construction sites in close proximity to noise sensitive properties which have the potential to lead to cumulative significant construction noise impacts.

Construction Vibration

On review of the likely vibration levels associated with construction activities, construction activities associated with 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 buildings.

Vibration from construction activities will be limited to the values set out in Table 11.3 to avoid any form of potential cosmetic damage to buildings and structures.

In the case of vibration levels giving rise to human response, impacts are significantly reduced once the source of vibration is known and good communications are in place. As such, in order to minimise any potential impacts to adjacent building occupants, the following measures shall be implemented during the Construction Phase at the roundabout improvement works, during surface breaking activities. During all other phases, vibration magnitudes will be imperceptible to building occupants.

- A clear communication programme will be established by contractor to inform adjacent building occupants in advance of any potential intrusive works which may give rise to vibration levels likely to result in significant effects as per Table 11.4. The nature and duration of the works will be clearly set out in all communication circulars as necessary.

Construction Traffic Noise

Construction traffic noise impacts are determined to be imperceptible and short term along the surrounding road network, hence no specific mitigation measures are required to control this source further.

Operational Stage

Additional Vehicular Traffic Noise on Surrounding Roads

Changes to traffic flows will not result in a perceptible increase in noise level in the surrounding environment. Therefore, no mitigation measures are necessary in this case.

Mechanical and Electrical Plant Noise

With consideration at the detailed design stage, the selection and location of plant items within the development buildings will ensure that noise emissions from any mechanical and electrical building services plant do not exceed the relevant internal noise criteria within Table 11.7 for residential dwellings within the proposed development therefore no further mitigation is required. In addition,

noise emissions should be broadband in nature and should not contain any tonal or impulsive elements.

Once operational noise emissions are controlled within the development site, there will be no perceptible noise impact at sensitive receivers off-site.

21.2.11 Landscape & Visual Impact Assessment (Chapter 15)

Construction Stage

The proposed development will entail significant groundworks to facilitate construction of the residential properties. The subsoils and topsoil are to be retained on site and reused to ensure no requirement for moving material off site.

The hedgerows will be managed to remove dead, dying and dangerous branches and any colonising scrub or brier. The works will also entail removal of trees on site suffering from Ash die-back disease. For retained trees, the recommendations given in BS5837:2012 Guide for trees in relation to construction will be adopted to ensure site and tree safety.

Operational Stage

At the core of the site is a large rectilinear public open space which has capacity and scale to accommodate informal and various amenity and landscape / parkland areas. This will be overlooked from the surrounding development to ensure safety in design with multiple connections and access points offered throughout. Further integrated elements relating to the landscape in terms of remediation, mitigation and enhancement include the following:-

- The main spine road leading into the development will be planted with street trees in broad grass verges to create a strong green link through the development for motorists, cyclists and pedestrians;
- Public and Communal Open Space includes extensive planting with a mix native and ornamental tree species to create a natural environment with colour and seasonal interest. The general principle will correspond with Development Plan Objective 26 and exceed the requirement for 15% Open Space provision with recreational and amenity spaces to the core of the site in a major new parkland space. Public spaces will feel welcome to all, while communal spaces will be differentiated from the public areas either physically or perceptively;
- Biodiversity and habitats creation or enhancement will be the objective in terms of landscape design to the site edge (with reference to County Meath Biodiversity Plan 2015-2020) and will include a 10m wide buffer / riparian corridors free from new development alongside the watercourses and streams;
- The planting of semi-mature trees will give instant impact and provide enclosure and screening. High canopy trees or ones that will be easy to manage in terms of such will be used along avenues to ensure vehicular sightlines are retained;
- Communal open spaces areas are positioned between and around the apartment blocks and connected along a linear arrangement that ties in with larger area of public open space. Again there is flexibility within these spaces for passive leisure, recreation, play and seating throughout. The use of “Advanced Turf” with a netlon mesh is proposed to provide reinforced grass in areas of lawn to allow these areas to have a green character and also have the capability of accommodating fire service access;
- Green links connects peripheral parks and internal open spaces including tree lined avenues, planted embankments, pocket parks, and ecology / biodiversity areas;
- Provision of playgrounds to cater for the recreational and educational requirements of children of residents;

- The Western boundary will also be augmented with native planting to visually screen the railway line. This will be augmented by a 2.2m high masonry wall to prevent access and reduce noise impacts;
- The masterplan will be supported by drawings including Landscape Sections., Boundary Treatments. Specification and Planting Plan. Generally the planting objectives are to propose a mix of native tree species and shrub planting to create a natural and welcoming environment for residents;
- The open spaces are designed with consideration given to long-term management ensuring this is not onerous with heavy resource requirements; and
- Due regard will also be given to coordinating with engineers in terms of *Sustainable Urban Drainage Systems (SuDS)* with the landscape designs working around required swales, compensation areas and retained watercourses or culverts. Any works on or aside ditches will be undertaken in dry spells and in correct season if vegetation removal required (i.e. Autumn to Winter).

The landscape works include for planting of trees within parkland areas and the central boulevard core through the proposed development that will entail over 600 no. semi-mature' or 'extra-heavy standard' size trees to provide an instant impression. The collective trees will, as they mature, assist in merging the proposed development into the surrounding landscape and local views as well as set about creation of the areas new landscape character. Other landscape works will include structure planting, amenity planting, garden trees, hedgerows and wooded belts. The extent of planting will more than compensate for the loss of any vegetation on this site and enhance the overall wooded character, biodiversity and ecological nature of the site.

Planting and augmentation of existing boundary hedgerows will consist of evergreen and deciduous trees with under-story scrub mix. A range of plant species and heights will be selected to provide quick establishment and assist in visual integration. Amenity planting will consist of trees, native woodlands, hedgerows, shrub / groundcover planting, meadow / wildflower and grass seeding works. As the planting matures, it will change the nature of the site and its visual amenity and the height of planting for assessment purposes is as follows:-

- Planting at Year 1 : 3 metres;
- Planting at Year 15 : 8 metres; and
- Planting at maturity : 20 metres (i.e., Year 25)

Plants selected will be predominantly indigenous and species selection based on those in the "All-Ireland Pollinator Code 2021-2025" to ensure successful plant establishment that will merge visually and ecologically into this area. Landscape works will be undertaken by an ALCI approved landscape contractor and in accordance with BS 4428:1989 Code of practice for general landscape operations (excluding hard surfaces). Any trees or shrubs dying, damaged or removed will be replaced in the following planting session with plant of similar size and species. Trees supply and planting shall correspond to BS 8545 Trees: from nursery to independence in the landscape - Recommendations.

While the baseline site character will change due to this proposal, in terms of woodland and trees the retention of the majority of boundary trees and the new planting provides the opportunity for this part of Dunboyne to have significantly enhanced tree cover and a more wooded character in the longer term with positive effects on amenity, environment and ecology.

21.2.12 Material Assets (Transportation) (Chapter 16)

Construction Stage

A Preliminary Construction & Environmental Management Plan (PCEMP) has been prepared by Waterman Moylan for the subject development in order to provide guidance on how to minimise the potential impact of the construction stage of the proposed development on the safety and amenity of other users of the public road. The PCEMP, which accompanies the documentation package under a separate cover, considers the following aspects:

- Dust and dirt control measures.
- Noise assessment and control measures.
- Routes to be used by vehicles.
- Working hours of the site.
- Details of construction traffic forecast.
- Times when vehicle movements and deliveries will be made to the site.
- Facilities for loading and unloading.
- Facilities for parking cars and other vehicles.

Further to the above, a detailed Construction Management Plan (CMP) and a detailed Construction Traffic Management Plan (CTMP) will be prepared by the main contractor prior to the construction stage. These documents, which will be prepared in coordination and agreement with the Local Authority, will outline site logistics and indicate the following:

- Site access location.
- Site boundary lines.
- Tower crane locations.
- Vehicle entry and exit routes to/from the site.
- Location of loading and unloading areas.
- Location of site offices and welfare facilities.
- Location of material storage areas.
- Banksmen locations.

Through the implementation of the detailed CMP and CTMP prior to the construction stage, it is anticipated that the effect of traffic on the surrounding road network during the construction stage will be short-term in nature and slight negative in terms of effect – causing noticeable changes in the character of the environment without affecting its sensitivities.

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 carpark is provided within the site for contractor's vehicles. It is likely that construction will have a not significant effect on pedestrian and cycle infrastructure – causing noticeable changes in the character of the environment but without significant consequences.

Operational Stage

Context

In order to understand the traffic impact and to determine suitable mitigation measures, a `Traffic and Transport Assessment' (TTA) has been prepared by Waterman Moylan as is accompanying the documentation package under a separate cover. This assessment includes a detailed traffic modelling exercise to assess impact and determine if any upgrade works were required on

surrounding road network to facilitate the proposed development. A summary of the modelling exercise if provided below.

Assessed Junctions

The traffic modelling carried out as part of the TTA includes the analysis of the following junctions on the surrounding road network:

- Junction 1 (Signalised Crossroads): L2228 / Navan Road / Main Street.
- Junction 2 (Signalised Crossroads): L2228 / Rooske Road.
- Junction 3 (Priority Staggered Junction): L2228 / Access Road to Dunboyne Station carpark / Southern Distributor Road (SDR).
- Junction 4 (Mini Roundabout): L2228 / R147.
- Junction 5 (Roundabout): L2228 / R147 / R156 / M3 Offramp.

Proposed Development Trip Generation

The peak hour trip generation estimated for the proposed development (716 residential units + Creche) is shown in Table 16.9. The trip rates used to calculate the potential traffic to/from the proposed development were obtained by consulting TRICS database. TRICS output report is provided in Appendix C of the accompanying TTA.

It is envisaged that the proposed development will be delivered in an organised manner following planning approval. For the purpose of the assessment carried out as part of the TTA, it was assumed that the first c. 200 residential units and the Creche will be developed by 2026, whilst the proposed overall development will be constructed by 2031.

Year	Proposed Development Units	AM Peak Hour		PM Peak Hour	
		Arrivals	Departures	Arrivals	Departures
2026	200 units	31	60	49	29
	Creche	16	0	0	16
	200 units + Creche	**47**	**60**	**49**	**45**
2031	**716 units + Creche**	**126**	**216**	**176**	**120**

Table 21.1: Proposed Development Trip Generation.

It is estimated that the proposed overall development will generate a total of 342 trips in the AM peak hour (126 inbound and 216 outbound) and a total of 296 trips in the PM peak hours (176 inbound and 120 outbound).

Proposed Development Trip Distribution

Access to the subject development is proposed off L2228 Station Road via the extension of the Southern Distributor Road (SDR). The trip distribution characteristics assumed for the proposed development trips are:

- 30% to/from west via L2228 Station Road, of which, at Junction 1, 15% arrive/depart from/to north via Navan Road, 11% arrive/depart from/to west via L2228 Summerhill Road and 4% arrive/depart from/to south via Main Street.
- 70% to/from east via L2228 Station Road, of which, 15% arrive/depart from/to north via R147 at Junction 4, and 10% arrive/depart via R147 and 45% via R156 at Junction 5.

Nearby Recently Constructed Residential Development (Planning Reg. Ref.: RA 180561)

In order to undertake a complete and cumulative assessment of the local road network, the nearby recently constructed development approved under Reg. Ref.: RA 180561, which was not occupied when the traffic survey for the accompanying TTA was carried out, was also included in the analysis.

The trip generation has been extracted from the "Traffic & Transport Assessment" report prepared as part of the planning application for the site. This is reproduced below.

Land Use Category	AM Peak Hour		PM Peak Hour	
	Arrivals	Departures	Arrivals	Departures
Houses/Duplexes	10	29	25	13
Apartments	1	1	2	1
Creche	3	2	2	2
Total	14	32	29	16

Table 21.2: Nearby Recently Approved Development Trips.

Potential Impact on Assessed Junctions

The extent of traffic impact from the proposed development has been determined by initially checking where generated traffic would exceed 10% of the traffic flow on the adjoining road of 5% on the road where congestion exists, or the location is sensitive. A summary of the existing two-way traffic and the expected traffic increase at each assessed junction is presented below.

Junction	Surveyed Two-way Flows (AM)	Surveyed Two-way Flows (PM)	Prop. Dev. Two-way Traffic (AM)	Prop. Dev. Two-way Traffic (PM)	Traffic Increase (AM)	Traffic Increase (PM)
1	899	816	103	89	11.46%	10.91%
2	1,055	1,048	103	89	9.76%	8.49%
3	1,175	899	342	296	29.11%	32.93%
4	1,598	1,343	239	207	14.96%	15.41%
5	2,105	2,132	188	163	8.93%	7.65%

Table 21.3: Surveyed Two-way Traffic and Expected Traffic Increase by Proposed Development.

All junctions are estimated to receive a two-way traffic increase higher than or close to 10%. Therefore, all junctions were modelled.

Assessed Scenarios

The performance of the junctions was analysed for the critical AM and PM peak hours (08h00 to 09h00 and 17h00 to 18h00) for the following scenarios:

- **2026 DO NOTHING**: 2021 surveyed flows factored up + trips to/from the recently constructed residential development.
- **2026 DO SOMETHING**: 2026 DO NOTHING + trips to/from the first c. 200 units + Creche of the proposed development.
- **2031 DO NOTHING**: 2021 surveyed flows factored up + trips to/from the recently constructed residential development.
- **2031 DO SOMETHING**: 2031 DO NOTHING + trips to/from the overall proposed development.
- **2041 DO NOTHING**: 2021 surveyed flows factored up + trips to/from the recently constructed residential development.
- **2041 DO SOMETHING**: 2041 DO NOTHING + trips to/from the overall proposed development.

Analysis Results

Junction 1

Junction 1 is an existing 4-armed signalised junction located at Dunboyne town centre. This junction was modelled based on its existing layout and the TRANSYT analysis results are summarised below. The arms of the junction were labelled as follows within the model:

- Arm 1: Summerhill Road (NW)
- Arm 2: Navan Road (N)
- Arm 3: L2228 (E)
- Arm 4: Main Street (S)

Arm (Mov)	AM Peak Hour			PM Peak Hour		
	Queue (veh)	Delay (sec/veh)	DOS	Queue (veh)	Delay (sec/veh)	DOS
2026 DO NOTHING						
1 (S/L/R)	8.61	52.34	67%	5.81	58.96	63%
2 (S/L/R)	7.77	60.02	71%	7.67	51.30	63%
3 (S/L/R)	6.78	58.19	66%	8.59	48.88	64%
4 (S/L)	4.00	48.32	40%	3.52	52.81	42%
4 (R)	6.27	56.24	62%	4.17	56.64	53%
2026 DO SOMETHING						
1 (S/L/R)	9.09	55.69	71%	6.12	60.21	65%
2 (S/L/R)	7.93	58.07	70%	7.98	52.28	65%
3 (S/L/R)	7.45	58.54	69%	9.21	50.41	67%
4 (S/L)	4.05	49.76	42%	3.52	52.81	42%
4 (R)	6.52	59.60	66%	4.25	56.96	53%
2041 DO NOTHING						
1 (S/L/R)	10.42	56.08	75%	6.84	60.95	68%
2 (S/L/R)	9.16	60.62	75%	9.31	56.58	73%
3 (S/L/R)	8.25	65.11	75%	10.39	53.98	73%
4 (S/L)	4.89	53.50	52%	4.27	57.23	53%
4 (R)	8.38	73.86	80%	5.16	64.04	64%
2041 DO SOMETHING						
1 (S/L/R)	12.22	69.47	85%	7.91	66.70	75%
2 (S/L/R)	11.62	83.33	88%	11.42	68.57	83%
3 (S/L/R)	11.35	72.17	84%	11.80	54.25	76%
4 (S/L)	4.89	53.50	52%	4.37	60.11	56%
4 (R)	8.80	76.72	82%	5.75	72.42	72%

Table 21.4: Existing Junction 1 – TRANSYT Analysis Results.

The TRANSYT analysis results indicate that Junction 1 would operate within capacity for the 2026 DO SOMETHING scenario and would continue to do so for the 2041 DO SOMETHING.

Junction 2

Junction 2 is an existing signalised junction located to the northwest of the proposed development site. This junction was modelled based on its existing layout and the TRANSYT analysis results are summarised below. The arms of the junction were labelled as follows within the model:

- Arm 1: L2228 (W)
- Arm 3: L2228 (E)
- Arm 4: Roskee Road (S)

Arm (Mov)	AM Peak Hour			PM Peak Hour		
	Queue (veh)	Delay (sec/veh)	DOS	Queue (veh)	Delay (sec/veh)	DOS
2026 DO NOTHING						
1 (S/L/R)	13.86	38.58	70%	12.88	40.42	69%
3 (S/L/R)	11.53	46.83	71%	14.04	38.93	71%
4 (L)	1.55	9.34	12%	1.98	13.88	15%
4 (S/R)	8.07	58.68	71%	5.35	65.27	66%
2026 DO SOMETHING						
1 (S/L/R)	14.50	39.58	72%	13.56	41.57	71%
3 (S/L/R)	12.14	46.74	72%	14.65	39.88	73%
4 (L)	1.58	9.75	12%	1.98	13.88	15%
4 (S/R)	8.32	62.49	74%	5.35	65.27	66%
2041 DO NOTHING						
1 (S/L/R)	17.91	47.46	82%	16.11	46.54	79%
3 (S/L/R)	14.38	54.30	81%	17.77	45.61	81%
4 (L)	1.79	9.49	14%	2.32	14.11	17%
4 (S/R)	9.88	63.91	78%	6.76	75.58	77%
2041 DO SOMETHING						
1 (S/L/R)	20.70	55.09	88%	19.11	52.42	86%
3 (S/L/R)	18.08	62.49	88%	20.25	51.71	87%
4 (L)	1.86	10.31	14%	2.32	14.11	17%
4 (S/R)	10.96	78.17	86%	7.32	87.09	82%

Table 21.5: Existing Junction 2 – TRANSYT Analysis Results.

The TRANSYT analysis results indicate that Junction 2 would operate within capacity for the 2026 DO SOMETHING scenario and would continue to do so for the 2041 DO SOMETHING.

Junction 3

Junction 3 is an existing priority-controlled staggered junction located to the north of the proposed development site. The southern approach of this junction (the Southern Distributor Road) is proposed to provide access to the subject development. This junction was modelled based on its existing layout. The PICADY analysis results are summarised below. The arms of the junction were labelled as follows within the model:

- Arm A: L2228 – Station Road (E)
- Arm B: Southern Distributor Road (S)
- Arm C: L2228 – Station Road (W)
- Arm D: Access Road to Dunboyne Rail Station (N)

Stream	AM Peak Hour			PM Peak Hour		
	Queue (veh)	Delay (sec/veh)	RFC	Queue (veh)	Delay (sec/veh)	RFC
2026 DO NOTHING						
B-ACD	0.1	11.07	0.12	0.1	9.34	0.09
AB-CD	0.0	7.89	0.01	0.0	6.85	0.01
D-AB	0.0	7.74	0.01	0.0	6.66	0.01
D-C	0.1	13.85	0.06	0.0	10.54	0.04
CD-AB	0.0	7.29	0.03	0.0	7.26	0.03
2026 DO SOMETHING						
B-ACD	0.5	15.24	0.32	0.3	11.70	0.22
AB-CD	0.0	7.95	0.01	0.0	6.90	0.01
D-AB	0.0	7.81	0.01	0.0	6.71	0.01
D-C	0.1	14.25	0.06	0.0	10.75	0.04

CD-AB	0.1	7.30	0.06	0.1	7.41	0.06
2031 DO NOTHING						
B-ACD	0.1	11.70	0.12	0.1	9.77	0.10
AB-CD	0.0	8.13	0.02	0.0	6.97	0.01
D-AB	0.0	8.01	0.01	0.0	6.78	0.01
D-C	0.1	15.20	0.06	0.0	11.08	0.05
CD-AB	0.0	7.41	0.03	0.0	7.38	0.03
2031 DO SOMETHING						
B-ACD	6.6	91.13	0.91	0.9	19.72	0.49
AB-CD	0.0	8.30	0.02	0.0	7.16	0.01
D-AB	0.0	8.22	0.01	0.0	6.99	0.01
D-C	0.1	16.86	0.07	0.1	11.86	0.05
CD-AB	0.2	7.42	0.12	0.2	7.95	0.16
2041 DO NOTHING						
B-ACD	0.1	12.42	0.13	0.1	10.21	0.11
AB-CD	0.0	8.39	0.02	0.0	7.08	0.01
D-AB	0.0	8.30	0.02	0.0	6.91	0.01
D-C	0.1	16.83	0.07	0.0	11.68	0.05
CD-AB	0.0	7.52	0.03	0.0	7.50	0.03
2041 DO SOMETHING						
B-ACD	9.6	128.47	0.97	1.0	21.56	0.51
AB-CD	0.0	8.57	0.02	0.0	7.28	0.01
D-AB	0.0	8.53	0.02	0.0	7.12	0.01
D-C	0.1	18.90	0.07	0.1	12.54	0.05
CD-AB	0.2	7.45	0.12	0.2	8.01	0.16

Table 21.6: Existing Junction 3 – PICADY Analysis Results.

The results indicate that Junction 3 would operate within capacity for the 2026 DO SOMETHING scenario with the highest RFC at 0.32 and a corresponding queue of < 1.0 vehicle.

For the 2031 and 2041 DO SOMETHING scenarios, with the inclusion of the overall proposed development, the results indicate that, in terms of RFC, Junction 3 would operate within satisfactory capacity during both peak hours (below 1.00). However, with regards to delays, the recorded values indicated that the vehicles exiting the SDR in the AM are likely to experience a moderate level of delay waiting for a gap on the L2228 Station Road to access both sides of the main road.

It is envisaged that sometime in the near future the northern approach of Junction 3 will be in place (formed by the Eastern Distributor Road (EDR)), and this junction would be upgraded to a 4-armed signalised junction. The layout of the EDR and its tie into Junction 3 is currently being designed and progressed by others on the northern side of the L2228. Considering a worst-case scenario where the construction of the EDR and the 4-armed signalised Junction 3 do not receive planning permission, as part of the assessment carried out in the accompanying TTA, Junction 3 was also modelled as a 3-armed signalised junction – in case it is judged by the Council that this junction requires future signalisation to support the delivery of the proposed development. The 3-armed signalised layout is shown below.

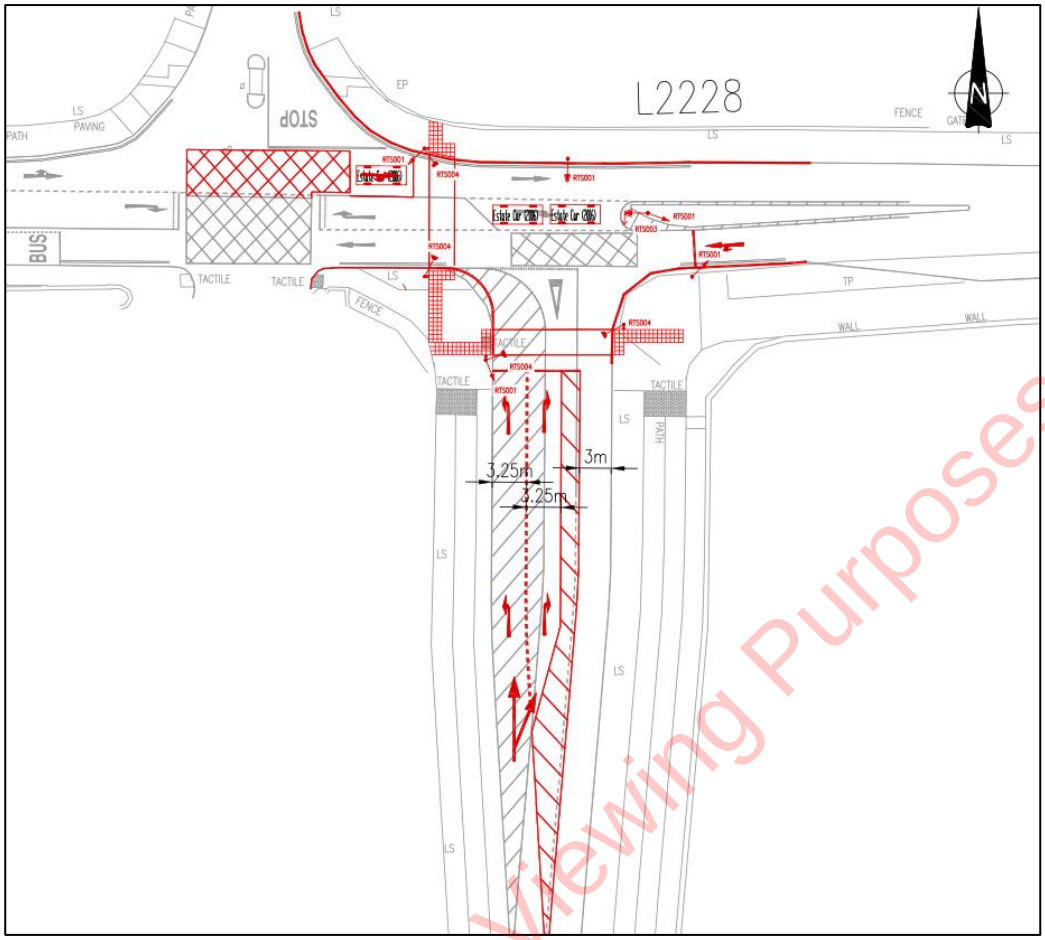


Figure 21.1: Junction 3 – 3-armed Signalised Layout.

The assessment of the 3-armed signalised Junction 3 was carried out for the 2041 DO SOMETHING scenario only. To provide a complete appraisal of the junction and to understand the extent of the blocking back effect resultant of the signalisation of Junction 3 along L2228 Station Road (eastbound), the road links immediately west of the traffic signals were also included in the model:

- Arm A: L2228 Station Road (Westbound) - signalised.
- Arm B: Southern Distributor Road (S) - signalised.
- Arm C: L2228 Station Road (Eastbound) – signalised
- Arm C-1: Right turning pocket lane from L2228 Station Road onto the SDR – signalised giveway.
- Arm D: L2228 Station Road (Westbound) – unsignalized.
- Arm E: L2228 Station Road (Eastbound) – unsignalized.
- Arm F: Access Road to Dunboyne Railway Station Carpark (N) – unsignalized.
- Arm G: Access Road to Dunboyne Herbal Clinic (S) – unsignalized.

Given the restrained queuing space, a queue limit has been set between the traffic signal at Arm C and the access road to the Dunboyne railway station carpark (Arm F). This adjustment to the model was set to simulate/identify any potential blocking back effect along the unsignalized Arm E (L2228 Station Road eastbound).

Arm (Mov)	AM Peak Hour			PM Peak Hour		
	Queue (veh)	Delay (sec/veh)	DOS	Queue (veh)	Delay (sec/veh)	DOS

2041 DO SOMETHING						
A (S/L)	17.11	19.88	74%	16.50	19.32	73%
B (L)	2.06	39.44	28%	1.34	37.90	19%
B (R)	4.90	48.42	60%	2.65	40.89	36%
C (S)	2.56	8.32	80%	1.31	4.43	53%
C-1 (R)	1.00	16.68	19%	1.39	20.91	24%
D (S/L)	0.16	0.75	43%	0.11	0.61	38%
D (R)	0.00	0.25	0%	0.00	0.25	0%
E (S/L)	18.80	20.05	78%	8.79	11.57	50%
E (R)	0.00	0.01	1%	0.00	0.01	1%
F (S/L/R)	0.21	7.32	1%	0.20	6.58	1%
G (S/L/R)	0.21	7.38	1%	0.20	6.63	1%

Table 21.7: Signalised 3-armed Junction 3 – TRANSYT Analysis Results.

The results indicate that Junction 3, as a 3-armed signalised junction, would operate within capacity for the future 2041 DO SOMETHING scenario during both peak hours and the blocking back effect from the signalised Arm C onto the unsignalized Arm E would not be an issue, should the signalisation of this junction be required.

Junction 4

Junction 4 is an existing mini roundabout located to the northeast of the proposed development site. This junction has been modelled based on its existing layout. The ARCADY analysis results are summarised below. The arms of the junction were labelled as follows within the model:

- Arm 1: R147 (S)
- Arm 2: L2228 Station Road (W)
- Arm 3: R147 (N)
- Arm 4: Minor Road (W)

Arm	AM Peak Hour			PM Peak Hour		
	Queue (veh)	Delay (sec/veh)	RFC	Queue (veh)	Delay (sec/veh)	RFC
2026 DO NOTHING						
1	3.6	17.31	0.78	4.9	21.88	0.83
2	4.6	22.43	0.82	1.3	9.76	0.56
3	2.1	20.04	0.68	0.7	8.55	0.41
4	0.0	0.00	0.00	0.0	0.00	0.00
2026 DO SOMETHING						
1	4.4	20.37	0.81	6.2	26.97	0.87
2	6.4	30.02	0.87	1.6	10.73	0.60
3	2.5	23.78	0.72	0.8	9.08	0.43
4	0.0	0.00	0.00	0.0	0.00	0.00
2031 DO NOTHING						
1	5.3	24.10	0.85	7.9	33.51	0.90
2	7.7	35.72	0.90	1.6	11.26	0.61
3	3.3	29.83	0.78	0.9	9.53	0.45
4	0.0	0.00	0.00	0.0	0.00	0.00
2031 DO SOMETHING						
1	11.1	46.75	0.94	29.7	103.09	1.02
2	47.2	158.04	1.08	2.5	15.05	0.71
3	6.2	53.85	0.88	1.1	11.76	0.53
4	0.0	0.00	0.00	0.0	0.00	0.00

Table 21.8: Existing Junction 4 – ARCADY Analysis Results.

The analysis results as summarised above indicate that, for the 2026 DO SOMETHING scenario, Junction 4 would operate within capacity during both peak hours. For the 2031 DO SOMETHING, however, with the inclusion of the overall proposed development, the results indicate that Junction 4 would operate above capacity during both peak hours.

The 'Transportation Study at Dunboyne & Environs' (TSDE) acknowledges that the R147 and its junctions are operating at/or approaching capacity and have proposed interventions to help increase capacity. The interventions proposed include the realignment of the R147 and R149 roundabout, and upgrades to the Clonee West Interchange. However, the TSDE does not mention any specific intervention related to the subject Junction 4 (mini roundabout between R147 and L2228 Station Road) which, as summarised above, is likely to become oversaturated any time in the future with the development of Dunboyne.

In this regard, as part of the subject application and in order to increase Junction 4 capacity to support the proposed development, an improved layout is proposed. The proposed layout consists of the upgrade of the existing mini roundabout to a standard-sized roundabout with two circulating lanes and an ICD of 28 metres, and upgrades to the northern, western and southern approaches to comprise additional entry lanes and increased entry widths. The proposed roundabout and surrounding area to be used for the proposed intervention is shown below. Details of the proposed roundabout are provided on Waterman Moylan Drawing No. 21-061 – P118 accompanying the documentation package.

It was advised by MCC that a pedestrian/cycling infrastructure along the R147 (north of Junction 4), is a work in progress currently being carried out by the Council to improve pedestrian/cycle connectivity in the area. The proposed upgraded Junction 4 has been designed in a way to facilitate this pedestrian/cycling infrastructure.

It is identified that the lands necessary to upgraded Junction 4 are in the public area. The existing access roads to the residential properties surrounding the roundabout are proposed to be retained. The details of the proposed layout and the timeframe for the construction of the proposed roundabout and any other essential local transport infrastructure are to be agree with the local authority.

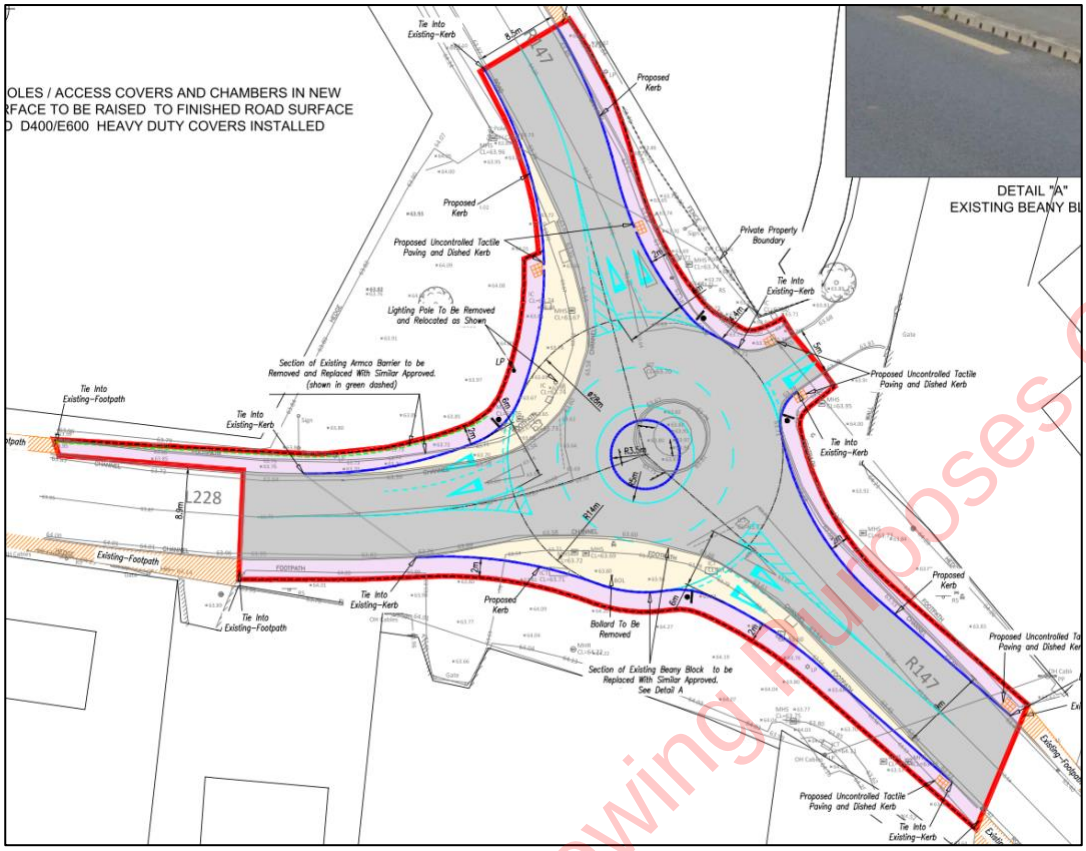


Figure 21.2: Junction 4 – Proposed Roundabout.

The ARCADY analysis results for the upgraded Junction 4 are presented below.

- Arm 1: R147 (S)
- Arm 2: L2228 Station Road (W)
- Arm 3: R147 (N)
- Arm 4: Minor Road (W)

Arm	AM Peak Hour			PM Peak Hour		
	Queue (veh)	Delay (sec/veh)	RFC	Queue (veh)	Delay (sec/veh)	RFC
2031 DO SOMETHING						
1	1.3	5.05	0.55	1.6	5.70	0.60
2	2.5	9.01	0.70	0.9	5.15	0.46
3	0.8	6.36	0.43	0.4	4.17	0.28
4	0.0	0.00	0.00	0.0	0.00	0.00
2041 DO SOMETHING						
1	1.5	5.52	0.59	1.9	6.34	0.64
2	3.1	10.73	0.75	1.0	5.54	0.49
3	0.9	7.13	0.47	0.5	4.40	0.31
4	0.0	0.00	0.00	0.0	0.00	0.00

Table 21.9: Proposed Junction 4 – ARCADY Analysis Results.

The analysis results as summarised above indicate that the proposed roundabout would operate within capacity for the 2031 DO SOMETHING scenario during both peak hours and would continue to do so for the 2041 DO SOMEHING. No high delays or queue lengths were recorded.

Junction 5

Junction 5 is an existing roundabout located to the east of the proposed development site. It has been modelled based on its existing layout and the ARCADY analysis are summarised below. The arms of the junction were labelled as follows within the model:

- Arm 1: R147 (E)
- Arm 2: R147 (S)
- Arm 3: R147 (N)
- Arm 4: M3 northbound on-slip (NE) – exit only

Arm	AM Peak Hour			PM Peak Hour		
	Queue (veh)	Delay (sec/veh)	RFC	Queue (veh)	Delay (sec/veh)	RFC
2026 DO NOTHING						
1	1.7	10.21	0.63	10.4	39.66	0.95
2	1.4	6.33	0.58	1.6	7.86	0.62
3	4.1	16.89	0.82	1.5	8.83	0.60
2026 DO SOMETHING						
1	1.8	10.79	0.64	11.8	44.54	0.97
2	1.5	6.61	0.60	1.8	8.28	0.64
3	4.9	19.52	0.85	1.7	9.40	0.63
2031 DO NOTHING						
1	2.2	12.49	0.69	25.7	94.92	1.05
2	1.7	7.29	0.63	2.1	9.23	0.67
3	6.7	25.57	0.89	1.9	10.41	0.66
2031 DO SOMETHING						
1	2.7	15.35	0.74	41.7	147.17	1.10
2	2.1	8.34	0.68	2.8	11.37	0.74
3	16.7	57.75	1.00	2.5	12.49	0.72
2041 DO NOTHING						
1	2.9	15.70	0.75	60.7	201.59	1.14
2	2.2	8.51	0.69	2.5	10.74	0.72
3	12.4	42.52	0.97	2.5	12.51	0.72
2041 DO SOMETHING						
1	3.6	19.17	0.80	84.0	290.94	1.19
2	2.7	9.96	0.73	3.5	13.55	0.78
3	39.3	125.23	1.08	3.3	15.46	0.78

Table 21.10: Existing Junction 5 – ARCADY Analysis Results.

The analysis results indicate that the existing Junction 5 would operate within satisfactory capacity for the 2026 DO SOMETHING scenario during both peak hours. In comparison with the 2026 DO NOTHING scenario, it can be noted that the proposed development, in 2026, would have a negligible impact on Junction 5.

For the 2031 DO NOTHING scenario, even without the proposed development trips in place, the results indicate that Junction 5 would operate without capacity in the PM peak hour with an RFC at 1.05. With the inclusion of the proposed development (2031 DO SOMETHING), the highest RFC is recorded at 1.10 in the PM peak hour.

As mentioned previously, the 'Transportation Study at Dunboyne & Environs' (TSDE) have proposed interventions to help increase capacity along the R147 and near the M3 interchange west of Clonee. These interventions include the realignment of the junction between R147 and the R149 (the

subject Junction 5), and upgrades to the Clonee West Interchange, which include additional entry and exit slips to/from the M3 motorway.

It is considered in the TSDE that the realignment of the junction between the R147 and the R149 (Junction 5) is a short-term intervention (planning needed in 1-3 years with delivery in 3-5 years) and is "*immediately required due to current traffic issues*".

It is estimate, therefore, that these road interventions, subject to planning approval, will be in place any time in the short/medium term period and will help alleviate/mitigate any potential traffic issues arising from the proposed and potential future developments in Dunboyne and in the area. However, should these interventions not take place, in order to increase its operational capacity and support the development of the proposed residential scheme, as part of this application, some interventions to Junction 5 are also proposed. The interventions consist of upgrades to the north-western (R147) and north-eastern (R147) approaches, by increasing road widths, entry widths and flare lengths. The proposed upgrades are shown below. For details, please refer to Waterman Moylan Drawing No. 21-061 – P119 accompanying the documentation package.

It was advised by MCC that improvements to the pedestrian and cycling infrastructure along the M3 overbridge (R147) are currently being progressed by the Transport Infrastructure Ireland (TII). The proposed upgraded Junction 5 has been designed in a way to facilitate this TII intervention.

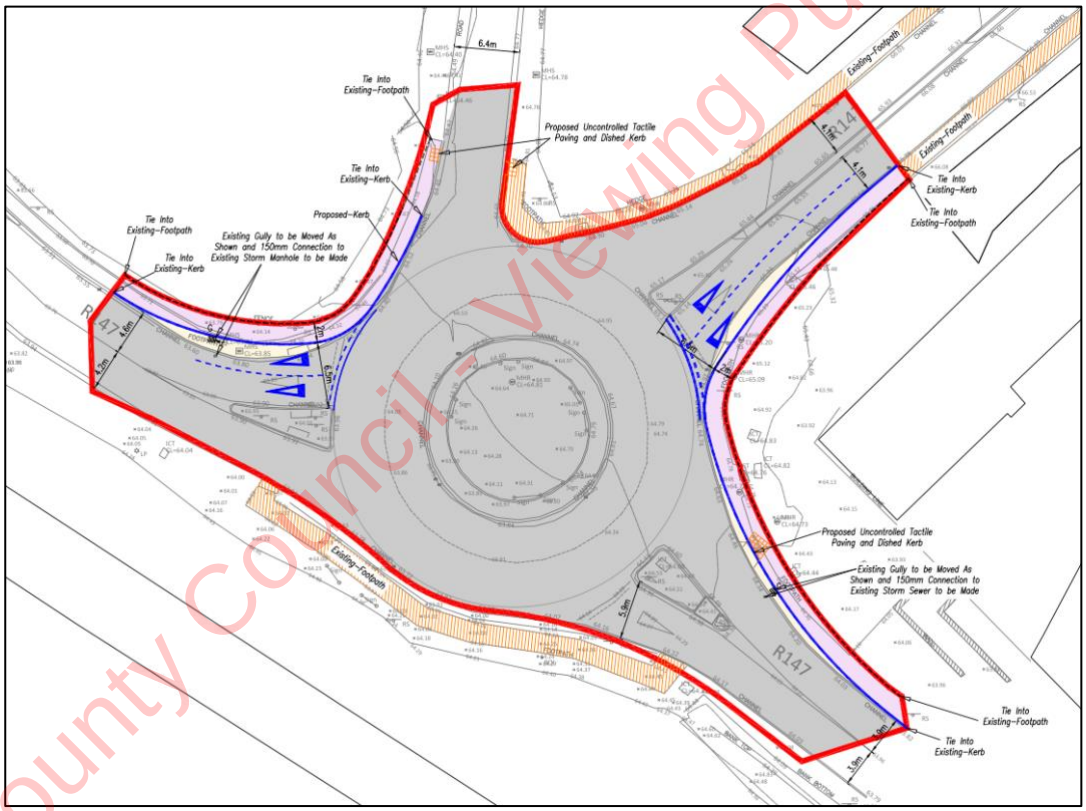


Figure 21.3: Junction 5 – Proposed Roundabout.

The ARCADY analysis results for the upgraded Junction 5 are presented below.

- Arm 1: R147 (E)
- Arm 2: R147 (S)
- Arm 3: R147 (N)
- Arm 4: M3 northbound on-slip (NE) – exit only

Arm	AM Peak Hour			PM Peak Hour		
	Queue (veh)	Delay (sec/veh)	RFC	Queue (veh)	Delay (sec/veh)	RFC
2031 DO SOMETHING						
1	1.3	7.11	0.56	4.6	16.10	0.83
2	2.1	8.35	0.68	3.1	12.66	0.76
3	3.2	10.56	0.77	1.2	6.08	0.55
2041 DO SOMETHING						
1	1.6	8.23	0.61	7.5	24.72	0.91
2	2.7	10.01	0.73	4.4	17.16	0.83
3	4.4	13.82	0.82	1.5	6.92	0.60

Table 21.11: Proposed Junction 5 – ARCADY Analysis Results.

The ARCADY analysis results summarised above indicate that the proposed upgraded Junction 5 would operate within capacity for the 2031 DO SOMETHING scenario during both peak hours and would continue to do so for the 2041 DO SOMETHING scenario.

In summary, it can be determined that the effects of the proposed development during the operational phase with regards to peak hour traffic will be momentary in terms of duration – occurring for less than an hour during the peak periods of the road network, and significant in terms of magnitude, which will alter the baseline condition, requiring upgrades to junctions. Outside the peak hours, however, the effects are likely to be permanent in terms of duration, but imperceptible or not significant in terms of magnitude.

Sensitivity Analysis

A Sensitivity Analysis was also undertaken as part of the TTA carried out for the subject application (accompanying the documentation package under a separate cover) to provide a robust appraisal of the local receiving road network for the future years of 2031 and 2041 (2031 Sensitivity Analysis and 2041 Sensitivity Analysis), and also to understand whether the proposed and potential future junctions would have capacity to accommodate the traffic arising from the potential future housing developments expected to be developed in the residential zoned lands to the north and south of L2228 Station Road.

The Sensitivity Analysis considered:

- The zoned lands to the north and south of the L2228 Station Road set out in the Dunboyne/Clonee/Pace Local Area Plan (2009 – 2015), to be accessed via the Eastern Distributor Road (EDR) and the Southern Distributor Road (SDR).
- The EDR, the Business Park Link and the SDR as set out in the 'Transportation Study at Dunboyne & Environs' (October 2018) and the current Meath County Council Development Plan (2021 – 2027)
- The upgrade of Junction 3 to a 4-armed signalised junction with the northern approach formed by the EDR.
- Reallocation of trips due to the construction of the EDR, the SDR and other road interventions.

In summary, the results for all assessed junctions indicated that they would operate within capacity for both the 2031 and 2041 Sensitivity Analysis scenarios during both peak hours. For additional details please refer to Section 10 of the accompanying TTA.

Walking, Cycling and Public Transport

A Travel Plan has been included in the subject application under a separate cover. The Plan sets out methods to reduce on private car journeys and encourage both residents and visitors of the proposed development to avail of sustainable forms of transport such as walking, cycling and public transport.

In this regard, the proposed development provides connectivity to existing facilities and public transport options, in particular the Dunboyne Railway Station. The proposed extension of the Southern Distributor Road (SDR) will facilitate pedestrian and cyclists' progression, by connecting the proposed cycle lanes and footpaths to the existing facilities.

It can be determined that the effects of the proposed development during the operational phase with regards to walking, cycling and public transport environment will be positive in terms of quality and permanent in terms of duration.

21.2.13 Material Assets (Waste) (Chapter 17)

Construction Stage

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 requirements of the EPA 'Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects' (2021) and is included as Appendix 15.1. The mitigation measures outlined in the RWMP will be implemented in full and form part of the mitigation strategy for the site. 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 17.1) in agreement with MCC, or submit an addendum to the RWMP to MCC, 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 implement the RWMP throughout the duration of the proposed excavation and construction phases.

A quantity of topsoil and sub soil will need to be excavated to facilitate the proposed development. The Development Engineers have estimated that 37,307 m^3 of excavated material 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.

In addition, the following mitigation measures will be implemented:

- Building materials will be chosen 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; (alternatively, the waste will be sorted for recycling, recovery or disposal);
- 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 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 Regulation 27 (By-products), as amended, of S.I. No. 323/2020 - European Union (Waste Directive) Regulations 2011-2020. EPA approval will be obtained prior to moving material as a by-product. However, it is not currently anticipated that Regulation 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 also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved and will promote more sustainable consumption of resources.

Operational Stage

The following mitigation measures will be implemented during the operational phase of the proposed development:

All waste materials will be segregated into appropriate categories and will be temporarily stored in appropriate bins or other suitable receptacles in a designated, easily accessible areas of the site.

- As previously stated, a project specific OWMP has been prepared and is included as Appendix 17.2. The mitigation measures outlined in the OWMP will be implemented in full and form part of the mitigation strategy for the site. Implementation of this OWMP will ensure a high level of recycling, reuse and recovery at the development. All recyclable materials will be segregated at source to reduce waste contractor costs and ensure maximum diversion of materials from landfill, thus achieving the targets set out in the EMR Waste Management Plan 2015 – 2021, Waste Action Plan for a Circular Economy – Waste Management Policy in Ireland and the MCC waste bye-laws.

- The Operator / Facilities Management of the site during the operational phase 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:

- 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 / Buildings Manager / Residents 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 / Buildings Manager / Residents 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 / Buildings Manager / Residents 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 development is dealt with in compliance with the provisions of the *Waste Management Act 1996*, as amended, associated Regulations, the *Litter Pollution Act 1997*, the *EMR Waste Management Plan (2015 - 2021)* and the MCC waste bye-laws. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved.

21.2.14 Material Assets (Utilities) (Chapter 18)

Construction Stage

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.
- Provision of silt fencing banners along the boundary of the site where surface water naturally falls towards watercourses/ditches.
- 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.
- Diversion of the existing Combined Sewer on site will be programmed carried out in such a way that disruption to the existing users will be kept to a minimum. For example, the diverted sewer will be constructed in it entirety prior to the connection from the neighbouring sites being made and the existing combined sewer being decommissioned and removed. Any long-term impact will be positive in nature as the sewer will be constructed with new materials.

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.
- The Irish Water contractor will be responsible for minimising disruption through adequate traffic management during construction of the upgraded watermain in the L2228. The impact on the surrounding road network will be short-term in nature.

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.
- The developer has considered the overhead lines and will limit the rotation of cranes and identify safe cranage zones to mitigate against any contact with the overhead lines. Plans for the proposed Cranage arrangements are included in the appendices of this document.

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.

Telecommunications – Virgin Media

- All existing services will be identified using Virgin Media service record maps.
- All connections to the Virgin Media network will be carried out and tested by Virgin Media personnel.

Operational Stage

Surface Water

- Flow restrictors with attenuation storage will be used to slowdown and store surface water runoff from discharging and to reduce runoff to the equivalent of the existing agricultural runoff.
- SUDS systems including permeable paving, swales and detention basing will be constructed on-line to intercept the first flush during rainfall events after periods of dry weather. Which will remove contaminants from the surface water runoff.
- 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.
- 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.
- Maintenance of permeable paving areas.

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.
- The pump will be adequately maintained and any dosing required prior to full occupation of the southern part of the site will be carried out to ensure adequate performance of the Foul Pumping station.

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.

21.2.15 Cultural Heritage (Architectural & Archaeological) (Chapter 19)

Construction Stage

There are no recorded archaeological sites listed in the SMR or RMP located within the proposed development site. There are also no Protected Structures or structures/gardens listed in the National of Architectural Heritage located within site and it is not within an Architectural Conservation Area. No mitigation measures for these elements of the cultural heritage resource are, therefore, required.

A programme of targeted archaeological test trenching would be carried out in advance of the construction phase under licence by the National Monuments Service. These site investigation works would include targeted test trenching of all features of archaeological potential identified during the geophysical survey of the proposed development site as well as the sections of the townland boundaries between Castlefarm, Ruskin and Clonee. All features confirmed as archaeological potential during the test trenching investigations would be cordoned off and recorded *in situ* in written, drawn and photographic formats. A report on the test trenching results would then be submitted to the National Monuments Service, per licensing requirements, who would be consulted to determine appropriate additional mitigation measures which may entail total/partial preservation *in situ* by avoidance or preservation by record by systematic archaeological excavation. Any required archaeological excavations works would be carried out under licence by the National Monuments Service and in advance of any construction works at their location.

Operational Stage

All required mitigation measures would be completed by the end of the construction phase and, therefore, no cultural heritage mitigation measures during the operational phase of the proposed development would be required.

21.2.16 Risk Management (Major Accidents & Disasters) (Chapter 20)

Construction Phase

The mitigation measures relevant to each environmental factor outlined in chapters 5 – 19 of the EIAR, as well as the CEMP, will be implemented during the Construction Phase of the development and will collectively mitigate the risk of major accidents and disasters during this time.

The Construction Phase of the Proposed Development will be carried out in accordance with best practice site management measures relating to health and safety and emergency response. These measures are described in the CEMP.

Operational Phase

No mitigation or monitoring measures are proposed specific to reducing the risk of major accident / disaster during operation.

22 SUMMARY OF RESIDUAL IMPACTS AND CUMULATIVE IMPACTS

22.1 Introduction

This Chapter of the EIAR collates the predicted residual impacts on the environment as identified in Chapters 5 to 19, arising from the Proposed Development, during Construction and Operational Phases.

Residual Impacts, according to the Draft EPA Guidelines (2017, p.3) are: -

> *"The final or intended effects which occur after the proposed mitigation measures have been implemented."*

A summary of the Proposed Mitigation Measures are outlined under Chapter 23: Summary of Mitigation Measures.

22.1.1 Population & Human Health (Chapter 5)

22.1.1.1 Proposed Development

Construction Phase

Businesses and Residences

It is predicted that there will be a positive impact on local business activity during the construction phase with the increased presence of construction workers using local facilities. This job creation will result in a ***positive***, ***local*** to ***regional***, ***imperceptible***, ***short-term*** socioeconomic impact.

The presence of these site personnel in the area during the construction phase will create a slight additional demand in the area for services, particularly for food from local shops, restaurants and cafés. There will also be economic benefits for providers of construction materials and other supporting services, e.g., quarries. This is predicted to result in a ***positive, local*** to ***regional, indirect, not-significant, short-term*** socioeconomic impact.

The residual impacts on local businesses and residences in relation to air quality, noise, visual impact, and traffic has been summarised in the below sections.

Landscape Amenity and Tourism

With reference to Chapter 15 (Landscape and Visual), the significance of the residual construction stage impacts is considered to be ***Moderate Adverse to Negligible, significant*** to ***not significant*** and ***temporary.*** The Proposed Development will have no discernible effect on local tourism.

Land and Water Emissions

The implementation of mitigation measures outlined above will ensure that the residual impacts during the construction phase in respect of the environmental factor of Soils, Geology and Hydrogeology is ***short term-imperceptible-neutral*** and **negligible** in magnitude. In respect of the environmental factor of Hydrology is ***short-term-imperceptible-neutral***.

Air Emissions

As detailed in Chapter 11 Air Quality Section 11.7.1.3, 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, direct, short-term*** and ***imperceptible*** with respect to human health.

Noise and Vibration Emissions

As detailed in Chapter 14 (Noise and Vibration), during the construction phase of the project there is the potential for temporary to 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.

Following mitigation, the residual noise and vibration effects during the construction phase will be ***local, negative, slight*** to ***moderate*** and ***temporary*** to ***short-term***. The residual impact of construction vibration building occupants is determined to be of ***Negative, Imperceptible*** to ***slight*** and ***Short-Term*** effect.

Traffic and Transportation

Provided the mitigation measures and the management procedures outlined in the Construction Management Plan (CMP) are incorporated during the construction phase, the residual impact upon the local receiving environment is predicted to be ***medium-term*** in nature and ***slight negative*** in terms of effect – causing noticeable changes in the character of the environment without affecting its sensitivities.

With regards to pedestrian and cycle infrastructure, construction will have a not significant effect – causing noticeable changes in the character of the environment but without significant consequences.

Major Accident Hazards and/or Natural Disasters

There are no significant potential impacts on Human Health from Major Accident Hazards and/or Natural Disasters; therefore, there are no residual impacts.

Operational Phase

Businesses and Residences

The Proposed Development will provide modern, well-designed and sustainable housing units in the Dunboyne and area during the operational phase. The proposed development will provide a childcare facility to the wider community, as well as open spaces and communal amenity open space for community use, all of which will be of benefit to the health of the local population.

Positive impacts on population and human health will include health benefits associated with the provision of a significant number of modern, well-designed and sustainable housing units, a high-quality environment, public open space and improvements to the public realm which creates a highly permeable layout that encourages walking and cycling, amenity and recreational facilities, including use of public transport options and local retail and commercial offerings.

The proposed development will enhance the local area by providing a childcare facility that will strengthen the social and community infrastructure of the area and provide employment opportunities.

The proposed development does not represent a loss of land that would otherwise be used for an alternative purpose. The proposed development will be located in residential zoning lands and aligns with the Meath County Development Plan 2021-2027, for Dunboyne, Clonee and Pace.

As such, the Proposed Development will result in a ***positive, significant*** and ***long term*** impact.

The predicted impacts on local businesses and residences in relation to air quality, noise, visual impact, and traffic has been summarised below.

Amenity and Tourism

With reference to Chapter 15 (Landscape and Visual), while recognising there are localised significant landscape and visual impacts, the proposed development, while sizeable, can be accommodated and absorbed into this part of Dunboyne without causing significant detrimental or unacceptable landscape or visual effects. Also, the proposed development, associated parklands, open space and public realm landscapes and additional planting to far more significant vegetation cover on this site than it had a present, will include positive and significant elements that will contribute to the amenity, character and broader environment of this part of Dunboyne.

The residual impact of the proposed development is considered to result in a ***positive, slight,*** and ***long-term*** impact for operational phase. The Proposed Development will have no discernible effect on local tourism.

Land and Water Emissions

The implementation of mitigation measures outlined above will ensure that the residual impacts during the operational phase in respect of the environmental factor of Soils, Geology and Hydrogeology is ***long-term-imperceptible-neutral*** and ***negligible*** magnitude***.*** In respect of the environmental factor of Hydrology is ***long-term-imperceptible-neutral*** and ***negligible*** magnitude***.***

Air Emissions

As detailed in Chapter 11 Air Quality, air dispersion modelling was undertaken to assess the impact of the development with reference to EU ambient air quality standards which are based on the protection of human health. As demonstrated by the dispersion modelling results, the emissions of air pollutants during the operational phase are predicted to be significantly below the ambient air quality standards, which are based on the protection of human health. Therefore, residual impacts to human health related to air quality will be ***long-term, localised, neutral and non-significant***.

Noise and Vibration Emissions

Regarding traffic noise levels, the predicted impact is expected to be ***Negative, Not Significant*** to ***Slight*** and ***Long-term,*** in the context of the existing noise environment and of traffic noise level at the nearest NSLs to the distributor road linking.

Regarding mechanical and electrical plant noise, once operational noise emissions are controlled within the development site, noise emissions outside the site will be imperceptible. The residual noise effect is **Neutral**, ***Imperceptible*** and ***Long Term***.

The proposed development will not generate any perceptible levels of vibration during operation and therefore there will be no impact from vibrations on human health.

Traffic and Transportation

The analysis of the road network has shown that the existing and proposed upgraded junctions would operate within capacity for the 2041 DO SOMETHING scenario during both the AM and PM peak hours. The proposed upgraded junctions would also be able to cater for the additional traffic demand arising from the residential zoned lands in Dunboyne (2041 Sensitivity Analysis).

Whilst the estimated increase in traffic over the baseline conditions is considered moderate, the proposed upgraded junctions would have a ***positive*** impact in terms of quality, increasing the

capacity of the road network to accommodate the proposed and potential future developments, and would be ***medium/long-term*** in terms of duration.

The extension of the Southern Distributor Road and provision of adequate pedestrian and cyclist facilities as part of the proposed development, will results in a ***positive*** and ***permanent*** effect in terms of sustainable transport options.

Major Accident Hazards and/or Natural Disasters

There are no significant potential impacts on Human Health from Major Accident Hazards and/or Natural Disasters; therefore, there are no residual impacts.

22.1.1.2 Cumulative

The potential for cumulative impact of the proposed development with any/all relevant other planned or permitted developments are discussed in Sections 5.7.2.1 and 5.7.2.2 below for construction and operational phases.

The likely cumulative impact of the proposed development in conjunction with these cumulative developments upon health in relation to noise, dust generation, construction traffic, visual impacts, etc., associated with the works; have been assessed in the respective EIA Report Chapters.

Construction Phase

In a worst-case scenario, multiple developments in the area could be developed concurrently or overlap in the construction phase and contribute to additional impacts in terms of traffic, dust, and noise.

The implementation of mitigation measures within each chapter and detailed in Section 5.5.1; as well as the compliance of adjacent development with their respective planning permissions, will ensure there will be minimal cumulative potential for change in soil quality or the natural groundwater regime during the construction phase of the proposed development. The cumulative impact is considered to be ***neutral*** and ***imperceptible***.

Regarding Water impacts, the implementation of the mitigation measures contained CEMP will result in minimal cumulative potential for change in surface water quality or the natural hydrological regime. The cumulative impact is considered to be ***neutral*** and ***imperceptible***.

There are no predicted cumulative impacts arising from the construction phase of the proposed development respective to Traffic.

Contractors for the Proposed Development will be contractually required to operate in compliance with a project-specific CEMP and Construction Traffic Management Plan which will include the mitigation measures outlined in this EIA Report. The construction phase for the overall development of the applicant owned lands would be restricted by the same binding limits for noise, dust, and emissions to water.

According to the IAQM guidance (2014) should the construction phase of the proposed development coincide with the construction phase of any other developments within 350m then there is the potential for cumulative construction dust related impacts to nearby sensitive receptors. However, provided the mitigation measures outlined in Section **Error! Reference source not found.** and Appendix 11.1, are implemented throughout the construction phase of the proposed development significant cumulative dust impacts are not predicted. The predicted residual cumulative air quality impacts during the construction phase are ***short-term, direct, negative, localised and imperceptible.***

The residual noise and vibration impact from the various projects with potential for cumulative impacts have been assessed. There are no residual significant cumulative impacts forecast. The residual effects are ***negative, slight*** to ***moderate*** and ***temporary to short-term***.

Operational Phase

Regarding chapter 7 (Soils), there are no other large projects proposed within this area of the aquifer so no cumulative impact on recharge to the aquifer. All developments are required to manage groundwater discharges. As such there will be no cumulative impact to groundwater quality and therefore there will be no cumulative impact on the Groundwater Body Status. The operation of the proposed development is concluded to have a ***long-term***, ***imperceptible*** significance with a ***neutral*** impact on soil and water quality.

All developments are required to manage groundwater discharges in accordance with S.I. 272 of 2009 and S.I. 77 of 2019. As such there will be no cumulative impact to groundwater quality and therefore there will be no cumulative impact on the Surface Waterbody Status. The cumulative impact is considered to be ***neutral*** and ***imperceptible***

The cumulative impact for air emissions is included within the operational stage impact for the proposed development. The impact is predicted to be ***long-term, negative*** and ***imperceptible*** with regards to air quality.

The residual noise and vibration impact associated with the operational phase of the proposed project and the projects assessed for cumulative impacts are ***negative, not significant*** and ***long-term***.

Worst Case Impact

In respect to Landscape, the assessment of effects is based on the worst-case scenario where the proposed development would be most visible.

In respect to Air Emissions, the assessment of effects is based on the worst-case scenarios.

In respect to Noise and Vibration, the assessments have all determined with the inclusion of potential worst case scenarios, no significant effects are likely to occur.

There was no specific modelling carried out for a worst-case impact scenario, however, it is very much likely that, should the construction of all zoned lands occur simultaneously, given its existing condition, there will be significant traffic displacement in the studied local road network.

22.1.2 Biodiversity (Chapter 6)

22.1.2.1 Proposed Development

The construction and operational mitigation proposed for the development satisfactorily addresses the mitigation of potential impacts on the sensitive receptors through the design and the application of construction and operational phase controls. In relation to bats foraging on site in the vicinity of the oak treeline would be reduced and this would be considered to be a moderate adverse/negative/site/long term/ not significant impact on bats. The overall impact on the ecology of the proposed development will result in a low Adverse / Negative/ site/ not significant / long term impact on the ecology of the area and locality overall. This is primarily as a result of the loss of terrestrial habitats including arable land and hedgerows on site, supported by the creation of an improved biodiversity focused riparian corridor, additional biodiversity features, standard construction and operational controls and a sensitive native landscaping strategy.

22.1.2.2 Cumulative

Cumulative Impacts can be defined as "*impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project*". Effects which are caused by the interaction of effects, or by associated or off-site projects, are classed as indirect effects.

Cumulative effects are often indirect, arising from the accumulation of different effects that are individually minor. Such effects are not caused or controlled by the project developer.

A review of other off-site developments and proposed developments was completed as part of this assessment. The following projects and plans were reviewed and considered for possible cumulative effects with the Proposed Development.

Table 6.5a & 6.5b detail the existing, proposed and granted planning permissions on record in the area:

Construction Stage

Table 6.5a. Potential Cumulative Impacts (Construction Stage)

Planning Ref. No.	Address	Summary of Development
212395	Mill Farm Cottage , Station Road, Dunboyne, Co. Meath	the demolition of an existing single storey cottage including partially demolished ancillary structures
RA180561	Site South Of Station Road, Dunboyne, Co. Meath	the construction of 83 no. dwellings and a creche on a site area of 2.6ha. The proposed development consists of the construction of 10 no. 1, 2 & 3 bed apartments in a 3 storey building, 16 no. 2 & 3 bed duplex units in 2 no. 3 storey blocks and 57 no. 2, 3 & 4 bedroom, 2 & 3 storey detached, semi-detached and terraced houses. The proposed development also provides for a single storey creche (117m2), open spaces, landscaping, car parking and all associated site development works. Access to the development will be via a newly constructed access road, directly off Station Road and associated upgrade works, including provision of new bus stop, along the boundary of the site with Station Road. Significant further information/revised plans submitted on this application
RA170175	Loughshallagh Pumping Station, Clonee, Co. Meath	a ten year planning permission for development which will consist of the construction of a 98.18 sq.m Water Pumping Station with access to the nearby R147 including associated site works to replace the existing Loughsallagh Water Pumping Station as part of improvements to the water supply network
RA150605	Lands at Portan, Gunnocks and Clonee, County Meath	Construction of a data centre campus in two phases within 10 years which consists of the following: In Phase 1: Construction of two data centre buildings containing 8 no. data halls with a gross floor area of 50,800 m2 and with a data capacity of 36MW per building (each building is 25,400 m2 and contains 4 no. data halls) together with associated mechanical and electrical spaces and parking. 1 No. single storey ancillary administration/office building with gross floor area of 6,424 m2 linking and accessing the data centre buildings. Ground-level emergency back-up generators (with internal fuel tanks). New site access and temporary construction access and car parking arrangements (including utilisation of existing farm access) off the Kilbride Road (L5028). Closure of existing

Planning Ref. No.	Address	Summary of Development
		accesses (following the demolition of 2no. residential units). Site infrastructure to include entrance gates and appropriate signage, security hut (36m2), internal roadways & footpaths, 217 car parking spaces in total across the site in both phases, bicycle shelter, a water sprinkler tank, pumping facilities, water tanks, drainage networks, attenuation ponds and a connection to the public sewer on the R147. Bridges and culverts over the Pace and Portan streams. Hard and soft landscaping. Demolition of two existing residential dwellings on Kilbride Road (L0528), 150 metres northeast of R147/L5028. Upgrade to L5028 Kilbride Road to provide cycle path and pedestrian footpath between the R147 and the proposed new site access. Installation of temporary electrical infrastructure to service the data centre campus before final connection. Ancillary site works including underground electricity 20kV cables between substation and data centres.

As part of the assessment of the impact of the proposed development, account has also been taken of cumulative projects, i.e. developments that are currently permitted or under construction within the surrounding area, but whose environmental impact are not yet fully realised within the existing environmental baseline. Following a review of projects located in proximity to the proposed development it was determined that no significant projects are proposed or currently under construction that could potentially cause in combination effects on designated conservation sites.

Given this, it is considered that in combination effects on biodiversity, with other existing and proposed developments in proximity to the application area, would be unlikely, neutral, not significant and localised. It is concluded that no significant effects on designated conservation sites will be seen as a result of the proposed development alone or in combination with other projects.

Operational Stage

Table 6.5b. Potential Cumulative Impacts (Operational Stage)

Planning Ref. No.	Address	Summary of Development
212395	Mill Farm Cottage , Station Road, Dunboyne, Co. Meath	the demolition of an existing single storey cottage including partially demolished ancillary structures
RA180561	Site South Of Station Road, Dunboyne, Co. Meath	the construction of 83 no. dwellings and a creche on a site area of 2.6ha. The proposed development consists of the construction of 10 no. 1, 2 & 3 bed apartments in a 3 storey building, 16 no. 2 & 3 bed duplex units in 2 no. 3 storey blocks and 57 no. 2, 3 & 4 bedroom, 2 & 3 storey detached, semi-detached and terraced houses. The proposed development also provides for a single storey creche (117m2), open spaces, landscaping, car parking and all associated site development works. Access to the development will be via a newly constructed access road, directly off Station Road and associated upgrade works, including provision of new bus stop, along the boundary of the site with Station

Planning Ref. No.	Address	Summary of Development
		Road. Significant further information/revised plans submitted on this application
RA170175	Loughshallagh Pumping Station, Clonee, Co. Meath	a ten year planning permission for development which will consist of the construction of a 98.18 sq.m Water Pumping Station with access to the nearby R147 including associated site works to replace the existing Loughsallagh Water Pumping Station as part of improvements to the water supply network
RA150605	Lands at Portan, Gunnocks and Clonee, County Meath	Construction of a data centre campus in two phases within 10 years which consists of the following: In Phase 1: Construction of two data centre buildings containing 8 no. data halls with a gross floor area of 50,800 m2 and with a data capacity of 36MW per building (each building is 25,400 m2 and contains 4 no. data halls) together with associated mechanical and electrical spaces and parking. 1 No. single storey ancillary administration/office building with gross floor area of 6,424 m2 linking and accessing the data centre buildings. Ground-level emergency back-up generators (with internal fuel tanks). New site access and temporary construction access and car parking arrangements (including utilisation of existing farm access) off the Kilbride Road (L5028). Closure of existing accesses (following the demolition of 2no. residential units). Site infrastructure to include entrance gates and appropriate signage, security hut (36m2), internal roadways & footpaths, 217 car parking spaces in total across the site in both phases, bicycle shelter, a water sprinkler tank, pumping facilities, water tanks, drainage networks, attenuation ponds and a connection to the public sewer on the R147. Bridges and culverts over the Pace and Portan streams. Hard and soft landscaping. Demolition of two existing residential dwellings on Kilbride Road (L0528), 150 metres northeast of R147/L5028. Upgrade to L5028 Kilbride Road to provide cycle path and pedestrian footpath between the R147 and the proposed new site access. Installation of temporary electrical infrastructure to service the data centre campus before final connection. Ancillary site works including underground electricity 20kV cables between substation and data centres.

As part of the assessment of the impact of the proposed development, account has also been taken of cumulative projects, i.e. developments that are currently permitted or under construction within the surrounding area, but whose environmental impact are not yet fully realised within the existing environmental baseline. Following a review of projects located in proximity to the proposed development it was determined that no significant projects are proposed or currently under construction that could potentially cause in combination effects on designated conservation sites. Given this, it is considered that in combination effects on biodiversity, with other existing and proposed developments in proximity to the application area, would be unlikely, neutral, not significant and localised. It is concluded that no significant effects on designated conservation sites will be seen as a result of the proposed development alone or in combination with other projects.

Do-Noting Impact

The site would continue to be farmed. The watercourses traversing through the subject site would remain unchanged.

22.1.3 Land, Soils and Geology (Chapter 7)

22.1.3.1 Proposed Development

Construction Phase

The implementation of mitigation measures outlined above will ensure that the predicted impacts on the geological and hydrogeological environment do not occur during the construction phase and that the residual impact will be ***short-term-imperceptible-neutral***. Following the TII criteria (refer to Appendix 7.1) for rating the magnitude and significance of impacts on the geological and hydrogeological related attributes, the magnitude of impact is considered ***negligible***.

Operational Phase

The implementation of mitigation measures outlined above will ensure that the predicted impacts on the geological and hydrogeological environment do not occur during the operational phase and that the residual impact will be ***long-term-imperceptible-neutral***. Following the TII criteria (refer to Appendix 7.1) for rating the magnitude and significance of impacts on the geological and hydrogeological related attributes, the magnitude of impact is considered ***negligible***.

22.1.3.2 Cumulative Development

As mentioned in section 7.4.2. above, the following considers the cumulative impacts of the proposed development and proposed and permitted and operating facilities in the surrounding area in relation to Land, Soils, Geology and Hydrology. This considers the proposed development and other surrounding proposed and permitted developments as follows:

- **Exempted Development** - In order to accommodate this development and other developments in and around the Dunboyne area, Irish Water will be required to upgrade c. 1,100m of existing 200mm uPVC watermain so as to provide a 400mm ID watermain in its place. This is to be undertaken by Irish Water under their exempted development provisions and these works do not form part of this planning application as a result.
- **Future Development** - The planning application includes an 470m length of distributor road linking to that part of the distributor road already built as part of the Castle Farm Meadows development which ultimately connects with Station Road. This proposed road forms part of the overall Dunboyne Distributor Road; an objective of the Meath County Development Plan 2021-2027. It is intended as part of that Development Plan objective that in the future that distributor road would be extended southwards and then eastwards over the railway line. The design for this future extension to the distributor road and bridge has been included in this application as evidence that it provides a viable workable solution, however permission for that extension is not being sought at this time as it is not required to cater for this development.
- **Residential Development Meath County Council Reg. Reg. 22675** - On 24 May 2022, Darcon Properties Ltd. applied for permission for 8 no. two storey semi-detached houses with habitable attic accommodation, 2 no. two storey end-terrace houses with habitable attic accommodation, 2 no. two storey mid terrace houses, a three storey apartment building accommodating 9 no. apartments and all ancillary and associated site development works. Further information was sent to Meath County Council on the 17 April 2023. This application was granted on the 24th May 2023.
- **Dart + West**– A railway order was submitted to An Bord Pleanála for a Railway Order for DART+ West Project on 29th July 2022. This project has completed its public consultation and is now currently undergoing detailed design and beginning the procurement process.

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

Contractors for the Proposed Development will be contractually required to operate in compliance with the CEMP which includes the mitigation measures outlined in this EIA report. Other developments will also have to incorporate measures to protect soil and water quality in compliance with legislative standards for receiving water quality (European Communities Environmental Objectives (Groundwater) Regulations (S.I. 9 of 2010 and S.I. 266 of 2016). As a result, there will be minimal cumulative potential for change in soil quality or the natural groundwater regime. The cumulative impact is considered to be ***neutral*** and ***imperceptible***.

Operational Phase

There are no other large projects proposed within this area of the aquifer so no cumulative impact on recharge to the aquifer. All developments are required to manage groundwater discharges in accordance with S.I. 9 of 2010 and S.I. 266 of 2016 amendments. As such there will be no cumulative impact to groundwater quality and therefore there will be no cumulative impact on the Groundwater Body Status. The operation of the proposed development is concluded to have a ***long-term***, ***imperceptible*** significance with a ***neutral*** impact on soil and water quality.

22.1.4 Water (Chapter 8)

22.1.4.1 Proposed Development

Construction Phase

The implementation of mitigation measures outlined above will ensure that the predicted impacts on the hydrological environment do not occur during the construction phase and that the residual impact will be ***short-term-imperceptible-neutral***. Following the TII criteria (refer to Appendix 8.1) for rating the magnitude and significance of impacts on the geological and hydrogeological related attributes, the magnitude of impact is considered ***negligible***.

Operational Phase

The implementation of mitigation measures outlined above will ensure that the predicted impacts on the hydrological environment do not occur during the operational phase and that the residual impact will be ***long-term-imperceptible-neutral***. Following the TII criteria (refer to Appendix 8.1) for rating the magnitude and significance of impacts on the geological and hydrogeological related attributes, the magnitude of impact is considered ***negligible***.

22.1.4.2 Cumulative Development

The following considers the cumulative impacts of the proposed development and proposed and permitted and operating facilities in the surrounding area in relation to Hydrology. This considers the proposed development and other surrounding proposed and permitted developments as follows:

- **Exempted Development** - In order to accommodate this development and other developments in and around the Dunboyne area, Irish Water will be required to upgrade c. 1,100m of existing 200mm uPVC watermain so as to provide a 400mm ID watermain in its place. This is to be

undertaken by Irish Water under their exempted development provisions and these works do not form part of this planning application as a result.

- **Future Development** - The planning application includes an 470m length of distributor road linking to that part of the distributor road already built as part of the Castle Farm Meadows development which ultimately connects with Station Road. This proposed road forms part of the overall Dunboyne Distributor Road; an objective of the Meath County Development Plan 2021-2027. It is intended as part of that Development Plan objective that in the future that distributor road would be extended southwards and then eastwards over the railway line. The design for this future extension to the distributor road and bridge has been included in this application as evidence that it provides a viable workable solution, however permission for that extension is not being sought at this time as it is not required to cater for this development.
- **Residential Development Meath County Council Reg. Reg. 22675** - On 24 May 2022, Darcon Properties Ltd. applied for permission for 8 no. two storey semi-detached houses with habitable attic accommodation, 2 no. two storey end-terrace houses with habitable attic accommodation, 2 no. two storey mid terrace houses, a three storey apartment building accommodating 9 no. apartments and all ancillary and associated site development works. Further information was sent to Meath County Council on the 17 April 2023. This application was granted on the 24th May 2023.
- **Dart + West**– A railway order was submitted to An Bord Pleanála for a Railway Order for DART+ West Project on 29th July 2022. This project has completed its public consultation and is now currently undergoing detailed design and beginning the procurement process.

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

Contractors for the Proposed Development will be contractually required to operate in compliance with the CEMP which includes the mitigation measures outlined in this EIA report. Other developments will also have to incorporate measures to protect surface water quality in compliance with legislative standards for receiving water quality (European Communities Environmental Objectives (Surface Water) Regulations (S.I. 272 of 2009 and S.I. 77 of 2019 amendments). As a result, there will be minimal cumulative potential for change in surface water quality or the natural hydrological regime. The cumulative impact is considered to be ***neutral*** and ***imperceptible***.

Operational Phase

There are no other large projects proposed within this area of the aquifer so no cumulative impact on recharge to the aquifer. All developments are required to manage groundwater discharges in accordance with S.I. 272 of 2009 and S.I. 77 of 2019. As such there will be no cumulative impact to groundwater quality and therefore there will be no cumulative impact on the Surface Waterbody Status. The cumulative impact is considered to be ***neutral*** and ***imperceptible***.

22.1.5 Microclimate (wind) (Chapter 9)

22.1.5.1 Proposed Development

Wind cannot be eliminated or totally mitigated as it depends on weather conditions which could vary. The data of the historical wind conditions collected and reported in the previous sections, show that the wind speeds likely to occur on the site are below critical values and that pleasant and comfortable microclimate can be maintained for most of the time and under the most frequent wind scenarios.

Having considered the above, no further changes to the development design and further increasing of the landscaping is suggested, as safety and pedestrian comfort is maintained in accordance with Lawson Comfort and Distress Criteria.

22.1.5.2 Cumulative Impacts

Construction Stage

Exempted Development

As the works to be undertaken by Uisce Eireann involve below ground works, these can be disregarded for the purposes of this assessment as there will be a negligible/neutral impact on the wind environment.

No residual wind impact arising from these exempted development works. No monitoring required.

Future Development

The wind conditions at the site would gradually adjust to those of the completed development during the construction phase and no significant wind impact arising during the construction phase.

No residual wind impact arising from these future development works. No monitoring required.

Residential Development Meath County Council Reg. Reg. 22675

The wind conditions at the site would gradually adjust to those of the completed development during the construction phase and no significant wind impact arising during the construction phase.

No residual wind impact arising from these Residential development works. No monitoring required.

Dart + West

The wind conditions at the site would gradually adjust to those of the completed development during the construction phase and no significant wind impact arising during the construction phase.

Operational Stage

Exempted Development

As the works to be undertaken by Uisce Eireann involve below ground works, these can be disregarded for the purposes of this assessment as there will be a negligible/neutral impact on the wind environment.

No residual wind impact arising from these Residential development works. No monitoring required.

Future Development

According to Lawson map shown in **Error! Reference source not found.**, the wind condition at the future development (future bridge/road over the existing railway) will be suitable for intended use (standing/strolling/walking) and there will be no unsafe or uncomfortable area for pedestrians.

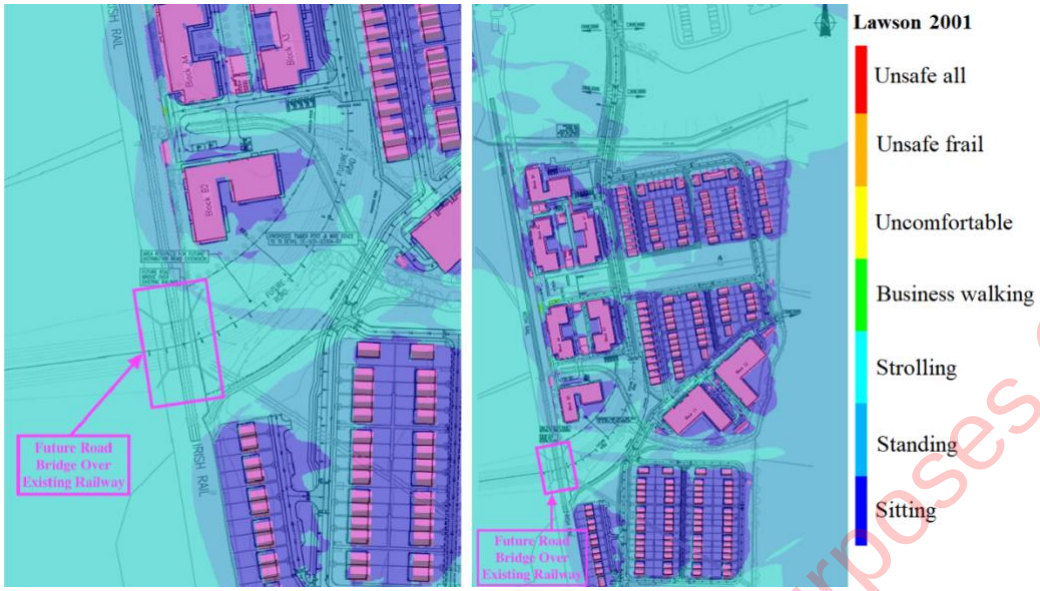


Figure 22.1: Wind Microclimate Conditions at future development (Lawson Comfort/Distress Map)

No residual wind impact arising from these Residential development works. No monitoring required.

Residential Development Meath County Council Reg. Reg. 22675

In accordance with the guideline cited in section **Error! Reference source not found.**, the wind microclimate study should consider the effect of the proposed development together with buildings (existing and/or permitted) that are within 400m from the centre of the site. As the proposed buildings are located at least 450m far from the residential development (Reg. 22675), the impact of wind on this cumulative development is negligible and the wind conditions on the site will be in line with the Proposed scenario wind microclimate.

No residual wind impact arising from these Residential development works. No monitoring required.

Dart + West

In accordance with the guideline cited in section **Error! Reference source not found.**, the wind microclimate study should consider the effect of the proposed development together with buildings (existing and/or permitted) that are within 400m from the centre of the site. As the proposed buildings are located at least 450m far from Dunboyne train station, the impact of wind on this cumulative development is negligible and the wind conditions on the site will be in line with the Proposed scenario wind microclimate.

No residual wind impact arising from these Residential development works. No monitoring required.

22.1.6 Climate (Air Quality) (Chapter 10)

22.1.6.1 Proposed Development

Construction Stage

In order to minimise dust emissions during construction, a series of mitigation measures have been prepared in the form of a Dust Management Plan (Appendix 10.1). Provided the dust minimisation measures outlined in the plan are adhered to, the predicted residual air quality impacts during the construction phase are short-term, direct, negative, localised and imperceptible.

Best practice mitigation measures are proposed for the construction phase of the proposed development, which will focus on the proactive 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 will ensure that the impact complies with all EU ambient air quality legislative limit values, which are based on the protection of human health (see **Error! Reference source not found.**). Therefore, the predicted residual, dust-related, human health impact of the construction phase of the proposed development is negative, direct, short-term and imperceptible.

Operational Stage

Dispersion modelling of traffic emissions at sensitive receptors in proximity to impacted road links during the operational phase indicate pollutant emissions will be in compliance with the relevant air quality standards. Section **Error! Reference source not found.** determined that the impact to air quality as a result of increased traffic volumes during the operational phase of the proposed development will be long-term, localised, neutral and non-significant.

Emissions of air pollutants during the operational phase are predicted to be significantly below the ambient air quality standards, which are based on the protection of human health. Therefore, residual impacts to human health related to air quality will be long-term, localised, neutral and non-significant.

22.1.6.2 Cumulative

Construction Stage

Developments that potentially could overlap during the construction phase:

- **Exempted Development** - In order to accommodate this development and other developments in and around the Dunboyne area, Irish Water will be required to upgrade c. 1,100m of existing 200mm uPVC watermain so as to provide a 400mm ID watermain in its place. This is to be undertaken by Irish Water under their exempted development provisions and these works do not form part of this planning application as a result.
- **Future Development** - The planning application includes an 470m length of distributor road linking to that part of the distributor road already built as part of the Castle Farm Meadows development which ultimately connects with Station Road. This proposed road forms part of the overall Dunboyne Distributor Road; an objective of the Meath County Development Plan 2021-2027. It is intended as part of that Development Plan objective that in the future that distributor road would be extended southwards and then eastwards over the railway line. The design for this future extension to the distributor road and bridge has been included in this application as evidence that it provides a viable workable solution, however permission for that extension is not being sought at this time as it is not required to cater for this development.
- **Residential Development Meath County Council Reg. Reg. 22675** - On 24 May 2022, Darcon Properties Ltd. applied for permission for 8 no. two storey semi-detached houses with habitable attic accommodation, 2 no. two storey end-terrace houses with habitable attic accommodation, 2 no. two storey mid terrace houses, a three-storey apartment building accommodating 9 no. apartments and all ancillary and associated site development works. Further information was sent to Meath County Council on the 17 April 2023. This application was granted on the 24th of May 2023.
- **Dart + West**– A railway order was submitted to An Bord Pleanála for a Railway Order for DART+ West Project on 29th July 2022. This project has completed its public consultation and is now currently undergoing detailed design and beginning the procurement process.

According to the IAQM guidance (2014) should the construction phase of the proposed development coincide with the construction phase of any other developments within 350m then there is the potential for cumulative construction dust related impacts to nearby sensitive receptors. However, provided the mitigation measures outlined in Section **Error! Reference source not found.** and Appendix 10.1, are implemented throughout the construction phase of the proposed development significant cumulative dust impacts are not predicted. The predicted residual cumulative air quality impacts during the construction phase are short-term, direct, negative, localised and imperceptible.

Operational Stage

The cumulative impact is included within the operational stage impact for the proposed development. The impact is predicted to be long-term, negative and imperceptible with regards to air quality.

22.1.7 Climate (Climate Change) (Chapter 11)

22.1.7.1 Proposed Development

Construction Stage

The proposed development will result in some impacts to climate through the release of GHGs. TII state that the crux of assessing significance 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"*. The proposed development is committing to reducing climate impacts, where feasible, and the development will comply with the Do-Minimum standards set through regulation. As per the assessment criteria in **Error! Reference source not found.** the impact of the proposed development in relation to GHG emissions is considered long-term, minor adverse and not significant in EIA terms provided the final design and construction phase take account of GHG mitigation measures set out in local and National Climate Action Plans.

Operational Stage

The proposed development will result in some impacts to climate through the release of GHGs, however the projects Energy Analysis Report aims to minimise operational phase energy requirements. TII state that the crux of assessing significance 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"*. As per the assessment criteria in **Error! Reference source not found.** the impact of the proposed development in relation to GHG emissions is considered long-term, minor adverse and not significant in EIA terms provided the final design and operational phase emissions take account of GHG mitigation measures set out in Fingal and National Climate Action Plans.

In relation to climate change vulnerability, it has been assessed that there is a low risk as a result of future climate change hazards with the exception of flood risk which has a medium risk. This risk will be mitigated where possible to reduce the vulnerability of the site. Design mitigation measures have been put in place to ensure buildings on the site have added resilience to potential flooding. These measures include a minimum finished floor level for the proposed development is set 500 mm above the fluvial 1% AEP plus MRFS climate change water level.

22.1.7.2 Cumulative

With respect to the requirement for a cumulative assessment PE-ENV-01104 (TII, 2022c) states that *"for GHG Assessment is the global climate and impacts on the receptor from a project are not geographically constrained, the normal approach for cumulative assessment in EIA is not considered applicable."*

However, by presenting the GHG impact of a project in the context of its alignment to Ireland's trajectory of net zero and any sectoral carbon budgets, this assessment will demonstrate the potential for the project to affect Ireland's ability to meet its national carbon reduction target. Therefore, the assessment approach is considered to be inherently cumulative.

While the assessment is inherently cumulative the progression of the Dart+ West project, regarding which a railway order was submitted to An Bord Pleanála on 29th July 2022, has the potential to

improve the availability of public transport for the residents of the proposed development. Therefore reducing a reliance on private vehicles for transport which have high GHG emissions.

22.1.8 Climate (Daylight) (Chapter 12)

22.1.8.1 Proposed Development

During the design process the position and mass of the buildings, the finished floor level, and the height of parapets were technically assessed to reduce any potential effect on the daylight of adjacent properties. This informed the final design. Any residual effect on the daylight of the adjacent properties is neutral.

Construction Stage

During the construction phase all scaffolding, hoarding and cranes will only be in use for as long as necessary to facilitate the construction of the proposed development. The effect of these is considered temporary and imperceptible.

Operational Stage

The effect on daylight to neighbouring buildings is not projected to change over the operational phase of the development.

Worst Case Impact

There are no 'Worst Case' effects projected from completion of this proposed development.

22.1.8.2 Cumulative

Any residual effect on the daylight of the adjacent buildings from the related and cumulative developments is neutral. No significant adverse effects will be experienced from the completion of the proposed development and the related and cumulative developments. No mitigation measures will be required.

Construction Stage

The effect of any hoarding or construction equipment, on the related and cumulative development sites, is considered temporary and imperceptible. During the construction of the Irish Water exempted development the effect of construction work would be temporary and imperceptible. Works that are underground have a neutral effect on the daylight of adjacent properties. During the construction of the future distributor road bridge the effect of construction work would be temporary and imperceptible. No mitigation measures will be required.

Operational Stage

The effect on daylight to neighbouring buildings is not projected to change over the operational phase of the related and cumulative developments. During the operational stage, the effect of the proposed road bridge on the daylight of adjacent buildings will be neutral. No mitigation measures will be required.

22.1.9 Climate (Sunlight) (Chapter 13)

22.1.9.1 Proposed Development

During the design process the position and mass of the buildings, the finished floor level, and the height of parapets were technically assessed to reduce any potential effect on the sunlight and overshadowing of adjacent properties. This informed the final design. Any residual impact on the sunlight and overshadowing of the adjacent properties is brief and not significant.

Construction Stage

During the construction phase all scaffolding, hoarding and cranes will only be in use for as long as necessary to facilitate the construction of the proposed development. The effect of these is considered temporary and imperceptible.

Operational Stage

The effect on sunlight and overshadowing to neighbouring sites and buildings is not projected to change over the operational phase of the development.

Worst Case Impact

There are no 'Worst Case' effects projected from completion of this proposed development.

22.1.9.2 Cumulative

Exempted Development

Works that are underground have a neutral effect on the sunlight of adjacent properties. No mitigation measures will be required.

Construction Stage

During the construction phase all hoarding and machinery will only be in use for as long as necessary to facilitate the underground works. The effect of these is considered temporary and imperceptible.

Operational Stage

The effect from the exempted development is not projected to change over the operational phase of the development. As the works are underground the residual effect on the sunlight of the adjacent properties is neutral.

Future Development

The shadow study on 21 March shows some additional shadow cast from the road embankment and bridge. The ground where this shadow falls is mainly on the railway line and on open space within the subject site. This effect of this additional shading will brief and not significant. No mitigation measures will be required.

Construction Stage

During the construction of the future development the effect of construction work would be temporary and imperceptible.

Operational Stage

The residual effect on the sunlight of the adjacent properties is neutral.

Cumulative Development

Residential Development on Station Road, Dunboyne Co. Meath - This proposed development at Station Road, Dunboyne is at a distance to the north of the subject site. It is in excess of 350m for the closest structure on the subject site. The shadow study shows that shadows from the subject site would not have the possibility to cross or interact with the Station Road development.

Dart + West - On the length of railway bordering this subject site, the relevant element of the Dart+ West project is the columns which provide electricity supply to the trains. These are modelled in the shadow study. Due to their slender nature the effect of this additional shading will be momentary and imperceptible.

Any residual effect on the sunlight and overshadowing of the adjacent properties from the related and cumulative developments is brief and not significant. No mitigation measures will be required.

Construction Stage

The effect of any hoarding or construction equipment, on the related and cumulative development sites, is considered temporary and imperceptible.

Operational Stage

The effect on sunlight and overshadowing to neighbouring sites and buildings is not projected to change over the operational phase of the related and cumulative developments.

22.1.10 Air (Noise and Vibration) (Chapter 14)

22.1.10.1 Proposed Development

Construction Stage

During the construction phase of the project there is the potential for temporary to 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.

Following mitigation, the residual noise and vibration effects during the construction phase will be local, negative, slight to moderate and temporary to short-term.

The residual impact of construction traffic on the surrounding road network is determined to be of Negative, Imperceptible and Short Term effect.

The residual impact of construction vibration building occupants is determined to be of Negative, Imperceptible to slight and Short Term effect.

Operational Stage

Additional Vehicular Traffic Noise 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 Negative, Not Significant and Long-term at nearby NSLs along the existing road network.

Traffic noise level at the nearest NSLs to the distributor road linking the proposed development with the L2228 (Station Road) is determined to be Negative, Slight, and Long-Term.

Mechanical and Electrical Plant Noise

Noise levels from any building services plant within the development site will be controlled to not exceed the internal noise levels within **Error! Reference source not found.** for residential dwellings within the proposed development.

Once operational noise emissions are controlled within the development site, noise emissions outside the site will be imperceptible. The residual noise effect is Neutral, Imperceptible and Long Term.

Worst Case Impact

The various considerations set out within the potential impacts section consider a range of worst case scenarios that have the potential to occur, specifically construction noise levels assumed for calculation purposes, and inward noise impact. The assessments have all determined with the inclusion of potential worst case scenarios, no significant effects are likely to occur.

22.1.10.2 Cumulative

Construction Stage

Cumulative Impacts of Proposed Development Phases

The preliminary construction programme for the proposed development involves the development of each of 5 phases to be constructed in sequence and hence the planned programme does not involve an overlap in the construction phases 1 to 5. There is however, potential for overlap in the construction of the 470m length of distributor road and Phase 1 residential development.

In order to assess the potential cumulative impact, the combined effect of both areas of the development site being constructed concurrently is presented in **Error! Reference source not found.**. As a worst case analysis, the assessment assumes the higher construction noise level (85 dB at 10m) along the closest boundary of both the distributor road and Phase 1 residential development to NSL1, north-east of the proposed development.

Construction Phase	Sound Power Level, dB	Cumulative Noise Level at NSL1		
		Road works at 90m	Phase 1 works at 110m	Cumulative Noise Level, dB $L_{Aeq,T}$
Distributor Road Construction and Phase 1 residential development	113 each	61 Note 1	54	62

Table 11.1: Cumulative construction noise level from road works and Phase 1 construction.

Note 1: Construction noise level in absence of site hoarding, which may not be practicable during road construction works.

The calculated cumulative construction noise level at the closest NSLs to north east of the development site are below the daytime construction noise threshold of 65 dB $L_{Aeq,T}$. The resultant

cumulative construction noise effect is determined to be Negative, Slight to Moderate and Short-Term.

Exempted Development

Construction works associated with upgrade c. 1,100m of existing 200mm uPVC watermains with 400mm ID watermains by Irish Water will generate localised noise impacts when works are occurring immediately adjacent to NSLs along the route. Given the closest boundary of the proposed development is set back some 280m from the nearest existing road (Station Road) where watermain works may occur, the contribution of construction noise at this distance is negligible and will not be audible above the prevailing noise environment. The potential cumulative impact is therefore Neutral, Not Significant and Short-Term.

There are no additional noise or vibration mitigation measures required to control cumulative impacts associated with the exempted development and the proposed development.

Future Development

In line with the Meath County Development Plan 2021-2027, it is intended the distributor road would be extended southwards and then eastwards over the railway line.

In the event the extension to the distributor road occurs in tandem with the proposed development, there is potential for cumulative construction noise impacts at the closest NSLs to the north-west (NSL1). These properties are some 200m from the road alignment and railway crossing. Reference to **Error! Reference source not found.** indicates construction noise levels below 50 dB $L_{Aeq,T}$ associated with road construction works. When added to construction noise from the proposed residential development, the cumulative noise impact remain as Negative, Slight and Short Term.

The greatest potential impact associated with the construction of the extension of the distributor road southwards and over the railway line is on the residential units within the proposed developments, if occupied during its construction.

During the construction phase of this potential future development, mitigation measures will need to be incorporated as part of the construction works to reduce potential impacts at NSLs within the proposed development, particularly at the closest NSLs within Phases 3, 4 and 5. It is outside the scope of this EIAR to specify the control measures that will be employed by this development, however any construction works will be required to work within best practice noise and vibration control measures as standard. The specific impacts associated with this development on its surrounding environment and any required mitigation measures will be determined as part of any planning application made for its development.

The future development will be required to include noise and vibration control measures to control any potential significant noise impacts at NSLs within the proposed development, assuming the various phases will be occupied. The range of noise and vibration control measures set out in Section 11.6.1.1 form part of any best practice control measures that apply to construction sites and shall be applied to any future development of the distributor road extension.

Residential Development Meath County Council Reg. 22675

This development will involve construction of houses within a plot of land in excess of 300m from the closest boundary of the proposed residential site of the proposed development and in excess of 200m from the 470m length of distributor road included as part of this proposed development. The range of construction techniques associated with standard house building and the distances between the two developments will not result in any significant cumulative noise effects at NSLs in the surrounding area should both projects be constructed at the same time. The impact is determined to be Negative, Not Significant, and Short-Term.

There are no additional noise or vibration mitigation measures required to control cumulative impacts associated with the residential development Reg 22675 and the proposed development.

Dart + West – Railway Order

There is potential for construction of the Dart + West project to overlap with the proposed development. Closest NSLs to both projects are those to the north-west of the site (NSL1) at Beechdale and Larchfield estates. Reference to the EIAR for the Dart + West project, *Chapter 14: Noise and Vibration* notes that the majority of construction works along the rail line will take place at night and weekend possessions, specifically track lowering at OBCN2390 at Dunboyne Station, overhead line equipment (OHLE) works and new fencing. The nature of the works are linear in nature and will move along the length of the track during these possession periods.

There are no night-time construction works as part of this proposed development, hence there are no cumulative night-time noise impacts. Any daytime construction works associated with the Dart + West project will be of limited duration at any one location along the line in proximity to the proposed development. The potential cumulative construction noise effect is likely to be Negative, Slight to Moderate and Short-Term.

The Dart + West railway order project EIAR includes a range of specific noise and vibration mitigation measures that will be implemented as part of the project. There are no additional mitigation measures required as part of the proposed development to future control any potential cumulative construction noise and vibration effects at NSLs in the surrounding environment.

The residual noise and vibration impact from the various projects with potential for cumulative impacts have been assessed. There are no residual significant cumulative impacts forecast. The residual effects are negative, slight to moderate and temporary to short-term.

Operational Stage

Exempted Development

Once operational, there are no operational noise sources associated with the upgraded watermains. There are therefore no cumulative operational noise effects associated with this project and the proposed development. The resultant cumulative impact is Neutral, Imperceptible and Long-Term.

Once operational, there are no operational noise or vibration sources associated with the upgraded watermains. There are therefore no additional mitigation measures required to control any cumulative noise or vibration effects.

Future Development

Traffic flows along the extended section of the distributor road southwards and then eastwards over the railway line has the potential for cumulative traffic noise effects on the surrounding environment and on traffic noise impacts on the proposed residential units.

Information relating to the future traffic flows along this road are not available at this stage to provide specific comment on. The closest NSLs to the proposed distributor road extension are the residential units within this proposed development. As part of the design and planning of this section of the road, consideration will be given to any potential noise impact to NSLs along the road edge. Further comment is included in Section 11.5.3

As part of the design and planning of this section of the road, the potential noise impact to NSLs and appropriate noise mitigation measures will be included to reduce any potential impacts within the proposed development. Further comment is included in Section 11.5.3

Residential Development Meath County Council Ref. 22675

The operational phase of both projects will introduce additional traffic onto the surrounding road network. Traffic flows associated with this development and the proposed development have been included within the traffic modelling assessment. The change in noise levels set out in **Error! Reference source not found.** to **Error! Reference source not found.** confirm the cumulative impact of permitted developments in the area (including residential development Ref 22675) combined with the proposed development is Negative, Not Significant and Long-term along the surrounding road network

There are therefore no additional mitigation measures required to control any cumulative noise or vibration effects from this development and the proposed development.

Dart + West – Railway Order

The operation of the Dart + West project has potential to alter the prevailing noise environment along the western site boundary and in turn affect residential units within the proposed development. Reference to the published EIAR for the Dart + West project, *Chapter 14: Noise and Vibration,* indicates the section of rail line between Clonsilla Station and Junction to M3 Parkway Station (Project Section D) will experience a positive, slight to moderate, long term effect as a result of the proposed project. This is due to the full replacement of Diesel Multiple Unit (DMU) trains with electric DART fleet along this section of line which are quieter units. The resultant impact is a noise level reduction of the order of 2 to 3 dB during day and night-time periods and hence is Positive, Slight to Moderate, Long Term.

The impact of inward noise of the rail line across the proposed development from existing and future operational scenarios is assessed in Section 11.5.3.

The proposed Dart + West project will result in a reduction in rail noise along the section of rail line along the western site boundary. The proposed development includes a solid boundary wall along the full extent of the western site boundary and the rail line. There are therefore no additional mitigation measures required to control any cumulative noise or vibration effects from this development and the proposed development.

The residual noise and vibration impact associated with the operational phase of the proposed project and the projects assessed for cumulative impacts are negative, not significant and long-term.

Worst Case Impact

The various considerations set out within the potential impacts section consider a range of worst case scenarios that have the potential to occur for the cumulative scenarios, specifically cumulative construction scenarios and operational traffic. The assessments have all determined with the inclusion of potential worst case scenarios, no significant effects are likely to occur.

22.1.11 Landscape and Visual Impact (Chapter 15)

22.1.11.1 Proposed Development

Construction Stage

There is likely to be temporary Moderate Adverse effects during the construction period though the most appreciable aspects of this will not be easily discerned from publicly accessible areas within the wider Dunboyne townscape or any farmland areas to its south-east periphery (that would be subject to very few visual receptors) and only the new access to the north towards Station Road being evident.

Operational Stage

The proposed development is regarded as being permanent or long term in landscape and visual terms. The residual impacts are muted in terms of significance and magnitude on account of the site's medium quality and condition rating and this equating to a general low sensitivity rating.

The most appreciable effects relate to the scale and nature of the proposed development which will result in houses and apartments occupying the majority of the site footprint although in excess of 20% is to be set out as public open space. While having a Major effect, the proposed development, associated parklands, open space and public realm landscapes will include positive and significant elements that will contribute to the amenity, character and broader environment of this part of Dunboyne.

The most notable natural features on the site, namely the mature trees and boundary hedgerows are to be retained within areas of public open space. The proposals include for planting over 600 no. standard tree and – in conjunction with more general woodland, shrub and hedgerow planting – this will contribute to far more significant vegetation cover on this site than it had a present.

The low-lying topography and existing vegetation ensure the majority of areas within the Dunboyne area will experience no or negligible effects due to the proposal being visually obscured or not being a significant factor in any view or association with any visual amenity provision.

While recognising there are localised significant landscape and visual impacts, the proposed development, while sizeable, can be accommodated and absorbed into this part of Dunboyne without causing any significant detrimental or unacceptable landscape or visual effects.

22.1.11.2 Cumulative

Exempted Development

Construction Stage

Negligible due to very limited areas that will be affected by works related to the underground watermain / sewer upgrades. The proposed corridor of work is not visually exposed or would be subject to high numbers of visual receptors so the associated construction works would have very Slight and insignificant effects in landscape and visual terms.

Operational Stage

Negligible as the exempted development relates to underground services. Given this work is underground effects are rated as Negligible.

No mitigation is necessary in landscape or visual terms due to the short-term nature of this work.

Future Development

Construction Stage

The proposed construction works will have a Major effect on the area within immediate proximity to the proposed extending of the Dunboyne Distributor Road and bridge due the nature of works required to facilitate this type of road engineering and height requirements for a bridge over a railway line. Due to the low-lying nature of the landscape and extent of vegetation, there will be insignificant and largely Negligible effects to the wider Dunboyne townscape deriving from this proposal. A broad corridor is retained for the proposed bridge to allow the Dunboyne Distributor Road to cross the railway line and then extend to south Dunboyne in the future. This area is to be retained as field in the intervening period though some Ash trees (subject to Ash die-back) will be felled to ensure no health and safety issues in this time. The construction stage would entail substantial groundworks to facilitate appropriate height for the new bridge and this would have notable and Major effects to a localised area in close vicinity to the road and bridge corridor. The area to the south of the site set aside for the Dunboyne Distributor Road and bridge over the railway

line will be graded out and retained as a grassed field with stock-proof boundary fencing. Access will be provided via a gate to the south of the proposed development. Once the grass has grown, this area will - for the period of time until bridge construction – have a character that is visually comparable with the adjacent fields in the south Dunboyne area. During the construction period hoardings are likely to be installed to the construction area to restrict access and views into the site.

Operational Stage

The road and bridge will have Major impacts on the landscape and visual amenity of the local area. Due to the extent of existing (and proposed) townscape, the low-rolling landscape and extent of tree cover, beyond the immediate area, there will be very limited landscape or visual effects with the majority of Dunboyne experiencing Negligible effects from this section of road and new bridge. A new bridge is likely to be a notable landmark in south-east Dunboyne on account of its relatively raised profile in an otherwise low-rolling landscape. The final bridge designs are not available at this time but it is reasonable to assume based on the land-take that sufficient room has been retained to either side of the proposed carriageway to allow for the banks to be landscaped in a manner that can contribute to the landscape setting and reduce the impact of the road corridor. The road is clearly a functional requirement (and objective of the Meath County Development Plan 2021-2027) and will have Major impacts on the landscape and visual amenity of the local area. Due to the extent of existing (and proposed) townscape, the low-rolling landscape and extent of tree cover, beyond the immediate area, there will be very limited landscape or visual effects with the majority of Dunboyne experiencing Negligible effects from this section of road and new bridge. Landscape works to the banks and verges aside the bridge are likely to include planting of trees and hedgerows to assist blending the road corridor into the landscape. Sufficient room has been retained to allow for such measures which can link into the proposed tree planting and retained tree belts within the Application Site.

Cumulative Development

Cumulative landscape or visual effects are the combined effects that arise through the interaction of two or more developments, whether of the same type or not, within the landscape and visual baseline context. Collectively they give rise to an overall combined effect.

A significant cumulative effect will occur where the addition of the proposed development to other existing and developments results in a landscape or view that is defined by the presence of more than one major development and is characterised primarily by large scale development so that other patterns and components are no longer definitive.

The proposed development is a large scale residential development that – as noted above – will in isolation result in significant changes to the Application Site but there is a degree of physical and visual separation between the site and the nearest residential areas at Beechdale / Larchfield / Chestnut Grove to the east and the recently completed Castle Farm to the north. South Dunboyne is an area already defined by housing estates and associated infrastructural elements including busy roads and the railway line. The effects on these area or Dunboyne deriving from this proposal have been assessed above.

The Area Plan identifies a link road through the Application Site lands that crosses the railway line via a bridge and connects to the Rooske Road to the south of Dundalk. This proposal retains lands to the mid and west of the site to allow appropriate space to facilitate this connection. This area is to be retained as a field until such a time as this link road can be constructed.

A residential development (Meath County Council Planning Reference 22675) is proposed to the north of Station Road and west of Dunboyne Railway Station. Due to intervening built environment, townscape and vegetation, there will be Negligible cumulative effects with the proposed development site.

The Dart+West Project entails the proposal by Córas Iompair Éireann (CIÉ) for the construction, maintenance, improvement and operation of the railway along an approximate 40km section of the

existing railway line between Dublin City Centre and M3 Parkway Station (County Meath) and a new maintenance depot to the west of Maynooth (County Kildare). Due to the railway line already being in place and having a presence in the landscape / townscape setting of Dunboyne and that any proposed buildings are sufficiently distant from the Application Site, there will be Negligible cumulative landscape and visual impacts.

There are no other proposed developments in the south-Dunboyne area that would have a significant bearings on the magnitude or nature of cumulative effect to local landscape character.

No residual landscape and visual impacts predicted. No landscape and visual impacts predicted and therefore mitigation not necessary.

22.1.12 Material Assets (Transport) (Chapter 16)

22.1.12.1 Proposed Development

The residual impacts of the proposed development from a traffic and transport perspective at both construction and operational phases are outlined below.

Construction Stage

Provided the mitigation measures and the management procedures outlined in the Construction Management Plan (CMP) are incorporated during the construction phase, the residual impact upon the local receiving environment is predicted to be medium-term in nature and slight negative in terms of effect – causing noticeable changes in the character of the environment without affecting its sensitivities.

With regards to pedestrian and cycle infrastructure, construction will have a not significant effect – causing noticeable changes in the character of the environment but without significant consequences.

Operational Stage

The analysis of the road network has shown that the existing and proposed upgraded junctions would operate within capacity for the 2041 DO SOMETHING scenario during both the AM and PM peak hours. The proposed upgraded junctions would also be able to cater for the additional traffic demand arising from the residential zoned lands in Dunboyne (2041 Sensitivity Analysis).

Whilst the estimated increase in traffic over the baseline conditions is considered moderate, the proposed upgraded junctions would have a positive impact in terms of quality, increasing the capacity of the road network to accommodate the proposed and potential future developments, and would be medium/long-term in terms of duration.

The extension of the Southern Distributor Road and provision of adequate pedestrian and cyclist facilities as part of the proposed development, will results in a positive and permanent effect in terms of sustainable transport options.

Worst Case Impact

The 'worst-case' scenario for the construction phase is for the mitigation measures to fail and cause significant and long-term effects on the area. These impacts would include long traffic delays and possible detours along the local road network. The 'worst-case' scenario would also affect the construction timeline and increase the construction programme.

For the operational phase, the 'worst-case' scenario is for slight, permanent effects to the local road network. These would include long delays at nearby junctions due to the impact of the proposed development operational traffic should mitigation measures fail.

22.1.12.2 Cumulative

Construction Stage

There are no predicted cumulative impacts arising from the construction phase of the proposed development.

Operational Stage

The traffic impact analysis carried out as part of the accompanying Traffic and Transport Assessment, and summarised in this Chapter, already accounts for the cumulative traffic impacts arising from a committed nearby development and residential zoned lands in Dunboyne.

22.1.13 Material Assets (Waste) (Chapter 17)

The implementation of the mitigation measures outlined in Section 17.6 will ensure that targeted rates of reuse, recovery and recycling are achieved at the site of the Proposed Development during the construction and operational phases. 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.

22.1.13.1 Proposed Development

Construction Stage

A carefully planned approach to waste management as set out in Section 17.6 .1 and adherence to the RWMP (which includes mitigation) (Appendix 17.1) during the construction phase will ensure that the predicted effect on the environment will be **short-term, imperceptible** and **neutral.**

Operational Stage

During the operational phase, a structured approach to waste management as set out in Section 17.6.2 and adherence to the OWMP (which includes mitigation) (Appendix 17.2) will promote resource efficiency and waste minimisation. When the mitigation measures are implemented and a high rate of reuse, recycling and recovery is achieved, the predicted impact of the operational phase on the environment will be **long-term, imperceptible** and **neutral.**

Worst Case Impact

In a worst-case scenario, if no mitigation measures found in section 17.6 or in Appendixes 17.1 and 17.2 are followed, poor onsite waste management, non-permitted waste contractors or unauthorised waste facilities could give rise to inappropriate management of waste offsite and result in negative environmental impacts or pollution as shown in section 17.5.

22.1.13.2 Cumulative

Construction Stage

Other developments in the area will be required to manage waste in compliance with national and local legislation, policies and plans which will mitigate against any potential cumulative effects associated with waste generation and waste management. As such the effect will be **short-term, imperceptible** and **neutral**.

Operational Stage

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**.

22.1.14 Material Assets (Utilities) (Chapter 18)

22.1.14.1 Proposed Development

Construction Stage

Surface Water

- Having adopted the mitigation measures proposed, it is not envisaged that there will be any residual impacts of the proposed development during construction.

Foul Water

- Having adopted the mitigation measures proposed, it is not envisaged that there will be any residual impacts of the proposed development during construction.

Water Supply

- Having adopted the mitigation measures proposed, it is envisaged that any residual impacts of the watermain upgrade works during construction will be moderate and short-term.

ESB Network

- Having adopted the mitigation measures proposed, it is envisaged that any residual impacts of the ESB Connection will be slight and short-term.

Gas

- Having adopted the mitigation measures proposed, it is envisaged that any residual impacts of the Gas Connection will be slight and short-term.

Telecommunications – Virgin Media

- Having adopted the mitigation measures proposed, it is envisaged that any residual impacts of the Virgin Media Connection will be slight and short-term.

Operational Stage

Surface Water

- A modern, high quality, foul sewer network will serve the subject lands. The foul sewer of the operational development is anticipated to have a slight to moderate, long-term positive impact.

Foul Water

- A modern, high quality, foul sewer network will serve the subject lands. The foul sewer of the operational development is anticipated to have a slight to moderate, long-term positive impact.

Water Supply

- The provision of enhanced watermains infrastructure as part of the proposed development is anticipated to have slight to moderate, long-term positive impacts for the site area and its surrounds as it will allow for increased water supply and allows for the removal / upgrade of the older existing watermains in the L2228.

ESB Network

- Any strengthening of the existing ESB network required as part of the development will result in a slight to moderate, long term positive impact on the local community.

Gas

- Having adopted the mitigation measures proposed, it is envisaged that any residual impacts of the Gas Connection will be slight and short-term.

Telecommunications – Virgin Media

- It shall be ensured that the proposed development will not in any way affect the existing TV infrastructure of the adjacent dwellings. The new development will also generate a more robust Virgin Media distribution network in and around the new development, any upgrade works will enhance the capacity of the existing networks within and around the development. This is expected to give moderate, long-term beneficial effects.

Worst Case Impact

No impact.

22.1.14.2 Cumulative

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. No mitigation required.

22.1.15 Cultural Heritage (Archaeological & Architectural) (Chapter 19)

22.1.15.1 Proposed Development

Construction Stage

The proposed development site and its close environs do not contain any extant recorded archaeological sites or designated architectural heritage structures and no residual effects on these elements of the cultural heritage resource are predicted. The mitigation measures presented in Section 19.6 would provide for either the preservation *in situ* of any unrecorded archaeological features within the proposed development site, including the potential features identified during the geophysical survey, or the proper and adequate recording of such features by full archaeological excavation. Preservation *in situ* would allow for a negligible magnitude of effect resulting in a potential not significant/imperceptible significance of residual effect on the unrecorded archaeological resource. Preservation by record would result in a high magnitude of effect, albeit ameliorated by the creation of a full and detailed archaeological record, the results of which would be publicly disseminated. This would result in a potential moderate significance of effect in the context of residual impacts on the unrecorded archaeological resource.

Operational Stage

Following the implementation of the mitigation measures presented in Section 19.6, the operational stage of the proposed development would not result in any residual effects on the cultural heritage resource.

Worst Case Impact

If the proposed development were to proceed without the implementation of the archaeological mitigation measures outlined in Section 19.6 then construction works could result in permanent,

direct, moderate to significant, negative residual impacts on any unrecorded, sub-surface archaeological features that exist within the proposed development site.

22.1.15.2 Cumulative

Construction Stage

As detailed in Section 19.3, a range of pre-construction and construction stage archaeological site investigations have been previously carried out within the development sites within the 1km study area. Where sub-surface remains of unrecorded archaeological features or sites have been identified at these locations, they were either preserved *in situ* by avoidance where feasible or preserved in record by systematic archaeological excavations licensed by the National Monuments Service. A review of a number of proposed future developments within the study area was also carried out as part of this assessment,

Exempted Development

As part of this development, and other developments within surrounding lands, circa 1,100m of existing 200mm uPVC will need to be upsized to a 400mm ID watermain. The trenching works to install the existing 200mm uPVC likely disturbed ground levels down to sterile natural subsoils and, therefore, the footprint of the proposed upsizing works likely retain negligible archaeological potential and the proposed works will have no predicted impacts on any cultural heritage receptors.

Future Development

The roads within the proposed development site would link to a future Distributor Road Bridge which will extend over the railway track outside the western end of the site. The indicative layout of the road runs in a general north-south direction through the northern portion of the site before it turns westwards across the rail line. There are no recorded archaeological sites or architectural heritage structures located along the section of the railway line that extends adjacent to the western boundary of the proposed development and this future development will have no predicted impacts on any known cultural heritage receptors.

Residential Development Meath County Council Reg. Reg. 22675

The location of a proposed residential development to the northwest of the proposed development (Meath County Council ref. 22625) does not contain any recorded archaeological sites or designated architectural heritage structures. The online planning file for this proposed development does not contain an archaeological or architectural impact assessment report. The file does contain a recommendation by the Development Applications Unit of the Department of Housing, Local Government and Heritage that a condition requiring archaeological monitoring of the construction phase be included in any grant of planning that may be issued for that development.

Dart + West

A railway order has been applied to An Bord Pleanála for a Railway Order for DART+ West Project which will introduce electrified high-capacity trains at increased frequency for all stations within the project area for that development. A review of the Archaeological, Cultural Heritage and Architectural Heritage chapters in the EIAR[1] for this rail scheme revealed that one potential significant impact was predicted to arise within the study area assessed as part of this proposed development. This will arise from the lowering of the track beneath the Dunboyne railway bridge which would have the potential to undermine the foundations of the bridge. Following the implementation of mitigation measures identified in the EIAR for the proposed scheme, the residual

[1] https://www.dartplus.ie/en-ie/railwayorder/dartwest

effect on this structure is concluded to be imperceptible. This bridge is listed in the NIAH (ref. 14341002) and is located 180m outside the nearest section of the proposed development.

When the completed and proposed developments within the surrounding study area are assessed in combination with the proposed development, no significant cumulative effects upon the archaeological or cultural heritage resource have been identified.

The construction phase of the proposed development will not result in any likely significant residual cumulative effects on the cultural heritage resource. No likely construction stage cumulative effects on the cultural heritage resource are predicted and, therefore, no mitigation measures are required.

Operational Stage

The operational phase of the proposed development would not result in any predicted cumulative effects on the cultural heritage of the area.

The operational phase of the proposed development will not result in any likely significant residual cumulative effects on the cultural heritage resource. No likely operational stage cumulative effects on the cultural heritage resource are predicted and, therefore, no mitigation measures are required.

Do-Nothing Impact

A 'Do Nothing Scenario' would see the continued preservation of recorded and potential cultural heritage features within the study area.

If the proposed development were to proceed without the implementation of the archaeological mitigation measures outlined in Section 19.6 then construction works could result in permanent, direct, significant, negative impacts on any unrecorded, sub-surface archaeological features that exist within the site.

22.1.16 Risk Management (Major Accidents & Disasters) (Chapter 20)

The risk of a major accident and / or disaster during the Construction Phase of the Proposed Development is considered low.

The risk of a major accident and / or disaster during the Operational Phase of the Proposed Development is considered medium.

23 SUMMARY OF INTERACTIONS

23.1 Introduction

This chapter of the EIAR identifies the principle interactions between the potential impacts of the environmental factors identified in Chapter 5 to 19 inclusive.

The principal interactions are summarised below, under Table 21.1, and further discussed in Section 21.2 of this Chapter.

Where there is an interaction = ✓ No Interaction = **x**

	Population & Human Health	Biodiversity	Land, Soils , Geology & Hydrogeology	Water	Wind	Climate (Air Quality & Climate Change)	Climate (Sunlight & Daylight)	Air (Noise & Vibration)	Landscape & Visual Impact	Material Assets (Transportation)	Material Assets (Waste)	Material Assets (Utilities)	Cultural Heritage (Archaeological & Architectural)
Population & Human Health		x	x	x	x	✓	x	✓	✓	✓	x	x	x
Biodiversity	x		✓	✓	x	x	x	x	✓	x	x	x	x
Land, Soils , Geology & Hydrogeology	✓	✓		✓	x	x	x	x	x	x	x	x	x
Water	x	✓	✓		x	x	x	x	x	x	x	x	x
Wind	x	x	x	x		x	x	x	x	x	x	x	x
Climate (Air Quality & Climate (Climate Change)	x	x	x	x	x		x	x	x	✓	x	x	x
Climate (Sunlight & Daylight)	x	x	x	x	x	x		x	x	x	x	x	x
Air (Noise & Vibration)	✓	x	x	x	x	✓	x		x	✓	x	x	x
Landscape & Visual Impact	x	✓	x	x	x	x	x	x		x	x	x	x
Material Assets (Transportation)	x	x	x	x	x	✓	x	✓	x		x	x	x
Material Assets (Waste)	✓	x	✓	x	x	x	x	x	x	✓		x	x
Material Assets (Utilities)	✓	x	✓	x	x	x	x	x	x	x	x		x
Cultural Heritage (Archaeological & Architectural)	x	✓	✓	x	x	x	x	x	✓	✓	✓	✓	

Table 21.1: Matrix of Interactions between Environmental Factors (During Construction and Operational Phases)

23.2 Interactions

23.2.1 Population & Human Health (Chapter 5)

Land, Soils, Geology and Hydrogeology

Construction Phase

There is a risk of accidental pollution to land, soil and geology within the area from construction works, such as excavations and oil / diesel spillages from construction plant and equipment. The proposed development will not impact on domestic wells or any groundwater protection areas.

Taking into account the design and mitigation measures set out in Chapter 7 of this EIAR, there is no potential for negative interaction between Population and Human Health, and Land, Soils and Hydrogeology during the construction phase. The interaction is considered to be neutral, imperceptible and short term.

Operational Phase

Due to the lack of receptors i.e., no groundwater wells in the vicinity of the site, groundwater source protection areas or direct pathway to surface water, the potential interaction between Population and Human Health and the environmental factor of Land, Soils, Geology and Hydrogeology is neutral, imperceptible and long term.

Water

Construction Phase

The construction phase of the proposed development has the potential to impact on the surface water quality due to increased sediment runoff from the site, which have the potential to interact negatively on human health in the long term if not adequately mitigated.

Taking into account the design and mitigation measures set out in Chapter 8 of this EIAR, there is no potential for negative interaction between Population and Human Health, and Hydrology during the construction phase. The interaction is considered to be neutral, imperceptible and short term.

Operational Phase

The Proposed Development represents an increase in hardstand, the proposed SuDS measures and flood risk assessment undertaken demonstrates that will not result in offsite flooding. The effect is considered to be long-term, imperceptible and neutral.

Biodiversity

Construction Phase

There are no potentially significant interactions identified between Population and Human Health, and Biodiversity during the construction phase.

Operational Phase

There are no potentially significant interactions identified between Population and Human Health, and Biodiversity during the operational phase.

Air Quality

Construction Phase

The construction phase of the proposed development has the potential to impact on air quality and climate and human health if not adequately mitigated. An adverse impact due to air quality in the construction phase has the potential to cause health and dust nuisance issues.

Taking into account the design and mitigation measures set out in Chapter 11 of this EIAR, there is no potential for significant interaction between Population and Human Health, and Air Quality during the construction phase. The interaction is considered to be negative, direct, imperceptible and short term.

Operational Phase

Operational phase impacts will be as a result of traffic emissions at sensitive receptors. Modelling has shown that emissions from the proposed development will comply with the ambient air quality standards which are set for the protection of human health. The operational phase impact is long-term, localised, neutral and non-significant.

Climate

Construction Phase

There are no potentially significant interactions identified between Population and Human Health, and Climate during the construction phase.

Operational Phase

There are no potentially significant interactions identified between Population and Human Health, and Climate during the operational phase.

Noise and Vibration

Construction Phase

During the construction phase of the Proposed Development, a variety of items of plant will be in use, such as excavators, lifting equipment, dumper trucks, compressors and generators. There will also be an increase in traffic, in particular via the L2228 Station Road, R147 Old Navan Road and M3 Motorway. Following mitigation, the residual noise and vibration effects during the construction phase will be local, negative, slight to moderate and temporary to short-term. The residual impact of construction vibration building occupants is determined to be of Negative, Imperceptible to slight and Short-Term effect.

Operational Phase

The assessment has determined that the predicted noise generated by the operational traffic levels can have Negative, Not Significant to Slight and Long-term impact.

Regarding mechanical and electrical plant noise, once operational noise emissions are controlled within the development site, noise emissions outside the site will be imperceptible. The residual noise effect is Neutral, Imperceptible and Long Term.

The proposed development will not generate any perceptible levels of vibration during operation and therefore there will be no impact from vibrations on human health.

Landscape and Visual Impacts

Construction Phase

It is considered that the introduction of new structures, access roads, machinery, materials storage, associated earthworks, car parking, lighting, and hoarding will impact negatively on Population and Human Health. Mitigation measures applied, the significance of the residual construction stage impacts is considered to be Moderate Adverse to Negligible, significant to not significant and temporary.

Operational Phase

Whilst recognising there are localised significant landscape and visual impacts, the proposed development won't cause significant detrimental or unacceptable landscape or visual effects. The

proposed development, associated parklands, open space, public realm landscapes and additional planting will include positive and significant elements that will contribute to the amenity, character and broader environment of the region. The interaction is considered to be positive, slight, and long-term.

Archaeological, Architectural and Cultural Heritage

Construction Phase

There are no potentially significant interactions identified between Population and Human Health, and Archaeological, Architectural and Cultural Heritage during the construction phase.

Operational Phase

There are no potentially significant interactions identified between Population and Human Health, and Archaeological, Architectural and Cultural Heritage during the operational phase.

Material Assets, including Utilities, Waste Management and Transport

Construction Phase

During construction connections to surface water drainage, water supply, wastewater drainage, power supply, telecommunications infrastructure and road infrastructure will be required. Any interruptions to these utilities could impact on the local population. Consultation with service providers and adherence to the CEMP will avoid any negative impacts on the local population.

The potential impacts on human beings are in relation to incorrect management of waste during construction and / or operation, which could result in littering and presence of vermin – with associated potential for negative impacts on human health and residential amenity. A carefully planned approach to waste management and adherence to the project specific RWMP and mitigation measures in Chapter 17 will (Material Assets - Waste) ensure appropriate management of waste and avoid any negative impacts on the local population.

The World Health Organisation Report 'Health Effects and Risks of Transport Systems: The Hearts Project' (World Health Organisation, 2006) states that road traffic is a major cause of adverse health effects. During construction there will be an increase in vehicle and HGV movement.

Provided the mitigation measures detailed in Chapters 16,17 and 18 are adhered to, the interaction between Material Assets and Population and Human Health is short to medium-term, imperceptible and neutral to slight negative.

Operational Phase

When operational there will be an increased demand on surface water drainage, water supply, wastewater drainage, power supply, telecommunications infrastructure and road infrastructure. Any interruptions to these utilities could impact on the local population. Consultation has been undertaken with service providers to confirm capacity for additional demand and avoid any negative impacts on the local population.

The potential impacts on human beings are in relation to incorrect management of waste during construction and / or operation, which could result in littering and presence of vermin – with associated potential for negative impacts on human health and residential amenity. A carefully planned approach to waste management and adherence to the project specific RWMP and mitigation measures in Chapter 17 will (Material Assets - Waste) will ensure appropriate management of waste and avoid any negative impacts on the local population.

The World Health Organisation Report 'Health Effects and Risks of Transport Systems: The Hearts Project' (World Health Organisation, 2006) states that road traffic is a major cause of adverse health effects. An assessment of the additional traffic movements associated with the Proposed Development show that development traffic will not impact negatively on the junction's operational performance.

Provided the mitigation measures detailed in Chapters 16,17 and 18 are adhered to, the interaction between Material Assets and Population and Human Health is long-term to permanent, imperceptible and neutral to positive.

23.2.2 Biodiversity (Chapter 6)

This section discusses interactions between this Chapter and other specialist environmental topics considered in this EIAR.

Land, Soils, Geology and Hydrogeology

Construction Phase

The construction phase of the proposed development has the potential to result in the removal of biodiversity in areas that are being reprofiled. There is also a potential for increased sediment runoff which has the potential to interact negatively on surface water quality. The proposed construction phase mitigation that will be implemented means that the proposed development will not result in significant negative impact on biodiversity and surface water quality.

Taking into account the design and mitigation measures set out in Chapter 7 and 8 of this EIA Report, there is a residual negative interaction between Land, Soil, and Hydrology during the construction phase. The interaction is considered to be neutral, not significant, and short term.

Operational Phase

Taking into account the design and mitigation measures set out in Chapter 7 (Land, Soils, Geology and Hydrogeology) and 8 (Hydrology) of this EIA Report there are no potentially significant interactions identified between Land, Soils and Hydrogeology, and Hydrology during the operational phase.

Air Quality and Climate

Construction Phase

Construction phase activities such as land clearing, excavations, stockpiling of materials etc. have the potential for interactions between air quality and biodiversity in the form of dust emissions that may deposit on biodiversity that is to be retained and in surface waters.

Mitigation measures implemented during the construction phase will ensure that the deposition of dust is minimised. With the appropriate mitigation measures to prevent fugitive dust emissions, it is predicted that there will be no significant interactions between air quality and biodiversity. The interaction is considered to be negative, not significant, and short term.

There are no potentially significant interactions identified between biodiversity, and Climate during the construction phase.

Operational Phase

Climate change has the potential to lead to increased rainfall in future years which may result in flood impacts and interactions between biodiversity and Land, Soils and Geology. A detailed Site Specific Flood Risk Assessment (SSFRA) was carried out for the proposed development which states that 1% AEP flood event (1 in 100 year) and the 0.1% AEP flood event (1 in 1000 year) do not inundate

the site. Although the northern entrance road is partially located in Flood Zone B, the development design has set floor levels to the 1% AEP climate change water level, plus a freeboard allowance of at least 500mm. Further, the finished floor level provides a minimum of 150mm above surrounding ground levels to provide protection against pluvial flooding. All residential buildings have also been located in Flood Zone C, further minimising the risk of inundation. Once the landscaping on site has established it would be expected that these interactions would be reduced.

The new infrastructure is designed to accommodate rainfall runoff/ flows up to 1% AEP event. In addition, the surface water network has been designed to include an additional allowance of 20% in rainfall intensities due to climate change.

Therefore it can be determined that there is no significant risk to the proposed development as a result of increased rainfall and climate. No significant interactions between biodiversity and Air Quality and Climate is predicted.

Water

Construction Phase

During construction of drainage ditch and watercourse elements of the project there is potential for interaction between biodiversity and water. Mitigation measures during the construction phase of the proposed development will ensure that surface water runoff and impacts on watercourses and associated biodiversity are minimised. The effect on water will be short term, imperceptible and neutral.

There is potential for impacts to water associated with uncontrolled discharges to surface waters. In this instance the surface water system discharges into the ground and the stormwater sewer which ultimately discharges into the Dunboyne Stream and Tolka River, and the foul water provision discharges to Ringsend WWTP. They have direct/indirect hydrological connection with a number of nationally and internationally designated sites, albeit at a substantial distance from the works.. The use of standard construction control measures as provided in the CEMP and the sustainable urban drainage systems, along with the water treatment processes and monitoring of treated effluent at Ringsend will result in no potential for impact on water downstream of the site and Ringsend WWTP. The impact upon water from biodiversity impacts would be long-term and neutral.

Taking into account the design and mitigation measures set out in Chapter 8 (Water), and Chapter 6 (Biodiversity) of this EIA Report, there remains a residual negative interaction between Water and Biodiversity during the construction phase. The interaction is considered to be negative, not significant, and short term.

Operational Phase

There is potential for impacts to water associated with uncontrolled discharges to surface waters. In this instance the surface water system discharges into the ground and the stormwater sewer which ultimately discharges into the Tolka River, and the foul water provision discharges to Ringsend WWTP. The reinstatement of biodiversity on site with the establishment of landscaping will reduce the potential for interaction between biodiversity and water as the biodiversity will assist in improving water quality through the control of surface runoff through e.g. transpiration. Stantard measures will be in place to protect biodiversity and water through SuDS and petrochemical interception. The impact upon biodiversity from hydrological impacts would be long-term and neutral.

Taking into account the design and mitigation measures set out in Chapter 8 of this EIA Report, the interaction between Hydrology, and Biodiversity during the operational phase is considered to be neutral, and long term.

Material Assets

Construction Phase

There are no potentially significant interactions identified between biodiversity and Material Assets Utilities Waste and Transport during the construction phase of the proposed development.

Operational Phase

The use of SuDS during operations will mean that the development will result in neutral water impacts in the operational phase with regard to contamination of waters and impacts on aquatic biodiversity. The interaction is considered to be negative, not significant, and long-term.

23.2.3 Land, Soils, Geology & Hydrogeology (Chapter 7)

This section discusses interactions between this Chapter and other specialist environmental topics considered in this EIAR.

Hydrology

Construction Phase

The construction phase of the proposed development has the potential to result in increased sediment runoff which has the potential to interact negatively on surface water quality. The proposed construction phase mitigation, and the lack of a direct pathway means that the proposed development will not result in significant negative impact on surface water quality in the local area.

Taking into account the design and mitigation measures set out in Chapter 7 and 8 of this EIA Report, there is a residual negative interaction between Land, Soil, and Hydrology during the construction phase. The interaction is considered to be neutral, not significant, and short term.

Operational Phase

Taking into account the design and mitigation measures set out in Chapter 7 (Land, Soils, Geology and Hydrogeology) and 8 (Hydrology) of this EIA Report there are no potentially significant interactions identified between Land, Soils and Hydrogeology, and Hydrology during the operational phase.

Biodiversity

Construction Phase

In the absence of mitigation measures to control the construction phase there is potential for silt laden material or pollution to enter the watercourse and impact on local biodiversity and European sites downstream from the works. Furthermore, dust emissions from exposed earthworks have the potential to settle on plants causing impacts to local ecology.

There is potential for impacts to biodiversity associated with the groundwater dewatering. However, this dewatering is associated with perched groundwater within the subsoils and not with the Dublin Groundwater Body which is confined within bedrock and is indirectly connected to with a number of nationally and internationally important habitats. The use of a water treatment processes and monitoring of treated dewatering will result in no potential for impact on biodiversity downstream of the subject site.

Taking into account the design and mitigation measures set out in Chapter 7 (Land, Soils and Hydrogeology), and Chapter 9 (Biodiversity) of this EIA Report, there remains a residual negative interaction between Land, Soil, Geology and Hydrogeology and Biodiversity during the construction phase. The interaction is considered to be negative, not significant, and short term.

Operational Phase

There are no potentially significant interactions identified between Land, Soils and Hydrogeology, and Biodiversity during the operational phase.

Air Quality and Climate

Construction Phase

Demolition and construction phase activities such as land clearing, excavations, stockpiling of materials etc. have the potential for interactions between air quality and land and soils and the water environment (hydrology) in the form of dust emissions. With the appropriate mitigation measures to prevent fugitive dust emissions, it is predicted that interactions between air quality and land and soils and hydrology will be short-term and imperceptible.

Operational Phase

Climate change has the potential to lead to increased rainfall in future years which may result in flood impacts and interactions between Hydrology and Land, Soils and Geology. A detailed Site Specific Flood Risk Assessment (SSFRA) was carried out for the proposed development which states that 1% AEP flood event (1 in 100 year) and the 0.1% AEP flood event (1 in 1000 year) do not inundate the site. Although the northern entrance road is partially located in Flood Zone B, the development design has set floor levels to the 1% AEP climate change water level, plus a freeboard allowance of at least 500mm. Further, the finished floor level provides a minimum of 150mm above surrounding ground levels to provide protection against pluvial flooding. All residential buildings have also been located in Flood Zone C, further minimising the risk of inundation.

The new infrastructure is designed to accommodate rainfall runoff/ flows up to 1% AEP event. In addition, the surface water network has been designed to include an additional allowance of 20% in rainfall intensities due to climate change.

Therefore it can be determined that there is no significant risk to the proposed development as a result of increased rainfall and climate. No significant interactions between Climate, Hydrology and Land, Soils and Geology is predicted.

Material Assets

Construction Phase

In the absence of mitigation, surface water run-off during the construction phase may contain increased silt levels or otherwise become polluted from construction activities. Suspended solids in runoff water may result in an increase in suspended sediment load, resulting in increased turbidity, which may damage downstream infrastructure.

During the construction phase, excavated topsoil and subsoil (c. 43,307 m^3) will be generated from the excavations required to facilitate site levelling, construction of new foundations and installations of site services. It is estimated that c. 33,307 m^3 of excavated material will need to be removed off-site. Where material has deemed unsuitable to be reused onsite it will be taken off-site, it will be taken for reuse or recovery, where practical, with disposal as a last resort. Adherence to the mitigation measures in Chapter 7, Chapter 15 and the requirements of the Resource & Waste Management Plan (Appendix 15.1), will ensure the effect is long-term, imperceptible and neutral.

Operational Phase

There are no potentially significant interactions identified between Land, Soils and Hydrogeology, and Material Assets Utilities Waste and Transport during the operational phase of the proposed development.

23.2.4 Water (Chapter 8)

This section discusses interactions between this Chapter and other specialist environmental topics considered in this EIAR.

Land, Soils, Geology and Hydrogeology

Construction Phase

The construction phase of the proposed development has the potential to result in increased sediment runoff which has the potential to interact negatively on surface water quality. The proposed construction phase mitigation, and the lack of a direct pathway means that the proposed development will not result in significant negative impact on surface water quality in the local area.

Taking into account the design and mitigation measures set out in Chapter 7 and 8 of this EIA Report, there is a residual negative interaction between Land, Soil, and Hydrology during the construction phase. The interaction is considered to be neutral, not significant, and short term.

Operational Phase

Taking into account the design and mitigation measures set out in Chapter 7 (Land, Soils, Geology and Hydrogeology) and 8 (Hydrology) of this EIA Report there are no potentially significant interactions identified between Land, Soils and Hydrogeology, and Hydrology during the operational phase.

Biodiversity

Construction Phase

Dust emissions have the potential to settle on plants causing impacts to local ecology. Mitigation measures during the construction phase of the proposed development will ensure that dust generation is minimised and the effect on biodiversity will be short term, imperceptible and neutral.

There is potential for impacts to biodiversity associated with uncontrolled discharges to surface waters. In this instance the surface water system discharges into the ground and the stormwater sewer which ultimately discharges into the Dunboyne Stream and Tolka River, and the foul water provision discharges to Ringsend WWTP. There is a hydrological connection or pathway through the Dunboyne stream with a number of nationally and internationally important habitats; however, this is considered to be of negligible significance due to the significant distance from the site (16 km). The use of standard construction control measures as provided in the CEMP and the sustainable urban drainage systems, along with the water treatment processes and monitoring of treated effluent at Ringsend will result in no potential for impact on biodiversity downstream of Ringsend WWTP. The impact upon biodiversity from hydrological impacts would be long-term and neutral.

Taking into account the design and mitigation measures set out in Chapter 8 (Water), and Chapter 9 (Biodiversity) of this EIA Report, there remains a residual negative interaction between Water and Biodiversity during the construction phase. The interaction is considered to be negative, not significant, and short term.

Operational Phase

There is potential for impacts to biodiversity associated with uncontrolled discharges to surface waters. In this instance the surface water system discharges into the ground and the stormwater sewer which ultimately discharges into the Tolka River, and the foul water provision discharges to Ringsend WWTP. There is a hydrological connection or pathway through the Dunboyne stream with a number of nationally and internationally important habitats; however, this is considered to be of negligible significance due to the significant distance from the site (16 km). The design of sustainable urban drainage systems, along with the water treatment processes at Ringsend will result in no potential for impact on biodiversity downstream of Ringsend WWTP. The impact upon biodiversity from hydrological impacts would be long-term and neutral.

Taking into account the design and mitigation measures set out in Chapter 8 of this EIA Report, the interaction between Hydrology, and Biodiversity during the operational phase is considered to be neutral, and long term.

Air Quality and Climate

Construction Phase

Construction phase activities such as land clearing, excavations, stockpiling of materials etc. have the potential for interactions between air quality and land and soils in the form of dust emissions that may deposit in surface waters.

Mitigation measures implemented during the construction phase will ensure that the deposition of dust is minimised. With the appropriate mitigation measures to prevent fugitive dust emissions, it is predicted that there will be no significant interactions between air quality and hydrology. The interaction is considered to be negative, not significant, and short term.

There are no potentially significant interactions identified between Water, and Climate during the construction phase.

Operational Phase

Climate change has the potential to lead to increased rainfall in future years which may result in flood impacts and interactions between Hydrology and Land, Soils and Geology. A detailed Site Specific Flood Risk Assessment (SSFRA) was carried out for the proposed development which states that 1% AEP flood event (1 in 100 year) and the 0.1% AEP flood event (1 in 1000 year) do not inundate the site. Although the northern entrance road is partially located in Flood Zone B, the development design has set floor levels to the 1% AEP climate change water level, plus a freeboard allowance of at least 500mm. Further, the finished floor level provides a minimum of 150mm above surrounding ground levels to provide protection against pluvial flooding. All residential buildings have also been located in Flood Zone C, further minimising the risk of inundation.

The new infrastructure is designed to accommodate rainfall runoff/ flows up to 1% AEP event. In addition, the surface water network has been designed to include an additional allowance of 20% in rainfall intensities due to climate change.

Therefore it can be determined that there is no significant risk to the proposed development as a result of increased rainfall and climate. No significant interactions between Climate, Hydrology and Land, Soils and Geology is predicted.

Material Assets

Construction Phase

There are no potentially significant interactions identified between Water and Material Assets Utilities Waste and Transport during the construction phase of the proposed development.

Operational Phase

The use of SuDS during operations will mean that the development will result in neutral water impacts in the operational phase with regard to runoff rates and flooding risk. As a part of the SuDS features, it is anticipated that small amounts of hydrocarbon sludge waste and debris may be generated in the hydrocarbon interceptors which will treat the surface water run-off.

Hydrocarbon sludge waste and debris will be generated in the hydrocarbon interceptors which will treat the surface water run-off from the proposed development during the operational phase. This waste stream will be managed in accordance with the relevant legislation identified in Chapter 15 (Waste). The interaction is considered to be negative, not significant, and long-term.

23.2.5 Microclimate (Wind) (Chapter 9)

The interactions of wind microclimate effects with other environmental topics are anticipated to be minimal, except for landscaping. To ensure a safe and comfortable wind environment for pedestrians and users of the site (at potential receptors), the recommended mitigation measures outlined in this chapter, which aim to address wind conditions exceeding desired levels and safety standards, should be incorporated into the overall landscaping scheme. This integration will enable the landscaping design to effectively provide a suitable wind environment while prioritizing the safety and comfort of individuals on the site.

23.2.6 Climate (Air Quality) (Chapter 10)

Air quality does not have a significant number of interactions with other topics. The most significant interactions are between population and human health and air quality. An adverse impact due to air quality in either the construction or operational phase has the potential to cause health and dust nuisance issues. The mitigation measures that will be put in place at the proposed development will ensure that the impact of the proposed development complies with all ambient air quality legislative limits. Therefore, the predicted impact is short-term, imperceptible and negative with respect to population and human health during construction and long-term, imperceptible and neutral during operation phase.

Interactions between air quality and traffic can be significant. With increased traffic movements and reduced engine efficiency, i.e. due to congestion, the emissions of vehicles increase. The impacts of the proposed development on air quality are assessed by reviewing the change in annual average daily traffic on roads close to the site. In this assessment, the impact of the interactions between traffic and air quality are considered to be long-term, imperceptible and neutral.

Air quality and climate have interactions due to the emissions from the burning of fossil fuels during the construction and operational phases generating both air quality and climate impacts. Air quality modelling outputs are utilised within the Climate Chapter. There is no impact on climate due to air quality however the sources of impacts on air quality and climate are strongly linked.

Construction phase activities such as land clearing, excavations, stockpiling of materials etc. have the potential for interactions between air quality and land and soils in the form of dust emissions. With the appropriate mitigation measures to prevent fugitive dust emissions, it is predicted that there will be no significant interactions between air quality and land and soils.

As set out in the Land, Soils & Geology Chapter, dust generation can occur during extended dry weather periods as a result of construction traffic. Dust suppression measures (e.g. dampening down) will be implemented as necessary during dry periods and vehicle wheel washes will be installed, for example. The works involve stripping of topsoil and excavations, which will remove some vegetation such as trees and scrub. It will also generate dust and potentially impact on the air quality in the locality. However, the generation of dust will be temporary during construction phase and is not anticipated to have a significant impact on biodiversity.

The impact of the interactions between land, climate, soils and geology, biodiversity and air quality are considered to be short-term, imperceptible and neutral.
No other significant interactions with air quality have been identified.

23.2.7 Climate (Climate Change) (Chapter 11)

Climate has the potential to interact with a number of other environmental attributes. The impact of flood risk has been assessed and the surface water drainage network will be designed to cater for run-off from the building and the surrounding hardscaped areas in accordance with, at minimum, 1 in 100-year event plus 20% climate change allowance. Interactions across many areas can be used to minimise the GHG emissions from both the construction and operational and operational phases. For instances, waste management measures will be put in place to minimise the amount of waste entering landfill, which has higher associated embodied carbon emissions than other waste management such as recycling or incineration. Detailed design can ensure that the impact due to embodied carbon are minimised and also take into account energy efficiency measures to reduce operational carbon emissions.

The risk to building design in terms of material vulnerability to climate change, specifically extreme heat and cold, has been considered. These aspects of climate interacts with drainage design, landscaping and building design.

23.2.8 Climate (Daylight) (Chapter 12)

There are no interactions relating to effects on Daylight and any other section of this EIAR.

23.2.9 Climate (Sunlight) (Chapter 13)

There are no interactions relating to effects on Daylight and any other section of this EIAR.

23.2.10 Air (Noise & Vibration) (Chapter 14)

The key interactions with other chapters of this Environmental Impact Assessment Report are as follows:

Chapter 3 (Description of the Proposed Development): The information within this chapter formed the main basis for setting out the key elements of the proposed development and construction phasing.

Chapter 5 (Population & Human Health): Elevated noise levels during the construction and operational phases have the potential to result in nuisance / disturbance to the local population and / or human health impacts, as assessed above and in Chapter 5.

Chapter 6 (Biodiversity): Elevated noise levels during the construction and operational phases have the potential to result in disturbance of wildlife, as addressed under the scope of Chapter 6.

Chapter 7 (Land, Soils and Geology): Ground conditions into which the building foundations are to be constructed are informed by the soils and geology assessment. This has informed the potential noise and vibration impact during certain elements of construction.

Chapter 14 (Material Assets (Transportation): Additional traffic generated by the proposed development during the construction and operational phases has the potential to perceptibly alter noise levels in the receiving environment, as assessed within this document.

The above-listed interactions have been addressed comprehensively in this Environmental Impact Assessment Report. No significant impacts are predicted in relation to any of these interactions.

23.2.11 Landscape & Visual Impact (Chapter 15)

The landscape and visual impact of the proposed development can be related to cultural heritage, human beings, material assets and ecology.

All designated monuments or heritage sites are distant enough from the Application Site to not be subject to any significant changes to their setting or amenity.

The design process took into account visual impact to local residential properties in the adjacent Beechdale estate and Castle Farm area where changes to the landscape setting could affect the setting and amenity. Landscape works to the boundary areas and integration of open spaces were designed into the scheme to minimise potential visual effects and assist in integration of the proposed development.

The proposed landscape works were reviewed by the project ecologist and plant species include significant indigenous species and other ecology measures are included which will have a positive effect as it matures on local ecology and diversity. There are no designated natural environment areas or landscape close enough to be affected by activity on the Application Site.

As noted within the Landscape Institute UK publication "*Landscape architecture and the challenge of climate change*", sustainable landscape planning, design and management are essential in order to adapt out environments to a changing climate and to mitigate future change. This includes a range of mitigation and adaptation principles that can provide wider socio-economic and environmental benefits. Within this project the extensive planting and retention of open spaces will have benefits

in terms of carbon storage and reducing surface run-off. Further, the project architects and landscape architects worked together to produce a plan that includes for green infrastructure (links) across the site for pedestrian and cycle use and minimised the requirement for removal or import of any soils off this site necessitating additional traffic and transport.

23.2.12 Material Assets (Transport) (Chapter 16)

During the **construction phase**, the following aspects would interact with traffic and transport;

Noise & Vibration

Construction traffic, excavation works and the construction of the apartment blocks and houses may result in short-term localised noise and vibration effects.

Air Quality and Climate

Emissions from construction traffic may impact local air quality and climate in terms of increased emissions of greenhouse gases from vehicles.

Population & Human Health

Increased noise and dust from construction traffic may impact the amenities and health of existing residents in close proximity to the site.

During the **operational phase** the potential interactions are;

Population & Human Health

Allowing people to work and live closer to services and amenities and high quality public transport modes would interact with patterns of traffic and transport locally.

Air Quality and Climate

Emissions from traffic associated with future occupants may impact local air quality and climate in terms of increased emissions of greenhouse gases from vehicles.

23.2.13 Material Assets (Waste) (Chapter 17)

Land, Soils and Geology

During the construction phase, excavated topsoil and subsoil (c. 43,307 m^3) will be generated from the excavations required to facilitate site levelling, construction of new foundations and installations of site services. It is estimated that c. 33,307 m^3 of excavated material will need to be removed off-site. Where material has deemed unsuitable to be reused onsite it will be taken off-site, it will be taken for reuse or recovery, where practical, with disposal as a last resort. Adherence to the mitigation measures in Chapter 7, Chapter 15 and the requirements of the Resource & Waste Management Plan (Appendix 15.1), will ensure the effect is long-term, imperceptible and neutral.

Transportation

Local traffic and transportation will be impacted by the additional vehicle movements generated by removal of waste from the Site during the construction and operational phases of the proposed Development. The increase in vehicle movements as a result of waste generated during the construction phase will be *temporary* in duration. There will be an increase in vehicle movements in the area as a result of waste collections during the operational phase but these movement will be imperceptible in the context of the overall traffic and transportation increase. Traffic-related impacts during the construction and operational phases are addressed in Chapter 14 (Transportation). Provided the mitigation measures detailed in Chapter 15 and the requirements of the OWMP (included as Appendix 15.2) are adhered to, the predicted effects are short to long-term, imperceptible and neutral.

Population & Human Health

The potential impacts on human beings are in relation to incorrect management of waste during construction and / or operation, which could result in littering and presence of vermin – with associated potential for negative impacts on human health and residential amenity. A carefully planned approach to waste management and adherence to the project specific RWMP and OWMP (Appendices 15.1 and 15.2), and the mitigation measures in Chapter 5 and Chapter 15, will ensure appropriate management of waste and avoid any negative impacts on the local population. The effects should be long-term, imperceptible and neutral.

23.2.14 Material Assets (Utilities) (Chapter 18)

The potential significant impacts on traffic and transport arising from these interactions have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant permanent residual negative impacts will occur.

During the **construction phase**, the following aspects would interact with built services;

Population & Human Health

Connections to existing services may require a temporary interruption to existing services in the local area.

Water & Hydrology

The construction of the proposed services (water supply, drainage and IT etc.) may affect the local hydrological and hydrogeological environment as there is a risk of suspended solids run off.

During the **operational phase** the potential interactions are;

Water & Hydrology

There will be an increased demand on potable water supply.

Air Quality and Climate

The built services have an interaction with climate in the availability and use of non-greenhouse gas reliant power and heat sources.

The potential significant impacts on built services arising from these interactions have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant permanent residual negative impacts will occur.

23.2.15 Cultural Heritage (Archaeological & Architectural) (Chapter 19)

No significant interactions with Archaeology are envisioned as the mitigation measures proposed are incorporated into the design, construction, or operation of the proposed development.

24 BIBLIOGRAPHY

This Chapter of the EIAR sets out a complete list of all documents referenced in the preparation of this EIAR. Each source of information is under its respective headings, outlined as follows: -

24.1 Population & Human Health (Chapter 5)

- 2011 Census carried out by the Central Statistics Office (CSO) 10 April 2011. Made available from https://www.cso.ie/en/
- 2016 Census carried out by the Central Statistics Office (CSO) 24 April 2016. Made available from https://www.cso.ie/en/
- Population and Actual and Percentage Change 2016 to 2022. Made available from https://data.cso.ie/
- Pobal HP Deprivation Index based on 2011 Census Data (CSO) Made available from https://www.pobal.ie/
- Pobal HP Deprivation Index based on 2016 Census Data (CSO) Made available from https://www.pobal.ie/
- Google maps available from https://www.google.com/maps
- OpenStreetMap and contributors available from https://www.openstreetmap.org
- GeoHive contributors and available from https://www.geohive.ie/

24.2 Biodiversity (Chapter 6)

- Environmental Protection Agency (August 2017): Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports. EPA, Wexford
- Environmental Protection Agency (September 2015): Draft - Advice Notes on Current
- Practice (in the preparation on Environmental Impact Statements). EPA, Wexford
- Environmental Protection Agency 1997 Draft guidelines on the information to be contained in Environmental Impact Statements. EPA, Wexford, Ireland.
- CIEEM (2016) Guidelines for Ecological Impact Assessment in the UK and Ireland, Terrestrial, Freshwater and Coastal. Chartered Institute of Ecology and Environmental Management.
- DoEHLG (2013) Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment. Department of the Environment, Community and Local Government.
- Environmental Protection Agency 2002 Guidelines on the information to be contained in Environmental Impact Statements. EPA, Wexford, Ireland.
- Hayden, T. & Harrington, R. 2000 Exploring Irish mammals. Duchas. Town House, Dublin.

- Institute of Environmental Assessment. 1995 Guidelines for Baseline Ecological Assessment. E&FN Spon, London.
- Lawrence, M.J. & Brown, R.W. 1973 Mammals of Britain: their tracks, trails and signs. Blandford Press, Dorset, UK.
- Lysaght, L. & Marnell, F (eds.) 2016 Atlas of Mammals in Ireland 2010-2015. National Biodiversity Centre, Waterford.
- NPWS 2013 The status of protected EU habitats and species in Ireland. DoEHLG, Dublin, Ireland.
- Assessment of Plans and Projects Significantly Affecting NATURA 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC;http://ec.europa.eu/environment/nature/Natura2000management/docs/art6/Natura_2000_assess_en.pdf
- Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission; http://ec.europa.eu/environment/nature/Natura2000/management/docs/art6/guidance_art6_4_en.pdf
- Guidance document on the implementation of the birds and habitats directive in estuaries and coastal zones with particular attention to port development and dredging; http://ec.europa.eu/environment/nature/Natura2000/management/docs/guidance_doc.pdf
- The Status of EU Protected Habitats and Species in Ireland. http://www.npws.ie/publications/euconservationstatus/NPWS_2007_Conservation_Status_Report.pdf
- Fossitt. (2000) A Guide to Habitats in Ireland. The Heritage Council
- IFI (2016) Guidelines on the Protection of Fisheries During Construction Works in and Adjacent to Waters. Inland Fisheries Ireland
- Jackson, M. W., et al. (2016) Ireland Red Lists No. 10 Vascular Plants. The IUCN Red List of Vascular Plants.
- King, J.L., Marnell, F., Kingston, N., Rosell, R., Boylan, P., Caffrey, J.M., FitzPatrick, Ú., Gargan, P.G., Kelly, F.L., O'Grady, M.F., Poole, R., Roche, W.K. & Cassidy, D. (2011) Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.
- NPWS (2013) Conservation Objectives: South Dublin Bay SAC 000210. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- NPWS (2013) Conservation Objectives: North Dublin Bay SAC 000206. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- NPWS (2021) Conservation Objectives: Rye Water Valley/Carton SAC 001398. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage
- NPWS (2015) Conservation Objectives: South Dublin Bay and River Tolka Estuary SPA 004024. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

- NPWS (2015) Conservation Objectives: North Bull Island SPA 004006. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

24.3 Land, Soils & Geology (Chapter 7)

- Environmental Protection Agency (EPA) Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2022a).
- TII/National Roads Authority Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (TII/formerly NRA, 2009).
- Water Framework Directive (WFD) - Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy. This relates to the improvement of water quality across Ireland including rivers and groundwater bodies.
- River Basin Management Plan 2018-2021 (including regional plans by Local Authority Waters Programme (Waters and Communities 2020)). Draft River Basin Management Plan 2022-2027.
- Institute of Geologists Ireland (IGI) -Geology in Environmental Impact Statements, a guide (IGI, 2002) and Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements (IGI, 2013).
- European Communities Environmental Objectives (Groundwater) Regulations 2010 (S.I. No. 9 of 2010).
- European Communities Environmental Objectives (Groundwater) Amendment Regulations 2016 (S.I. No. 366 of 2016); European Communities Environmental Objectives (Groundwater) (Amendment) Regulations 2022 S.I. No. 287 of 2022.
- Part IV of the First Schedule of the Planning and Development Act 2000, as amended.
- European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003)
- Environmental Protection Agency 'Towards Setting Guideline Values for the Protection of Groundwater in Ireland Interim Report', (EPA 2003).
- European Union (Drinking Water) Regulations 2014 (S.I. No. 122/2014).
- European Union (Drinking Water) (Amendment) Regulations (S.I. No. 464 of 2017).

24.4 Water (Chapter 8)

- Environmental Protection Agency (EPA) Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2022).
- Environmental Impact Assessment of Projects, Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017).
- Transport Infrastructure Ireland - Road Drainage and Water Environment (TII, 2015).

- Transport Infrastructure Ireland (previously National Road Authority) - Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (TII, 2009).

- Water Framework Directive (WFD) - Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy. This relates to the improvement of water quality across Ireland including rivers and groundwater bodies.

- The Planning System and Flood Risk Management, Guidelines for Planning Authorities (Department of the Environment, Heritage and Local Government (DoEHLG) and the Office of Public Works (OPW)).

- Guidelines on protection of fisheries during construction works in and adjacent to waters (Inland Fisheries Ireland, 2016).

- Guidelines for the Crossing of Watercourses during Construction of National Road Schemes, (TII, 2008).

- European Communities Environmental Objectives (Surface Waters); Regulations, 2009 (S.I. No. 272 of 2009 as amended by SI No. 77 of 2019).

- Part IV of the First Schedule of the Planning and Development Act 2000, as amended.

- European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003).

- Environmental Protection Agency 'Towards Setting Guideline Values for the Protection of Groundwater in Ireland Interim Report', (EPA 2003).

- European Union (Drinking Water) Regulations 2014 (S.I. No. 122/2014).

- European Union (Drinking Water) (Amendment) Regulations (S.I. No. 464 of 2017).

24.5 Wind (Chapter 9)

- Lawson, T.V., 2001, 'Building Aerodynamics', Imperial College Press, London

- Simiu, E., 2011, 'Design of buildings for wind: a guide for ASCE 7-10 Standard users and designers of special structures', 2nd Edition, John Wiley and Sons, Inc., Hoboken, New Jersey, U.S.A.

- Standard, B., 2005. Eurocode 1: actions on structures–part1-4: general actions-wind actions; BS EN 1991-1-4: 2005. British Standard Institution, London.

- Building Aerodynamics, Tom Lawson FREng. Imperial College Press, 2001

- Blocken, B., 2015. Computational Fluid Dynamics for Urban Physics: Importance, scales, possibilities, limitations and ten tips and tricks towards accurate and reliable simulations. Building and Environment.

- Blocken, B., Janssen, W.D. and van Hooff, T., 2012. CFD simulation for pedestrian wind comfort and wind safety in urban areas: General decision framework and case study for the Eindhoven University campus. Environmental Modelling and Software, 30, pp.15–34.

- Franke, J., Hellsten, A., Schlunzen, H., Carissimo, B, Ed. 2007; Best Practice Guidelines for the CFD Simulation of Flows in the Urban Environment, University of Hamburg

- CFD - Green Mark 2021 Computational Fluid Dynamics Guidelines.

24.6 Climate (Air Quality) (Chapter 10)

- BRE (2003) Controlling Particles, Vapours & Noise Pollution from Construction Sites
- Department of the Environment Heritage and Local Government (DEHLG) (2004) Quarries and Ancillary Activities, Guidelines for Planning Authorities
- Dublin City Council (2018) Air Quality Monitoring and Noise Control Unit's Good Practice Guide for Construction and Demolition
- Environmental Protection Agency (2015) Advice Notes for Preparing Environmental Impact Statements – Draft
- Environmental Protection Agency (2022a) Air Quality Monitoring Report 2021 (& previous annual reports)
- Environmental Protection Agency (2022b) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports
- German VDI (2002) Technical Guidelines on Air Quality Control – TA Luft
- Institute of Air Quality Management (IAQM) (2014) Guidance on the Assessment of Dust from Demolition and Construction Version 1.1
- Met Éireann (2023) Met Eireann website: https://www.met.ie/.
- The Scottish Office (1996) Planning Advice Note PAN50 Annex B: Controlling the Environmental Effects Of Surface Mineral Workings Annex B: The Control of Dust at Surface Mineral Workings
- Transport Infrastructure Ireland (2022a) Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106
- Transport Infrastructure Ireland (2022b) TII Road Emissions Model (REM): Model Development Report – GE-ENV-01107
- 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)

24.7 Climate (Climate Change) (Chapter 11)

- BSI (2016) Publicly Available Specification (PAS) 2080:2016 on Carbon Management in Infrastructure
- Civil Engineering Standard Method of Measurement (CESSM) (2013) Carbon and Price Book database.

- Construction Industry Federation (2021) Modern Methods of Construction.
- Department of the Taoiseach (2022) Carbon Budgets Available at https://www.gov.ie/en/publication/9af1b-carbon-budgets/
- Environmental Protection Agency (2015) Advice Notes for Preparing Environmental Impact Statements – Draft
- Environmental Protection Agency (EPA) (2020a) Research 339: High-resolution Climate Projections for Ireland – A Multi-model Ensemble Approach.
- Environmental Protection Agency (2020b) State of the Irish Environment Report (chapter 2: climate change)
- Environmental Protection Agency (EPA) (2021a) What impact will climate change have for Ireland? [Online] Available at https://www.epa.ie/environment-and-you/climate-change/what-impact-will-climate-change-have-for-ireland/
- Environmental Protection Agency (EPA) (2021b) Critical Infrastructure Vulnerability to Climate Change Report no. 369
- Environmental Protection Agency (2022) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports
- Environmental Protection Agency (EPA) (2023) Ireland's Final Greenhouse Gas Emissions 1990-2021
- European Commission (2013) Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment
- European Commission (2017) Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report
- European Union (2018). Regulation 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
- European Commission (2021a) Technical guidance on the climate proofing of infrastructure in the period 2021-2027.
- European Commission (2021b) Forging a climate-resilient Europe - the new EU Strategy on Adaptation to Climate Change.
- Government of Ireland (2015) Climate Action and Low Carbon Development Act
- Government of Ireland (2019) Climate Action Plan 2019
- Government of Ireland (2020) Draft General Scheme of the Climate Action (Amendment) Bill 2019
- Government of Ireland (2021a) Climate Action Plan 2021
- Government of Ireland (2021b) Climate Action and Low Carbon Development (Amendment) Act 2021 (No. 32 of 2021)
- Government of Ireland (2022) Climate Action Plan 2023

- Government of Ireland (2023) Long-term Strategy on Greenhouse Gas Emissions Reductions
- Institute of Environmental Management & Assessment (IEMA) (2010). IEMA Principles Series on Climate Change Mitigation & EIA
- Institute of Environmental Management & Assessment (IEMA) (2017) Assessing Greenhouse Gas Emissions and Evaluating their Significance
- Institute of Environmental Management & Assessment (IEMA) (2020a) EIA Guide to: Climate Change Resilience and Adaptation.
- Institute of Environmental Management & Assessment (IEMA) (2020b) GHG Management Hierarchy. Assessing Greenhouse Gas Emissions and Evaluating their Significance
- Institute of Environmental Management & Assessment (IEMA) (2022) Assessing Greenhouse Gas Emissions and Evaluating their Significance
- Meath County Council (MCC) (2018) Climate Action Strategy.
- Transport Infrastructure Ireland (TII) (TII 2021) Sustainability Implementation Plan – Our Future
- Transport Infrastructure Ireland (TII) (2022a) PE-ENV-01104: Climate Guidance for National Roads, Light Rail and Rural Cycleways (Offline & Greenways) – Overarching Technical Document
- Transport Infrastructure Ireland (TII) (2022b) PE-ENV-01105: Climate Assessment Standard for Proposed National Roads (PE-ENV-01105)
- Transport Infrastructure Ireland (TII) (2022c) GE-ENV-01106: TII Carbon Assessment Tool for Road and Light Rail Projects and User Guidance Document
- Transport Infrastructure Ireland (2022d) TII Road Emissions Model (REM): Model Development Report – GE-ENV-01107
- UK Highways Agency (2019) UK Design Manual for Roads and Bridges (DMRB) Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 14 LA 114 Climate

24.8 Climate (Daylight) (Chapter 12)

- Building Research Establishment (BRE) BR209: 2022 “Site Layout Planning for Daylight and Sunlight” (Third Edition), also referred to as the BRE guidelines.
- Guidelines on the information to be contained in Environmental Impact Assessment Reports. Environmental Protection Agency 2022
- Environmental Impact Assessment of Projects European Commission 2017

24.9 Climate (Sunlight) (Chapter 13)

- Building Research Establishment (BRE) BR209: 2022 “Site Layout Planning for Daylight and Sunlight” (Third Edition), also referred to as the BRE guidelines.
- Guidelines on the information to be contained in Environmental Impact Assessment Reports. Environmental Protection Agency 2022
- Environmental Impact Assessment of Projects European Commission 2017

24.10 Air (Noise & Vibration) (Chapter 14)

- ANC, IOA & CIEH (2017). ProPG: Planning & Noise – Professional Practice Guidance on Planning & Noise – New Residential Development.
- British Standard Institute (BSI) British Standard (BS) 5228-1:2009 +A1 2014 Code of Practice for noise and vibration control of construction and open sites - Part 1: Noise
- BS 5228-2:2009+A1:2014 Code of Practice for noise and vibration control of construction and open sites - Part 2: Vibration.
- BS 7385: 1993 Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration.
- BS 6472-1: 2008 Guide to evaluation of human exposure to vibration in buildings, Part 1 Vibration sources other than blasting.
- BS 8233:2014 Guidance on sound insulation and noise reduction for buildings.
- BS 4142: 2014 +A1 2019 Methods for Rating and Assessing Industrial and Commercial Sound.
- Córas Iompair Éireann (CIÉ) DART+ West project EIAR. Chapter 13 : Noise and Vibration
- Environmental Protection Agency (EPA) online noise maps (http://gis.epa.ie)
- Environmental Noise Regulations (S.I. No. 549/2018 – European Communities (Environmental Noise) Regulations 2018).
- International Organization for Standardization (ISO) 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors - Part 2: General method of calculation.
- ISO 1996-1:2016 Acoustics - Description, measurement and assessment of environmental noise. Part 1: Basic quantities and assessment procedures.
- ISO 1996-2:2017 - Description, measurement and assessment of environmental noise - Part 2: Determination of sound pressure levels (ISO 2017).
- The UK Department of Transport Calculation of Road Traffic Noise.
- UK Highways Agency (UKHA) Design Manual for Roads and Bridges (DMRB) LA 111 Sustainability and Environmental Appraisal LA 111 Noise and Vibration Revision 2.

24.11 Landscape & Visual Impact Assessment (Chapter 15)

- Environmental Protection Agency (2022) Guidelines on the Information to be contained in Environmental Impact Assessment Reports;
- European Commission (2017) Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report;
- Meath County Development Plan 2021-2027 (MCDP);

- Dunboyne Clonee Pace Local Area Plan 2009-2015 Incorporating Amendment No. 1 - Adopted March 2015; and
- Meath County Landscape Character Assessment (as per Appendix 7 of Meath County Development Plan 2013-2019).

Other sources of information include: -

- National Inventory of Architectural Heritage http://www.buildingsofireland.ie;
- National Parks and Wildlife Service (NPWS) and Environmental Protection Agency - https://gis.epa.ie/EPAMaps;
- https://www.heritagecouncil.ie
- Design Manual for Urban Roads and Streets by the Department of Transport, Tourism and Sport and the Department of Housing, Planning and Local Government (2019);
- Urban design manual - a best practice guide by the Department of Environment, Heritage and Local Government (2009);
- Sustainable Urban Housing: Design Standards for New Apartments (2022); and
- Sustainable Residential Development in Urban Areas and the accompanying Urban Design Manual: A Best Practice Guide (2009).

24.12 Material Assets (Transportation) (Chapter 16)

Not Applicable.

24.13 Material Assets (Waste) (Chapter 17)

- Waste Management Act 1996 - 2021 (No. 10 of 1996) as amended.
- Protection of the Environment Act 2003, (No. 27 of 2003) as amended.
- Litter Pollution Act 1997 (S.I. No. 12 of 1997) as amended
- Circular Economy and Miscellaneous Provisions Act 2022
- 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).
- European Commission, Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (2017).
- Environmental Protection Agency (EPA) 'Guidelines on the information to be contained in Environmental Impact Assessment Reports' (2022)
- Forum for the Construction Industry – Recycling of Construction and Demolition Waste.

- Department of Communications, Climate Action and Environment (DCCAE), Waste Action Plan for the Circular Economy - Ireland's National Waste Policy 2020-2025 (Sept 2020).
- DCCAE, Whole of Government Circular Economy Strategy 2022-2023 'Living More, Using Less' (2021)
- Environmental Protection Agency (EPA) 'Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects' (2021)
- Department of Environment, Heritage and Local Government, Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects (2006).
- FÁS and the Construction Industry Federation (CIF), Construction and Demolition Waste Management – a handbook for Contractors and site Managers (2002).
- Meath County Council (MCC), Meath County Development Plan 2021-2027 (2021)
- Meath County Council (MCC) 'Waste Management (Segregation, Storage and Presentation of Household & Commercial Waste Bye-Laws' (2018).
- BS 5906:2005 Waste Management in Buildings – Code of Practice
- Planning and Development Act 2000 (No. 30 of 2000) as amended
- Environmental Protection Agency (EPA), Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous (2018)
- 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.
- EPA, European Waste Catalogue and Hazardous Waste List (2002)
- EPA, National Waste Database Reports 1998 – 2020.
- US EPA, Characterisation of Building Uses (1998);
- 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)

24.14 Material Assets (Utilities) (Chapter 18)

Not Applicable.

24.15 Cultural Heritage (Archaeological & Architectural) (Chapter 19)

Published Sources

- Department of Arts, Heritage and Gaeltacht (2011) Architectural Heritage Protection: Guidelines for Planning Authorities.
- Department of Arts, Heritage, Gaeltacht and the Islands (1999) Framework and Principles for the Protection of Archaeological Heritage.

- Dowling, G. (2023) 'Geophysical Survey Report (Licence No.: 23R0167), Castlefarm, Rusk and Clonee townlands, Dunboyne, Co. Meath'. Unpublished report submitted to National Monuments Service.
- Environmental Protection Agency (2022) Guidelines for Information to be Contained in EIAR.
- International Council on Monuments and Sites (2011) Guidance on Heritage Impact Assessments for Cultural World Heritage Properties.
- Lewis, S. (1837) Topographical Dictionary of Ireland. 2 Volumes, Lewis & Company, London
- Meath County Council (2021) Meath County Development Plan 2021-2027.
- Moore, M. (1987) The Archaeological Inventory of County Meath. Government Publications
- National Monuments Service (2006) Guidelines for Authors of Reports on Archaeological Excavations.
- Stout, M. (1997) The Irish Ringfort, Dublin: Four Courts Press

Internet Resources

- Database of Irish Archaeological Excavations, last accessed on 15/05/2023 http://www.excavations.ie/
- National Monuments Service Historic Environment Viewer, last accessed on 15/05/2023 http://webgis.archaeology.ie/historicenvironment/
- Geohive Map viewer Resource, last accessed on 15/05/2023
- http://www.geohive.ie/
- Google Earth Pro, last accessed on 15/05/2023
- https://www.google.com/earth/versions
- Heritage Map Viewer - various interactive heritage maps, last accessed on 15/05/2023
- https://heritagemaps.ie/WebApps/HeritageMaps/index.html
- Meath County Development Plan 2021-2027, last accessed on 15/05/2023
- https://consult.meath.ie/en/consultation/meath-draft-county-development-plan/chapter/08-cultural-and-natural-heritage-strategy
- Meath County Council planning enquiry system, last accessed on 15/05/2023
- https://www.meath.ie/council/council-services/planning-and-building/planning-permission/view-or-search-planning-applications
- Teagasc Soil Map, accessed on 06/09/2022
- https://gis.teagasc.ie/soils/map.php
- National Folklore Collection UCD Digitization Project, last accessed on 15/05/2023 https://www.duchas.ie/en

- Placenames Database of Ireland, last accessed on 15/05/2023
- https://www.logainm.ie/en/
- Geological Survey of Ireland Open Topographic Viewer, last accessed on 15/05/2023
- https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=b7c4b0e763964070ad69bf8c1572c9f5
- Uisce Éireann Code of Practice for Wastewater Infrastructure: Connections and Developer Services
- https://www.water.ie/docs/connections/faqs/Wastewater-Code-of-Practice.pdf