Large Scale Residential Development at Dunboyne North, Co. Meath

August 2023

McCutcheon Halley
CHARTERED PLANNING CONSULTANTS

Large Scale
Residential Development
at Dunboyne North, Co. Meath

Volume II

Environmental Impact Assessment Report

CHAPTER 1

Introduction

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1 Introduction

1.1 Introduction

This Environmental Impact Assessment Report (EIAR) sets out the results of the environmental assessments which have been completed for the proposed development to inform the planning consent process.

The assessment has been completed as a statutory environmental assessment. The environmental impact assessment process has been completed in line with Directive 2014/52/EU, based on the guidance presented in the Guidelines on the Information to be Contained in the Environmental Impact Assessment Reports (EPA, 2022).

EIA is a process for anticipating the effects on the environment caused by a development. The document produced as a result is termed the EIAR. Article 1(2)(g) of the 2014 Directive (2014/52/EU) states that:

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

The EIAR is a presentation of the potential environmental impacts of the proposed development with a focus on significant impacts.

This Chapter 1 introduces the project and describes the scope and methodology of the EIA process. The consultation process which was undertaken is outlined and the details of the environmental assessment team are also provided.

1.1.1 The Applicant

The applicant is Marina Quarter Ltd. which is a subsidiary of Glenveagh Homes.

Glenveagh are a leading Irish home builder founded in 2017, whose vision is to build homes and create sustainable communities through exemplary design. Their focus on people, homes, and communities has created successful developments nationally by understanding that well planned, well designed, and well-built homes is the essence of thriving communities.

1.2 Expertise & Qualifications

This chapter of the EIAR has been prepared by Saoirse Kavanagh, Executive Planning Consultant of McCutcheon Halley Planning Consultancy. Saoirse holds a Bachelor's degree in Arts (International), majoring in Geography, and a Master's in Planning and Sustainable Development. She has over 4 years' experience working with multi-disciplinary teams and has provided input into a variety of projects. In particular, she has co-ordinated the preparation of the following four Environmental Impact Assessment Reports (EIARs) including the completion of the Introduction, Alternatives, and Population and Human Health chapters.

- Cooldown Commons Strategic Housing Development, Citywest, Dublin.
- Parkside 5B Strategic Housing Development, Belmayne, Dublin.
- Clonattin Strategic Housing Development, Gorey, Co. Wexford.
- Rathgowan Large Scale Residential Development, Mullingar, Co. Westmeath

1.3 Proposed Development

The full description of the proposed development is outlined in Chapter 2 'Development Description' of this EIAR.

In summary, the proposed Large Scale Residential Development will consist of the construction of 267 no. residential units, a creche, a new link road between the R157 and the Old Navan Road including a bridge over the River Tolka, 2 no. signalised junctions, upgrade works and road improvements to the R157 and the M3 Parkway access road, and all associated site development works including drainage, landscaping, and boundary treatments.

Figure 1.1 Extract from Proposed Site Layout Plan prepared by John Fleming Architects.

1.4 Background and Purpose of the EIAR

The proposed development falls within the class of development types requiring an EIA under Schedule 5 of the Planning and Development Regulations 2001 (as amended). The proposed development is subject to Part 2 of this Schedule (Section 10) which deals with infrastructure projects where EIA is required for:

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

The proposed Large-Scale Residential Development (LRD) comprises the construction of 267 no. residential units, creche and ancillary/associated development on a gross site area of 14.17ha. An EIAR is therefore required as the LRD comprises urban development on a site area that exceeds the 10ha threshold for a mandatory EIAR.

The criteria for assessing whether a development would or would not be likely to have significant effects on the environment are outlined in Schedule 7 of the 2001 Regulations and require the submission of information on the following:

- Characteristics of the proposed development
- Location of the proposed development, in terms of environmental sensitivity of geographical areas likely to be affected by the proposed development and

- Characteristics of the proposed impacts, in terms of the potential significant effects of the proposed development.

1.5 Methodology

This chapter has been prepared pursuant to Schedule 6 of the Planning and Development Regulations 2001 (as amended). Section 2 of the Schedule 6 sets out the additional information relevant to the specific characteristics of the project required, which includes a description of the likely significant effects on the environment of the proposed development.

1.5.1 Relevant Legislation & Guidance

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

- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Environmental Protection Agency (EPA), May 2022).
- Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA, 2003).
- EU Environmental Impact Assessment of Projects: Guidance on the Preparation of Environmental Impact Assessment Report (EU, 2017).
- EU Environmental Impact Assessment of Projects: Guidance on Scoping (EU, 2017).
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (OPR, 2018).

1.5.2 Site Surveys/Investigation

Site surveys and investigations were carried out as relevant and required by the various disciplines to inform the relevant EIAR chapters.

1.5.3 Description of Impacts

The significance of the effects of the development have been assessed according to the EIAR guidance and with the professional judgement of the competent experts who assisted in preparing this EIAR (the study team are presented in Table 1.3 of this EIAR). In this EIAR the terms "effects" and "impacts" are used interchangeably, unless stated otherwise.

Significance of effects is usually understood to mean the importance of the outcome of the effects (the consequences of the changes). Significance is determined by a combination of (objective) scientific and subjective (social) concerns. The significance of effects for each discipline is described using the terms provided in the 2022 EPA Guidelines documents (Table 1.1 following).

Table 1.1 Description of Effects

Quality of Effects **It is important to inform the non-specialist reader whether an effect is positive, negative or neutral.**	Positive Effect A change which improved the quality of the environment (for example, by increasing species diversity, of the improving reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).
	Neutral Effect No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
	Negative/Adverse Effects A change which reduces the quality of the environmental (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem, or damaging health or property or by causing nuisance).
Describing the Significance of Effects **"Significance" is a concept that can have different meanings for different topics – in the absence of specific definitions for different topics the following definitions may be useful (also see Determining Significance below).**	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 caused noticeable changes in the character of the environment without affecting its sensitivities.
	Moderate effects An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
	Significant effects An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
	Very significant An effect which, by its character, magnitude, duration or intensity alters most of a sensitive aspect of the environment.
	Profound effects An effect which obliterates sensitive characteristics.
Describing the Extent and Context of Effects **Context can affect the perception of significance. It is importance to establish if the effect is unique of, perhaps, commonly or increasingly experienced.**	Extent Describe the size of the area, the number of sites, and the proportion of a population affected by an effect.
	Context Describe whether the extent, duration, or frequency will conform or contrast with established(baseline) conditions (is it the biggest, longest effect ever?).
Describing the Probability of Effects **Descriptions of effects should establish how likely it is that the predicted effects will occur – so that the CA can take a view of the balance of risk over advantage when making a decision.**	Likely Effects The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
	Unlikely effects The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.

Describing the Duration and Frequency of Effects **'Duration' is a concept that can have different meanings for different topics – in the absence of specific definitions for different topics the following definitions may be useful.**	Momentary Effects Effects lasting from seconds to minutes
	Brief effects Effects lasting less than a day
	Temporary effects Effects lasting less than a year
	Short term effects Effects lasting one to seven years
	Medium term effects Effects lasting seven to fifteen years
	Long term effects Effects lasting fifteen to sixty years
	Permeant effects Effects lasting over sixty years
	Reversible effects Effects that can be undone, for example through remediation or restoration.
	Frequency of effects Describe how often the effect will occur (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, months, annually).

1.5.4 Study Area

In general, the study area comprises the entire gross site area. However, the study areas are defined individually for each environmental topic, according to guidance and the geographic scope of the potential impacts and/or the information required to assess those impacts. Details are provided by each discipline as part of the description of baseline conditions of the site.

1.5.5 Scope of Cumulative Effects

Directive 2014/52/EU substituted a new Annex IV into the Directive 2011/92/EU. Annex IV of the EIA Directive is to be read in conjunction with Article 5(1) and sets out the information to be included in an EIAR. Annex IV was transposed into national law via Article 97 of the European Union (Planning and Development) (Environment Impact Assessment) Regulations 2018 (under the "2018 Regulations") which substituted a new Schedule 6 into the Planning and Development Regulations 2000, as amended. The Directive required that the EIAR described the cumulation of effects with other existing and/or approved projects. Cumulative effects may arise from:

> *"The interaction between the various impacts within a single project; - The interaction between all of the differing existing and / or approved projects in the same areas as the proposed project."*

In August 2018, the Department of Housing, Planning and Local Government issued Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment. The Guidelines summarise cumulative effects in the following way on page 40:

"Effects are not to be considered in isolation but cumulatively i.e. when they are added to other effects. A single effect on its own may not be significant in terms of impact on the environment but, when considered together with other effects, may have a significant impact on the environment. Also, a single effect which may, on its own, have a significant effect, may have a reduced and insignificant impact when combined with other effect."

Paragraph 2(i)(V) of Schedule 6 (paragraph 5(e) of Annex IV) provides as follows:

"The cumulative of effects with other existing or approved development, or both, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources."

The proposed development is located on part of the Dunboyne North Masterplan – MP22 Lands. Two applications have been submitted on these masterplan lands which will be taken into consideration in this EIAR. In addition, we note the Part 8 development by Meath County Council for a new link road. The details of these applications are provided in the table below:

Table 1.2 Projects Considered for Cumulative Impacts

Reference	Application	Link to Documents
P822022	Dunboyne Link Road – Dunboyne Business Park and the R157. Part 8 Development	iDocs Web (meathcoco.ie)
23/424	3 no. office buildings, located to north of subject site. At FI stage at time of writing.	ePlan - Online Planning Details
23/60065	Single Storey commercial building to north of subject site. At FI stage at time of writing.	ePlan - Online Planning Details
23/816	Large Scale Residential Development for 716 no. residential units located south of the site, c. 1km east of Dunboyne town centre. This application was made invalid on the 18th August 2023 but it is anticipated that the application will be relodged shortly.	ePlan - Online Planning Details

1.5.6 Difficulties Encountered

Any limitations and/or difficulties encountered such as technical deficiencies or lack of knowledge in compiling the required information and the main uncertainties involved are outlined in each of the EIAR chapters, as relevant.

1.6 Report Structure

The EIAR has been prepared according to the 'Grouped Format Structure'. This means that each topic is considered as a separate section and is drafted by the relevant specialists.

The EIAR is divided into three volumes as follows:

- Volume 1: Non-Technical Summary
- Volume 2: Main Environmental Impact Assessment Report

- Volume 3: Appendices

Volume 1, the Non-Technical Summary (NTS), provides an overview of the project and the EIAR in non-technical terms, The summary is presented similar to the grouped format structure and discusses each environmental topic separately.

Volume 2, the main EIAR, provides the detailed information on the proposed development and the relevant environmental topics, with technical and detailed investigations of the topic areas as appropriate. This volume is prepared in the grouped format structure as it allows specialist studies to be completed for environmental topics in chapters.

Volume 3, the Appendices, contains supporting documentation and information on the EIAR.

1.7 EIAR Team

McCutcheon Halley Planning Consultants (MH Planning) are the planning consultants and project coordinators of the EIAR. The EIAR structure and consultant responsible for each of the chapters are presented in Table 1.3.

Table 1.3 EIAR Chapter List

Chapter	Chapter Title	Consultant
1.	Introduction	MH Planning
2.	Site Location & Project Description	MH Planning
3.	Alternatives Considered	John Fleming Architects
4.	Population & Human Health	MH Planning
5.	Land, Soils & Geology	Atkins
6.	Hydrology & Hydrogeology	Atkins
7.	Air Quality	AWN Consulting
8.	Climate	AWN Consulting
9.	Noise & Vibration	AWN Consulting
10.	Landscape & Visual Impact	JBA Consulting
11.	Material Assets – Traffic & Transport	Atkins
12.	Material Assets – Service Infrastructure & Utilities	Atkins
13.	Biodiversity	Enviroguide Consulting
14.	Cultural Heritage & Archaeology	John Cronin & Associates
15.	Significant Interactions of Impacts	MH Planning
16.	Summary of Mitigation Measures & Monitoring	MH Planning
17.	Screening for Major Accidents	MH Planning

The details of each consultancy within the EIAR team are provided in the table below. The qualifications of consultants responsible for each discipline is provided in the introduction to each chapter.

Table 1.4 EIAR Team Consultancy Details

Consultancy	Address	Phone	Email
MH Planning	6 Joyce Square, Barrack House, Ballincollig, Cork.	021 4208710	info@mhplanning.ie
John Fleming Architects	The Tree House, 17 Richview Office Park, Clonskeagh, Dublin, D14 XR82.	01 6689888	info@jfa.ie
Atkins	Atkins House, 150 Airside Business Park, Swords, Co Dublin, K67K5W4	01 810 8000	info.ie@atkinsglobal.com
Enviroguide Consulting	Head Office, 3D, Core C, Block 71, The Plaza, Park West, Dublin 12.	01 5657430	info@enviroguide.ie
AWN Consulting	The Tecpro Building, Clonshaugh Business and Technology Park, Dublin 17	01 8474220	Ciara.nolan@awnconsulting.ie
John Cronin & Associates	3a, West Point Trade Centre, Ballincollig, Cork.	021 4810311	info@johncronin.ie
JBA Consulting	24 Grove Island, Corbally, Limerick, V94 312N	061 579400	info@jbaconsulting.ie

1.8 Scoping and Public Consultations

The EIAR was scoped following an appraisal of the 2022 EPA Guidelines on Information to be contained within the EIAR, through design team meetings with the specialist consultants and the pre-planning meetings held with Meath County Council and decisions issued on previous applications on the subject site and the adjacent Phase 3 site.

Prior to lodging this application, the required information has been issued to the Department of Housing, Planning and Local Government's EIA Portal. The purpose of this tool is to inform the public in a timely manner, of applications that are accompanied by an EIAR.

The following prescribed bodies have been consulted in relation to the general scope of the EIAR.

- Department of Housing, Local Government, and Heritage
- Department of Tourism, Culture, Arts, Gaeltacht, Sport & Media
- Department of Education
- Geological Survey Ireland (Department of the Environment, Climate and Communications)
- The Heritage Council
- Office of Public Works (OPW)
- Transport Infrastructure Ireland (TII)
- The National Transport Authority (NTA)
- The Health and Safety Authority (HSA)

- The Health Service Executive (HSE)
- Inland Fisheries Ireland
- Bat Conservation Ireland
- Uisce Éireann
- An Taisce
- Bord Gais
- ESB
- Environmental Protection Agency
- Fáilte Ireland

Responses received are presented in Appendix 1.1

1.9 References & Sources

Guidelines on the Information to be Contained in Environmental Impact Statements (Environmental Protection Agency (EPA), May 2022); https://www.epa.ie/publications/monitoring--assessment/assessment/EIAR_Guidelines_2022_Web.pdf

Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA, 2003). https://www.epa.ie/publications/monitoring--assessment/assessment/advice-notes-on-current-practice-in-the-preparation-of-environmental-impact-stat.php

EU Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (EU, 2017). https://ec.europa.eu/environment/eia/pdf/EIA_guidance_EIA_report_final.pdf

EU Environmental Impact Assessment of Projects: guidance on Scoping (EU, 2017). https://ec.europa.eu/environment/eia/pdf/EIA_guidance_Scoping_final.pdf

Guidelines for Planning Authorities and An Bord Pleanála on carrying our Environmental Impact Assessment (OPR, 2018). https://www.opr.ie/wp-content/uploads/2019/08/2018-Environmental-Impact-Assessment-1.pdf

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Environmental Impact Assessment Report

CHAPTER 2

Site Location & Project Description

August 2023

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RECEIVED: 21/09/2023

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2 Site Location & Project Description

2.1 Introduction

According to the EIA Directive, an EIAR must provide a project description that includes information on the project's site, design, scale, and other relevant elements. The 2014 Directive stipulates in Recital 22 that:

> *"In order to ensure a high level of protection of the environment and human health, screening procedures and environmental impact assessments should take account of the impact of the whole project in question, including, where relevant, its subsurface and underground, during the construction, operational and, where relevant, demolition phases".*

This chapter complies with the EIA Directive's criteria by giving information about the proposed project's location, size, and features.

2.2 Expertise & Qualifications

This chapter of the EIAR has been prepared by Saoirse Kavanagh, Executive Planning Consultant of McCutcheon Halley Planning Consultancy. Saoirse holds a bachelor's degree in Arts (International), majoring in Geography, and a Master's in Planning and Sustainable Development. She has over 4 years' experience working with multi-disciplinary teams and has provided input into a variety of projects. In particular, she has co-ordinated the preparation of the following three Environmental Impact Assessment Reports (EIARs) including the completion of the Introduction, Alternatives, and Population and Human Health chapters.

- Cooldown Commons Strategic Housing Development, Citywest, Dublin.
- Parkside 5B Strategic Housing Development, Belmayne, Dublin.
- Clonattin Strategic Housing Development, Gorey, Co. Wexford.
- Rathgowan Large Scale Residential Development, Mullingar, Co. Westmeath.

2.3 Methodology

2.3.1 Relevant Legislation & Guidance

The relevant guidelines to the development of the built environment in Ireland are referenced by the architect. The following documents are among them:

- National Planning Framework 2040
- Urban Development and Sustainable Residential Development in urban areas.
- Quality Housing for Sustainable Communities
- Design Manual for Urban Roads and Streets (DMURS)
- Meath County Council Development Plan 2021-2027
- Dunboyne North Masterplan – MP22

2.3.2 Site Surveys/Investigation

The site's layout and design has been informed by site surveys completed as part of this EIAR and the planning application.

2.4 Difficulties Encountered

The subject site presented a number of design challenges which the design team has sought to resolve through our collaborative design process:

- Reaching an appropriate balance between current planning policy requirements while respecting the existing residential scale and context.
- Designing an appropriate drainage solution responding to both site conditions and existing limitations.

2.5 Baseline Environment

2.5.1 Site Location

The subject site is located within the townland of Bennetstown to the north of, and within the defined development boundary, of Dunboyne. The site area immediately south of the M3 Parkway Station, west of the River Tolka and the Dublin-Maynooth railway line, and east of the R157. The centre of the site is located c. 1.45km north of Dunboyne town centre, which is a c. 2.5km driving distance when taking the R157.

Figure 2.1 Approximate Site Area

The lands surrounding the subject site consist primarily of agricultural lands. The M3 Parkway Station to the north of the site provides a large surface car park adjacent to the train station.

The boundaries of the site consist of hedgerows and treelines and there is a ditch along the southern boundary of the site.

The red line boundary for the application extends from the main site area to include part of the R157 to the north and south, and over the River Tolka to the east.

2.5.2 Zoning

The majority of the subject site is zoned 'A2 New Residential' in the Meath County Development Plan 2021-2027 and is located within the Dunboyne North Masterplan MP22 area. A portion of the site to the east is located on lands zoned F1 Open Space and is outside the masterplan boundary.

The Dunboyne North Masterplan MP22 was adopted in October 2022 and was prepared to fulfil a requirement of the Meath County Development Plan to prepare a masterplan for the area. The subject site comprises the residential element of Phase 1A.

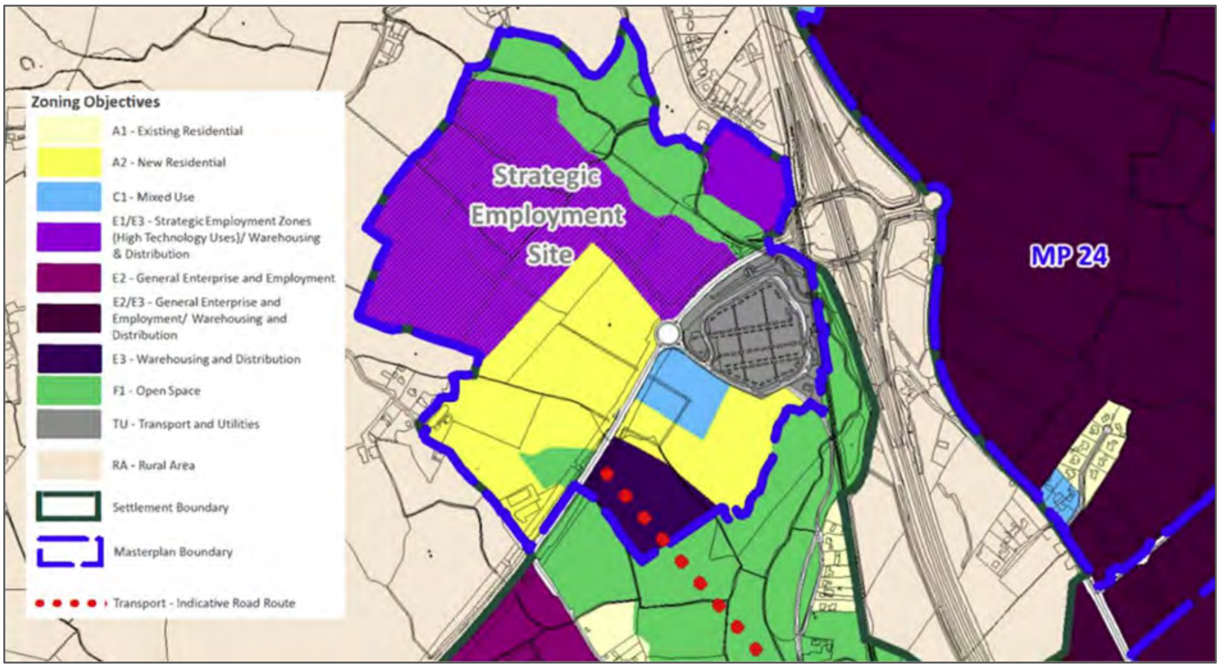

Figure 2.2 Extract from Meath County Development Plan 2021-2027 Land Use Zoning Map (Sheet 13(a) Dunboyne/ Clonee/ Pace)

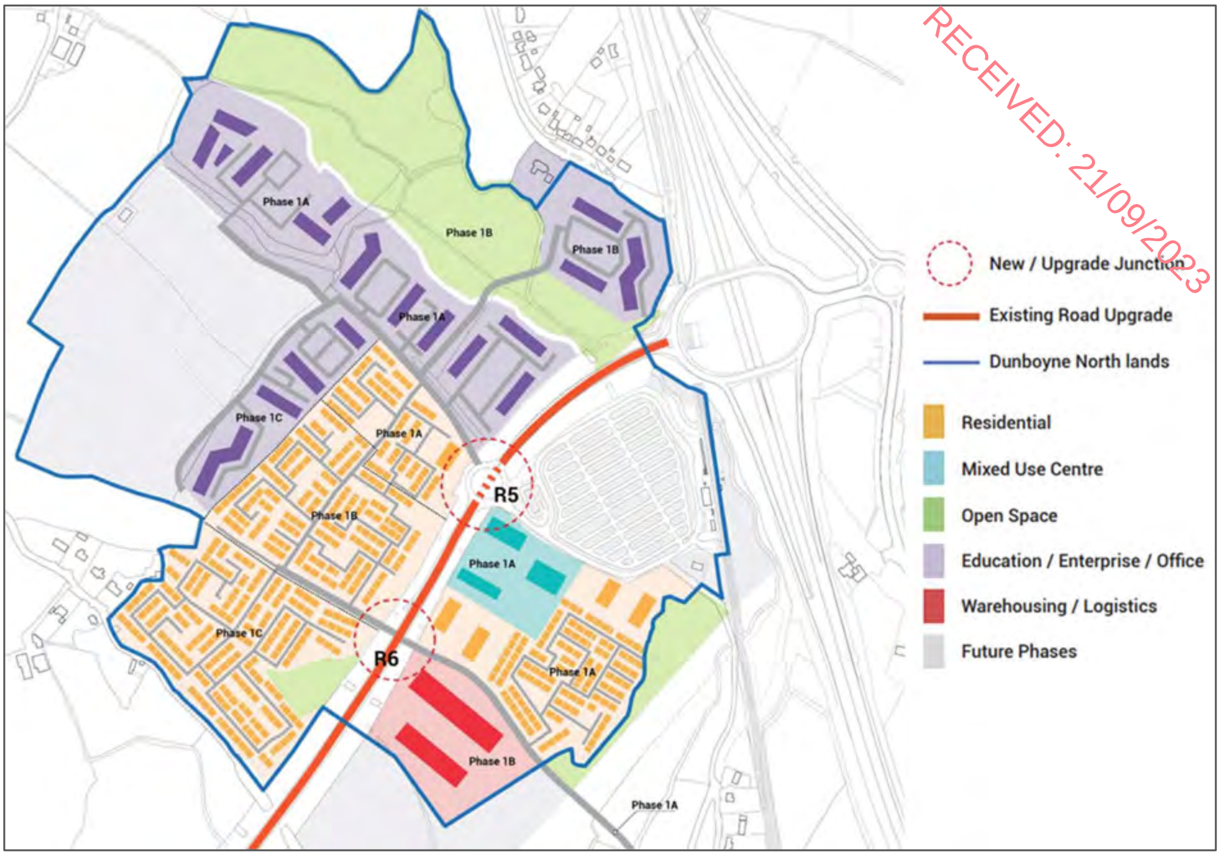

Figure 2.3 Extract from Dunboyne North Masterplan Phasing Plan

2.6 Proposed Development

The proposed development consists of

- 267 no. residential units.
- A 280sqm creche with 65 no. childcare spaces.
- A new link road from the R157 to the Navan Road including the construction of a new bridge over the River Tolka.
- Road improvements and upgrade works to the R157.
- Landscaping and boundary treatments
- Reprofiling of the F1 lands to the east to accommodate flooding.
- All associated site development works.

2.6.1 Layout

The layout consists of 8 no. cells of residential units (Cells A to H) comprising 122 no. apartments in 7 no. blocks (Blocks A to G) and 145 no. houses.

Cell A is located along the northern boundary and comprises apartment blocks A to E. Block A, B and C provide a strong urban frontage to the site and the proposed public plaza adjacent the M3 Parkway Park and Ride facility. Blocks D and E are located along the boundary with the adjacent commercial zoned lands and have been carefully located to provide a strong frontage to the boundary while also ensuring the future development of the adjacent lands.

Cell B is located south of the apartment blocks in Cell A. Cells C, D, and H are located along the eastern edge of the developable site area. Cell C and F are located along the southern boundary. These cells include a mix of terraced houses with Cell H including some semi-detached units alongside the terraced units.

Cell E is located in the western corner of the site and includes apartment blocks F, G and H. Block H has been designed and located to provide a strong frontage to the R157 while Blocks F and G provide a strong urban frontage to the adjacent site to the north and to the proposed link road to the south.

2.6.2 Unit Mix and Type

The proposed development includes a mix of terraced houses, semi-detached houses, duplexes, and apartments. The unit mix is shown in the table below.

Table 2.1 Unit Size and Type Breakdown

Unit Size	Number	%	Unit Type Breakdown
1 bed	28	10.5%	28 no. apartments (100%)
2 bed	144	53.9%	59 no. apartments (41.0%) 85 no. houses (59.0%)
3 bed	87	32.6%	35 no. apartments (40.2%) 52 no. houses (59.8%)
4 bed	8	3.0%	8 no. houses (100%)
Total	267	100.0%	122 no. apartments (45.7%) 145 no. houses (54.3%)

2.6.3 Creche

The creche is located to the east of the site, south of the proposed plaza and pumping station and northeast of Cell C. The creche measures c. 280sqm and has been designed to cater for 65 no. children. The orientation of the building and the play spaces has been carefully considered to ensure a high level of daylight and the provision of a high-quality environment.

2.6.4 Open Space

The proposed development includes a total of 9 no. public open spaces which is provided in the following spaces:

- 1,412sqm - Cell E – Sycamore Square
- 921 sqm – Cell E Linear Park
- 1,838 sqm – Bennetstown Green
- 895 sqm – Cell A Linear Park
- 1,676 sqm -Parkway Plaza.
- 580sqm – Creche Green

- 370 sqm FI Pocket
- 136 sqm – Fi Pocket
- 513 sqm-Park under Sycamore to NE edge.

In addition, the FI Open Space lands to the east of the site provide a large amenity open space are for residents. A shared footpath/cycle path is provided through this area, providing an amenity walkway for residents and an alternative route through the scheme.

Communal open space is also provided for the apartments and duplexes.

2.6.5 Parking

The proposed development includes a total of 327 no. car parking spaces and 649 no. cycle parking spaces.

Car parking is provided at a ratio of 2 no. spaces for 3 and 4 bed houses with 2 bed houses provided with 1 no. car parking space. The apartments are provided with car parking at a rate of 0.5 no. spaces per apartment unit and the duplexes are provided with 1 no. car parking space per duplex unit. 11 no. car parking spaces are provided for the creche (including 3 set down spaces) and 27 no. visitor car parking spaces are provided.

72 no. cycle parking space are provided for the duplexes and 125 no. are provided for the apartments. These spaces are all provided in safe secure stores. Bike stores are also provided for the mid-terrace houses while the end of terrace and semi-detached houses will have access to their rear gardens for bike storage. 12 no. secure bike spaces and 20 no. Sheffield stand spaces are provided for the creche. 150 no. Sheffield stand spaces are provided throughout the development.

2.6.6 Access

The proposed development includes the construction of a new link road along the southern boundary of the main site area, connecting the R157 to the west with the Old Navan Road to the east. This new road will provide two vehicular access points to the site.

In addition to the vehicular access, there will be a variety of pedestrian and cyclist access points into the scheme. The F1 zoned lands to the east will provide pedestrian links to the site. The public plaza area to the north has been designed to be permeable for both pedestrians and cyclists.

2.6.7 Improvements to the R157 and M3 Parkway Access Road

The proposed development includes changes and improvements to the R157 to the west of the site and the M3 Parkway access road to the north of the site.

The existing single carriageway R157 will be altered to provide two lanes of traffic in both directions for approximately 600m. This will be accompanied by a reduction of the existing speed limit from 80 km/h to 50 km/h.

The existing roundabout junction to the north of the site which provides access to the M3 Parkway will be replaced with a signalised crossroads junction. This will require the widening of the existing carriageway by 0.5m to 3m for 50m on both sides on approach to the junction.

An additional new signalised crossroad junction will be provided on the R157 which will provide access to the new link road between the R157 and Old Navan Road and lands for development to the west of the R157.

The existing M3 Parkway Access Road will be modified by providing a new cycle track on footpath on its southern side along with two new zebra crossings.

2.6.8 New Link Road and Bridge

The proposed development also includes the construction of a new link road along the southern boundary of the main site area, connecting the R157 to the west with the Old Navan Road to the east.

The new link road will include footpaths and cycle paths on both sides of the road. A raised toucan crossing will be provided across the link road at the access to the amenity pathway through the F1 Open Space lands.

Two priority junction access points providing vehicular access to the site are included along the new link road. An additional priority junction access point for the industrial zoned lands to the south of the road will also be provided with the exact location to be confirmed as part of future planning applications.

A new priority junction will be provided at the new junction with the Old Navan Road.

The construction of this new road will include the partial culverting of the existing open drain along the southern boundary of the site.

Four bridge structures will be provided along the new road to cross the River Tolka and the flood plain area.

2.6.9 Flood Mitigation Measures

The eastern portion of the site, which is zoned F1 Open Space, is located within a flood zone. As a result, a Flood Risk Assessment has been carried out and appropriate mitigation measures have been incorporated into the design of the development including:

- The realignment of the existing flood defence berm to the east of the site.
- The construction of three flood relief bridge structures along the new link road.
- The reprofiling of the F1 Open Space lands to provide flood storage.

2.7 Construction Stage

The construction of the proposed development is expected to take approximately three years.

2.7.1 Construction Site Establishment

A temporary site compound will be set up during the construction stage of the works.

Proposed works will include construction of a site compound, perimeter hoardings, provision of site security and access points, and erection of cranes as necessary. Safeguards will be put in place to protect the site, the works, materials and plant. Existing buildings, persons and access will be protected during the works.

2.7.2 Working Hours

The proposed construction working hours will be from 7am to 7pm Monday to Friday, and 7am to 2pm on Saturdays. No construction work will take place on Sundays or public holidays, except works necessary for health and safety reasons or to protect the environment. An Outline Construction Traffic Management Plan has been prepared by Paul McGrail Consulting Engineers and is submitted with the planning application.

2.7.3 Demolition

No demolition works are proposed.

2.7.4 Earthworks

During construction of foundations, underground services and utilities, and flood attenuation tanks, site earthworks will be required. Site investigations will be carried out by the contractor prior to construction. Any contaminated soils will be segregated and removed off-site in accordance with relevant waste legislation.

The programming and scheduling of earth works will be managed by the Main Contractor.

- Existing topsoil is to be removed over the extent of the proposed Berm area and excavation of subsoil material is to a minimum depth of 500mm below existing ground levels.
- Suitable clay material to be imported to the site (or use of site-won clay material following testing of material to confirm permeability requirements).
- The Clay material is to be placed and compacted in layers greater than 250mm thick by the contractor.
- The Berm is to be shaped to have a slope no greater than 2:1 and to maximum height as indicated on the proposed Berm Detail and associated project Flood Risk Assessment.
- 200mm topsoil to be placed on top of clay material to allow for grass seeding in accordance with landscape requirements.
- The topsoil of the existing Berm is to be removed and stored on site adjacent to the works.
- The existing Berm is to be reduced to 200mm lower than the existing surrounding ground levels. Excavated material is to be removed from the site.
- The topsoil is to be reused and placed over the removed berm location and grass seeding in accordance with landscape requirements.

2.7.5 Construction Sequencing and Phasing

The proposed development will be constructed in three phases. Phase 1 will include 250 no. residential units, the creche, cut and fill works, the pump station, flood compensation measures, and the bridge works over the River Tolka. Phase 2 will include 62 no. units and Phase 3 will include the remainder of the infrastructural works.

The subject site is also located within Phase 1B of the Dunboyne North Masterplan Area. The subsequent phases will be subject to separate planning applications and assessment.

2.7.6 Traffic Management

An Outline Construction Traffic Management Plan has been completed by Paul McGrail Consulting Engineers which notes that construction vehicle movements will be minimised by:

- Phasing works and delivery schedules
- Use of precast/prefabricated materials where possible
- Reuse on site of cut material generated by construction works
- Site storage
- Promotion of car sharing and public transport for construction workers.

2.7.7 Construction Management Plan

A Construction Environmental Management Plan has been completed by Paul McGrail Consulting Engineers. This report outlines the site enabling works, the construction traffic and site access, the site logistics, the indicative construction methods, the health and safety environment, the work force, and the environmental management measures.

2.7.8 Site Services and Waste Management

Refer to accompanying preliminary Construction Environmental Management Plan prepared by Paul McGrail Consulting Engineers. Refer also to the Material Assets Service Infrastructure and Utilities chapter of this EIAR.

Large Scale
Residential Development
at Dunboyne North, Co. Meath

Volume II

Environmental Impact Assessment Report

CHAPTER 3

Alternatives Considered

August 2023

McCutcheon Halley
CHARTERED PLANNING CONSULTANTS

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3 Alternatives Considered

3.1 Introduction

Consideration of reasonable alternatives is an important aspect of the EIA process and is necessary to evaluate the likely environmental consequences of a range of development strategies for the Site of the Proposed Development within the constraints imposed by environmental and planning conditions. This section provides a description of the reasonable alternatives that have to be considered. The EIA Directive 2014/52/EU notes that the following is required in relation to the consideration of alternatives in the preparation of the EIAR;'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".

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 is deciding on the selected option.

This section of the EIAR provides an explanation of the reasonable alternatives examined throughout

the design and consultation process. This serves to indicate the main reasons for choosing the

proposed development, taking into account and providing a comparison of the environmental effects.

The alternatives may be described under the following headings.

- Alternative locations
- Alternative designs
- Alternative layouts
- Alternative processes

Alternatives may also be described at six levels: do-nothing alternative, alternative locations, alternative layouts, alternative design, alternative processes and alternative mitigation measures

3.2 Expertise & Qualifications

This chapter of the EIAR has been prepared by Deirdre Hargaden of John Fleming Architects.

Deirdre Hargaden holds an Architectural Degree and is a Fellow of the Royal Institute of Architects of Ireland and has been trained in conservation methods to Grade 3 standard (BArch dip Arch FRIAI Grade 3 Conservation). John Fleming Architects have carried out an Architectural assessment and been involved in the preparation of EIARs for the following projects:

- Bective Hotel and Demense in County Meath.
- Mixed Use Scheme Omni Park Santry
- Mixed Use Scheme at Fosterstown Swords

3.3 Proposed Development

The full description of the proposed development is outlined in Chapter 2 'Development Description' of this EIAR.

3.3.1 Aspects Relevant to this Assessment

The subject site is located within the townland of Bennetstown to the north of the defined development boundary of the town of Dunboyne. The site is located c.3km to the north of the town centre and situated directly south of the Dunboyne to Clonsilla Rail Line and M3 Parkway rail station, west of the Royal Canal and the Dublin-Maynooth Railway Line and east of the R157 (to Dunboyne). The site is accessible via the R157 which is located at the west of the site.

The area surrounding the site is characterised by predominantly agricultural uses. The lands immediately adjoining the site to the west, east and south are all under agricultural use. The M3 Parkway rail station is situated to the north of the site. The R157 bounds the site to the west with agricultural land beyond.

The site is phase 1 of a larger masterplan area. Future phases of development will be situated to the west of the subject site.

3.4 Methodology

3.4.1 Relevant Legislation & Guidance

This EIA Report has been prepared in accordance with the requirements of EIA Directives (2011/92/EU and 2014/52/EU). It is prepared in the Grouped Format Structure following the guideline structure set down in the Environmental Protection Agency (EPA) "Guidelines on the Information to be Contained in Environmental Impact Assessment Reports" (2022).

The "Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment" (August 2018) and the European Commission Guidance on the preparation of the Environmental Impact Assessment Report have been considered in the preparation of the EIA report.

3.4.2 Site Surveys/Investigation

John Fleming Architects have used the following disciplines to inform their design layout of the scheme:

- Measured Site survey.
- Arborist Survey.
- Bat Surveys.
- Mammal survey.
- Bird Surveys.
- Proposed New Link Road layout.
- Flood survey.

3.4.3 Consultation

The Applicant and the Proposed Development project team have liaised with the relevant departments of MCC in advance of lodgement of this application. A Section 247 meeting was held in person and online with MCC on the 15th of May 2023. A section 32B meeting was held on the 20th of July 2023. Officials from MCC and members of the design and developer team attended. Several specific issues, concerns and suggestions were raised during this meeting and further details regarding how they have been implemented into the design are provided in the Architectural Design Statement which is part of the Planning Application documents. The issues and concerns raised informed the progression of the design and layout.

3.5 Difficulties Encountered

There were no significant difficulties encountered while compiling information for this EIAR chapter.

3.6 Project Need

There is a housing crisis in Ireland, and this site is well serviced being beside the M3 Parkway Station and part of the greater Dublin catchment area. The train takes 38 minutes to reach Dublin city centre Connolly station. The site is just off the M3 motorway and the R157 leading to Dunboyne and Maynooth. It is beside Dunboyne town. The Site is zoned **A2 New Residential Land Use** as an objective of Meath County Council which recognises the residential need in the area. The current project is phase 1 of a masterplan promoting a live/work mixed use surrounding the train station. Particularly in light of the housing shortage, it is imperative that this site, which meets all relevant criteria, should be developed.

3.7 Baseline Environment

The site is zoned A2 New Residential Lands which will benefit the commuter being directly beside the M3 Parkway Station and 1200 park and ride carparking spaces.

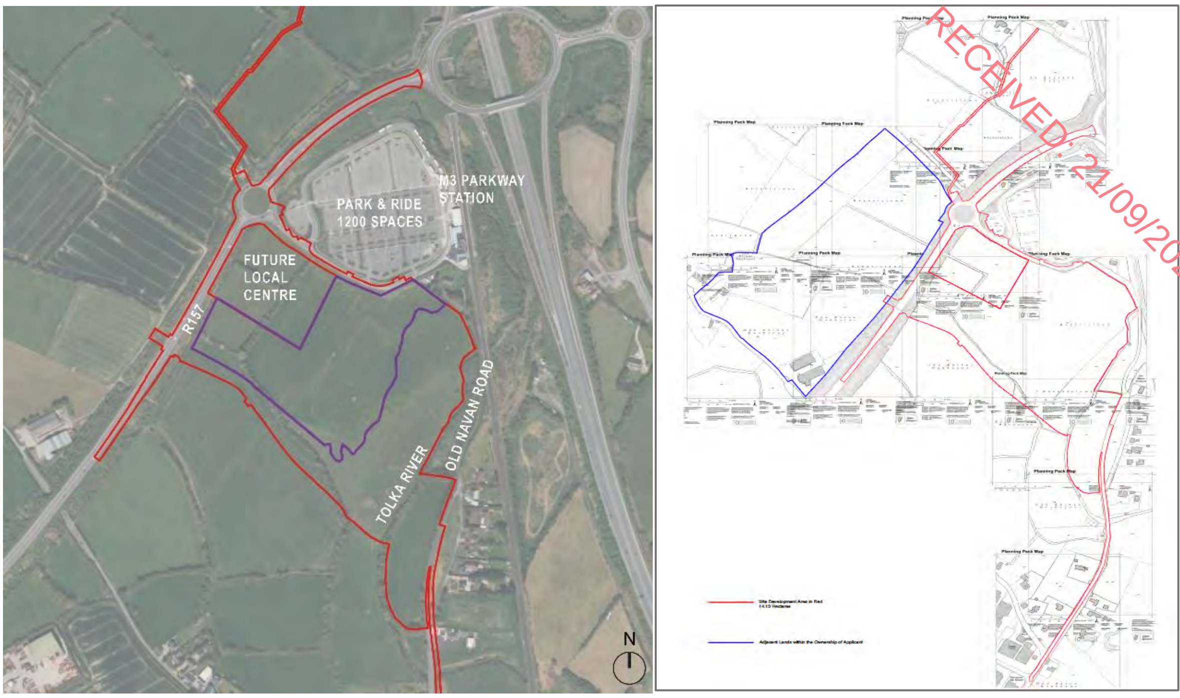

Figure 3.1 Site ownership and zoning lines (purple line denotes Zoning line and developable area). The red line on the next map shows the full red line boundary of works.

The site ownership is a 6.82Ha greenfield site situated 1.4km north of Dunboyne town centre and 0.5km from the Pace Interchange Junction 5 on the M3. The A2 zoned residential actual developable area of this site is 5.18 Ha net area. The topography is mostly flat with a gentle decline eastward towards the Tolka River. The overall site development area (shown above) includes links to Irish water, foul drainage and road upgrades and is 14.13 hectares.

It is currently in pasture and contains water courses draining the fields to the west of the Site parallel to the R157 into the Tolka to the east. These water courses are lined with trees and hedgerows.

The northern boundary of the site adjoins the M3 Parkway Station and a single storey dwelling circa 23 meters from the site boundary and to the north west wraps around a plot zoned C1 (Mixed Use) where a local centre with retail and apartments are planned. The eastern boundary runs beside meadows zoned F1 (Open Space) along the Tolka River. A proposed road linking the R157 and the Old Navan Road forms the southern boundary and the site has circa 85 metres of frontage to the R157 road along the west

The Archaeological Survey of Ireland maps show no monuments on the site. ESB overhead cables run north south across the site before running under the M3 Parkway Station Park and Ride.

The site is part of Phase 1 Development of the Masterplan MP22 Version 1 in the Meath County Development plan 20 21- 2027.

3.8 The 'Do nothing' Scenario

In the event that the Proposed Development does not proceed, the specific need for this residential development would still exist for the site, and as such the Proposed Development would need to be built elsewhere. The implementation of the masterplan to create a new residential and commercial community on underutilised grazing lands between the M3 Parkway Station and Dunboyne town centre has already commenced with the issue of the Meath County Council Masterplan MP22 in late 2022. There has been a recent lodgement of commercial offices on zoned lands E3 already within the masterplan.

The land is zoned 'A2- New Residential '' within which mixed-neighbourhood facilities are permissible. Consideration of an alternative location would equate to a 'do-nothing' alternative for the subject site. The lands would remain underutilised farmlands and would not maximise upon the development potential of the site. The status of the environmental receptors described throughout this EIAR would be likely to remain unaffected.

According to the Meath Council (MCC) Development Plan 2021-2027 and the Masterplan Plan MP22 Version 1 within it:

> "…it shall be a requirement that proposals for the provision of a maximum of 500 residential units in a range of densities to support the delivery of a sustainable "live work" community-based model."

As such, it is considered that this development will support the A2 New Residential land use objective of Meath County Council.

3.9 Alternative Project Locations & Alternative Uses

As noted in Section 4.13 of the 2018 Guidelines "some projects may be site specific so the consideration of alternative sites may not be relevant."

We also refer to the Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA. 2022), which states that in some instances alternative locations may not be applicable or available for a specific project which is identified for a specific location.

In the first instance, the Proposed Development is in accordance with the zoning and other relevant policies and objectives of the current MCC Development Plan 2021 – 2027 and the Masterplan MP22. The site is zoned as 'Zone A2 New Residential – 'To provide for new residential communities and ancillary community facilities, neighbourhood facilities as considered appropriate.'. The masterplan for Bennettstown provides a variety of Zones to allow for a diverse mix of uses such as Zone C1 (Mixed Use) E3 (Warehousing and distribution) and F1 (Open Space) along with A2 (New Residential) this will allow a diverse community to develop. Therefore, the Proposed Development represents alignment with the zoning goals of A2 – and will be the catalyst to initialise the development of the masterplan.

Having regard to the site-specific nature of both the Proposed Development and future developments, further consideration of alternative site locations is not considered essential in respect of the EIAR legislation and guidance.

Given the current zoning of the site, the surrounding proposed land uses, the future proximity to similar associated developments, and the future availability of necessary services and infrastructure, the Proposed Development is the most appropriate use for the site.

3.10 Alternative Design/Layouts

Both the context and approach to the site of the proposed development, and the emerging design rationale have been subject to consultation with Meath County Council (MCC). The Statement of Consistency prepared by McCutcheon Halley Chartered Planning Consultants, in conjunction with John Fleming Architects, Ilsa Rutgers Landscape Design and Paul McGrail Engineers on behalf of Glenveagh Homes notes that the proposed development will provide an appropriate form of high-quality residential development, which is consistent with all planning policy framework, for an effective and efficient use of this highly accessible and under-utilised site.

A number of alternative layouts were considered for the proposed development; 8 of these are detailed below (A-H).

3.10.1 Options A & B

Option A **Option B**

Figure 3.2 Pre-Planning Design Concept (JFA 2023)

Two sketch schemes were explored before developing the preferred option.

Option A retained the hedgerow and land drain and concentrated the open space around these areas. A secondary open space was located to the north-east of the site at the apartments. The large central open space was considered an attractive feature to the design. However, the distribution of open space was not good as back gardens face the zoned C1 mixed use lands.

Potential link routes to lands to the west were incorporated. The crèche was positioned to the west of the site beside the main 157 road.

Option B is similar to Option A retaining the hedgerow and land drain as open space. However, the use of apartments is lessened, and the public open space is central to both A2 and C1 zoned lands. This means no back garden faces the mixed-use lands. The F1 zoned lands of open space is taken advantage of by housing facing directly onto it. The creche is on the ground floor of the apartments with easy access from the park and ride to serve the wider community.

Option A and B were further modified to create Option C. A concept sketch is shown below for the preplanning meeting S247.

3.10.2 Option C

Figure 3.3 Pre-Planning Design Concept (JFA 2023)

Option C considered lands zoned C1 mixed use on the neighbouring site, and units in cells D, E, F and C face towards it, therefore allowing more integration. Passive surveillance is also achieved overlooking open spaces. Dual frontage houses face the main Dunboyne Road R157 and end of terraces.

Figure 3.4 Pre-Planning Design S247 Layout (JFA 2023)

On Monday 15th May 2023, a meeting was held in Meath County Council Offices and online with members of the design and developer team to present the above design concept to the Planning and Transportation and roads departments.

Several specific issues were raised, and constructive criticism was provided by the Meath County Council local authority which informed the future design and those who welcomed the proposal. They were happy to see that development of the site was progressing:

1. Dunboyne: Dunboyne is within Dublin's Metropolitan area. This is an important and strategic residential site for Meath County Council.

2. Masterplan: It was noted that the interaction between site and the neighbourhood centre C1 site was very important for development of the masterplan and collaboration between the two sites needed to be explored.

'' it shall be a requirement that proposals for the provision of a maximum of 500 residential units in a range of densities to support the delivery of a sustainable "live work" community-based model".

3. Density: MCC queried the location of the apartment block and advised that overall, the scheme needs to be more urban (less suburban). MCC recommended increasing height and density, particularly with proximity to the train station. MCC noted that creating a high-quality urban scheme is more important than density/numbers but, recommended looking at a core strategy and zoning overlay.

4. Connectivity: MCC noted that the connectivity and permeability within the site and its connectivity to the surrounding area/neighbourhood centre is key. MCC emphasised pedestrian and cyclist access from Glenveagh site to retail/services in C1 zoned site is key and that the current site layout does not provide this i.e., people should not drive to the shops.

5. Urban edge: MCC classify this site as urban rather than suburban and would like to see a strong urban edge to the site especially facing the train station, C1 zoning and the main Road R157 into Dunboyne. It was suggested that the blocks labelled A, B and D could be redesigned. Good legible character areas are to be created within the scheme. A variety of building types and heights are required. Therefore, it is necessary to reconsider massing and scale along the edge.

6. Open Space and site layout: 15% of the developable site area has to be dedicated to open space, it is currently 10% being so close to the F1 zoned open space adjacent. Communal open space is a requirement for the apartments. Open space should be high quality and not just pocket parks. The present scheme has too many cul-de-sacs. Traffic calming is to be introduced. The open space along Block F and G is to be overlooked by the units to provide a safe space.

7. Arborist survey and report: Overlay the scheme showing the hedge rows and tree protection and impact from development. Ash trees are being removed currently in the environ of Meath due to disease.

8. Creche: Its position was queried. However, it was explained that it is there for proximity to the train station and ease of access from station parking. Also, there is potential to provide a larger creche to suit both A2 and C1 sites in the F1 lands where a creche is deemed allowable.

3.10.3 Options D and E

Figure 3.5 Post S247 Layout Options D and E

After the S247 consultation with Meath County Council, option D and E explored the formation of an urban edge using a 3-storey terrace house and 3 storey terrace duplexes facing onto the park and ride and C1 zoned mixed use lands. Option D had 2 apartment blocks both acting as landmarks on opposite ends of site. Option E only used one block of apartments facing the R157, the position suiting the scale of the roadway. Cell A and B in option E facing the train station are only 3 storeys high, whereas block B in option D was 5 storeys and acted as a gateway building into the scheme from the parkway. Option E also created a plaza which acted as a buffer between the public carpark and the quieter area of the parks within the scheme. Both Options D and E successfully formed an urban edge facing the neighbouring retail and parking areas.

In both schemes, the open space remained central and are adjacent to C1 zoned land. Houses addressed neighbouring lands and connectivity permeability was created by cycle and pathways to the train station and retail.

The creche remained in the position nearest the train station to allow for drop offs and to take advantage of the F1 open space lands.

After consultation with the design team, the creation of a buffer plaza with the higher apartments and terrace duplexes forming an urban edge to the parkland became the preferred option. This option was further developed to the final site layout.

3.10.4 Option F lodgement for S32B meeting Layout & description

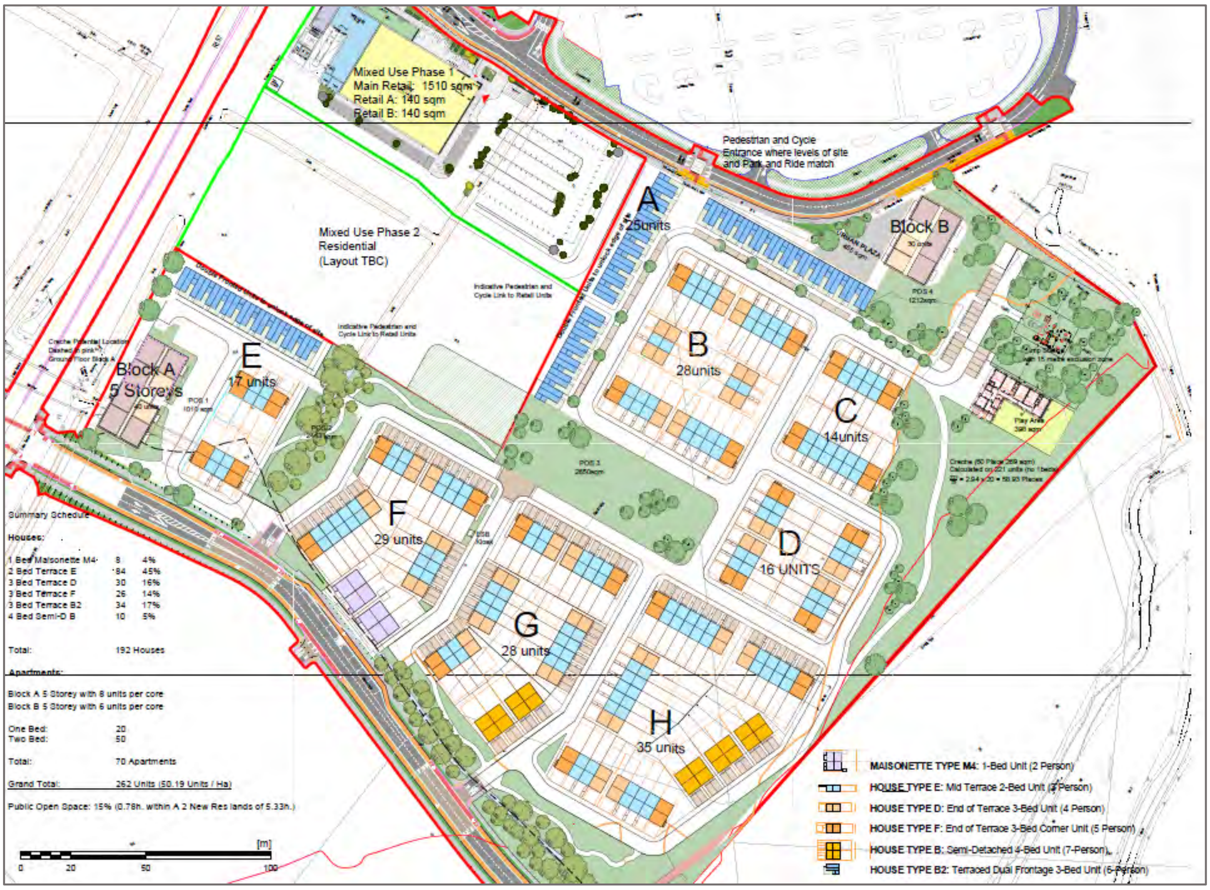

Figure 3.6 S32B Option F (JFA 2023)

Option F site layout was chosen to encourage connectivity and permeability for both pedestrians and cyclists. The layout of the houses creates an articulated community through its series of plazas, streets and pocket parks and amenity/open space areas. This is further highlighted through the pedestrianisation between neighbourhoods, the provided open space and amenity trail and removal of vehicular access.

The proposed development provides a connected and sustainable community that brings passive surveillance and accessible amenity areas within the site. The new plaza is protected by an urban edge of 5 storey apartments and 3 storey terrace houses which continues around the site facing the mixed use C1 zoned land ensuring no rear gardens face the neighbours. A suitably scaled 5-storey apartment block addresses the R157 main road to Dunboyne and acts as a gateway building into the scheme.

The public green will also integrate the two sites. There are a series of open spaces interwoven throughout the proposed scheme retaining as much of the original hedgerow viable. Pathways are designed under tree canopies and face the new link road with it been overlooked also by the new development. The recreational requirements were carefully considered during the design and layout of the open spaces associated with the proposed development. The open spaces are defined and overlooked by the built elements to provide passive surveillance, whilst shared surface access roads and raised tables facilitate safe and convenient access for future residents. The final design takes into consideration a road safety audit. Road safety measures were incorporated, including raised junctions, a raised table, and a turning bay at the crèche parking.

This final iteration goes into greater detail for the street design including: refuse storage & bicycle parking for mid terraced units, passive surveillance for the public domain, boundary treatments and crèche design & capacity calculations.

The creche is located near the plaza and Park and ride to serve not only the development but the wider community. It is also perfectly placed to avail of the F1 zoned open space.

Layout F provides a mixture of housing types with immediate access to amenity areas and walkways/cycleways that connect to the neighbouring communities. In this option , the house type range was reviewed for constructability and the following finalised house types were selected:

- 1 Bed Maisonette
- 1 Bed apartment
- 2 Bed apartment
- 2 Bed Mid Terrace
- 3 Bed end of terrace (Corner)
- 3 Bed End Terrace
- Bed Semi Detached
- 3 Bed Duplex terraced dual frontage

The proposed dwellings are orientated to overlook the open spaces and create passive surveillance for these areas. The duplex units create the urban edge to the site and will complement the overall development.

3.10.5 Option G – After discussions with McGarrell Reilly Developments C1 zoned lands.

Post the Section 32B meeting the design team collaborated with the neighbouring site owners McGarrell Reilly about the interaction of the proposed plan with their site. They requested that they would need the duplex apartments set back 11m to allow for future housing or apartment design on their site. Several layout changes occurred, including the creation of communal open space for the duplex apartments facing the C1 zoned lands. The maisonettes moved west, to create a corner edge with the apartments facing the new link road. A kink in the road in cell B was created to allow for the 11m setback, but it helped slow down traffic. F1 lands will be culverting the field drain which meant only a small section will be open in the residential lands so the decision was taken to culvert the entire north south field drain. All the collaborative changes were a positive contribution to the plan.

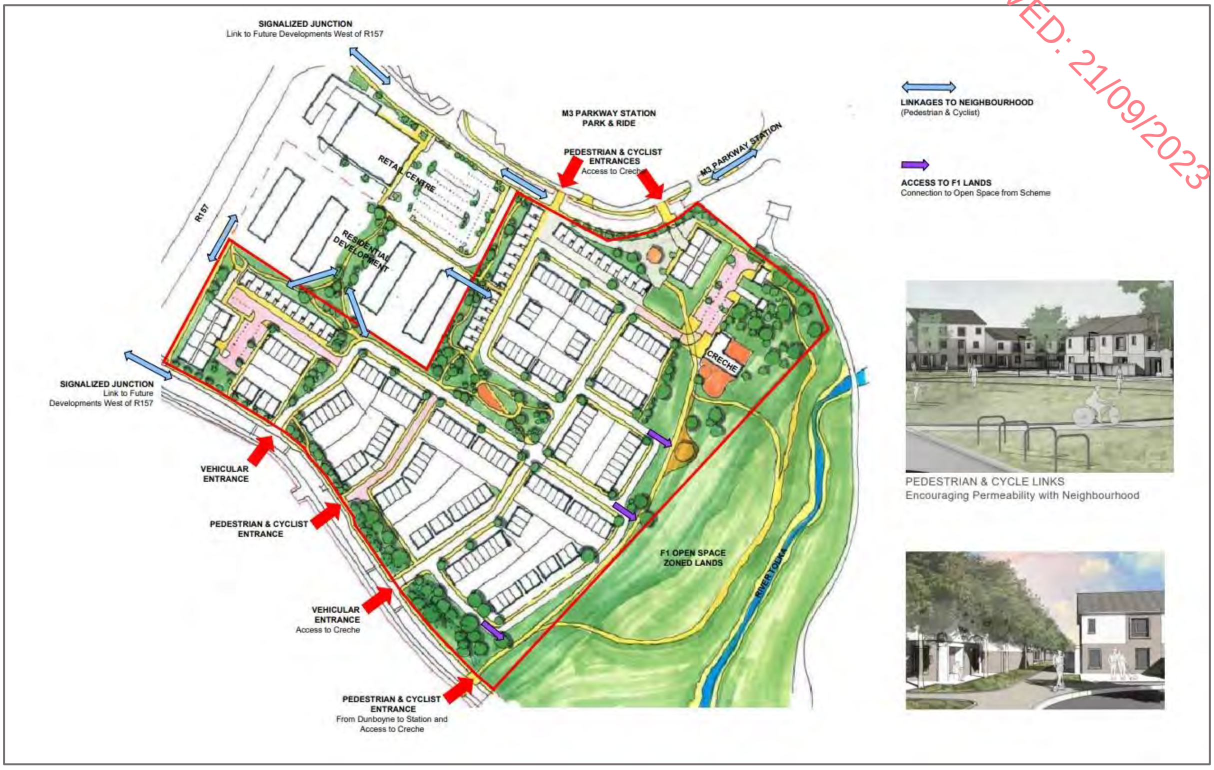

Figure 3.7 Option G McGarrell Reilly discussions. (JFA)

3.10.6 Section 32B Opinion – Alternative character area options.

On the 20th of July 2023 a S32B meeting took place at Meath County Council with most departments attending with the consultant team in person and on line. One of points raised during the section 32B meeting was to create 3 main character areas including a feature building on the corner of the new link road with the existing main R157 Road. Several studies took place looking at different building scales which would suit this prominent corner. A 4-storey tall standalone duplex unit was placed at the corner with a terrace of 3 storey duplex apartments running beside them facing the main road. See Figure 3.8.

Figure 3.8 A 4 storey tower.

A corner duplex building with a larger ground plan was placed as an alternative addressing the cross roads with larger duplexes to the side. See Figure 3.9.

Figure 3.9 A corner 4 Storey duplex unit .

Both seemed too small in scale and the larger duplexes facing the R157 appeared to be a better solution to address the scale of the cross roads. JFA did several 3Ds using the duplexes as the corner feature building by stepping the buildings. The result being a uniform urban edge and corner and the creation of a better open space on the west entrance to the proposed scheme. The smaller 3 storey duplex apartments surround the open space on the north and south creating a strong character area. See 3D options.

Figure 3.10 3D study options on cross roads on the R157.

Figure 3.11 Duplex Corner option chosen to address the R157. (JFA).

The second character area is the plaza, this is the focal point when arriving at the train station and sets the stage for the 'live work community' stated in the masterplan. An urban emphasis was requested by the county council to include apartments on both sides facing the open space so as a stronger focal point is created.

A new shallower apartment block is now proposed to have over 50% dual aspect, one block being 5 stories and the second block is 4 floors progressing to a reduction in height to the 3 storey duplex apartments on the west of the site facing C1 lands. Stepping the height was also important to allow as much light into the plaza, while both protecting and heralding the scheme entrance from the train station/ parkway.

The third character area is surrounding the creche where it now addresses a communal open green space at its entrance and sits within the F1 lands surrounded by open space. The building itself has been redesigned so it sits more prominently within the site with a more pronounced entrance and private play spaces, (north area for the toddlers and south for the older children). See Figure 3.11.

Figure 3.12 New Creche elevations.

Figure 3.13 Final lodged scheme for LRD planning.

3.10.7 Final Layout Option H result of Section 32B meeting.

This final scheme shown in Figure 3.13 has developed since the Section 32B meeting and has taken cognisance of the opinion issued by Meath Co. Council on the 16th of August.2023 as well as the character area studies shown above in section 3.10.6. There are 4 well distributed public open spaces of over 15% which generate their own character areas and provide passive surveillance. A selection of different types of accommodation surrounds them which create a sense of place which have good legibility and a strong urban edge. Structures addressing the parkway and the R157 are dual frontage and are in scale with the urban parkway and road they face High quality finishes and the theme of finishes are constant throughout the project, including houses, apartments and the creche as well. Pedestrian and cycle access has been allowed for along the R157 and into the park and ride for the train station as well as pedestrian links into the C1 retail zoned lands. Communal, accessible, and bike parking have been catered for and boundary treatments have been clarified by the Landscape design

The final layout provides a mixture of housing types addressing the live work community objective with immediate access to amenity areas, walkways and cycle ways that connect to Dunboyne.

- 1 and 2 Bed Apartments.
- 2 Bed duplex Apartments.
- 2 Bed houses mid terrace.
- 3 Bed houses end of terrace.
- 3 Bed duplex apartments.
- 4 Bed Semi – Detached houses.
- 65 person Creche

3.11 Alternative Flood Risk Management

The proposed residential site is located adjacent to an existing flood zone and as part of the development and as outlined in the LAP a new road and associated bridge over the river Tolka is to be constructed within the Flood Zone. A Stage 3 Flood Risk Assessment has been carried out to determine the quantitative analysis of potential flood events, the impact the proposed road and associated bridge would have on the flood events and mitigation measures required to ensure no increase in flood risk.

A large number of assessments were carried out to determine different scenarios in relation to alternative measures required including a review of the span of the proposed bridge over the river Tolka ranging in span from 8-meter to 15-meter span. The final and most efficient design is for a 13-meter span bridge. While the 13-meter span bridge is sufficient in size to accommodate the flow within the Tolka without having to undertake works within the river, the out-of-bank flooding required flood mitigation measures which includes an additional 3No. 13-meter span bridges to the west of the Tolka River, an 8 meter wide culvert to the east of the river along with Flood Compensation areas adjacent to the proposed development and the relocation of an existing earth berm within the applicant's lands.

Refer to the IE Consulting Flood Risk Assessment Report for further information

3.12 Alternative Mitigation

For each aspect of the environment, each specialist has considered the existing environment, likely impacts of the proposed development, and reviewed feasible mitigation measures to identify the most suitable measures appropriate to the environmental setting of the proposed development. In deciding on the most suitable mitigation measure the specialist has considered relevant guidance and legislation. In each case, a comparison of environmental effects was made, and the specialist has reviewed the possible mitigation measures available and considered the use of the mitigation in terms of the likely residual impact on the environment. The four established strategies for mitigation of effects have been considered: avoidance, prevention, reduction, and offsetting (not required in this development). Mitigation measures have also been considered based on the effect on quality, duration of impact, probability, and significance of effects.

The selected mitigation measures are set out in each of the EIA Report Chapters.

3.13 Alternative Processes

Due to the nature of the current proposal (i.e., a residential development greater than 100 dwellings) where the only option is to submit a large-scale Residential Development (LRD) planning application to the planning authority, it is not considered necessary to consider alternative processes for the proposed development.

3.14 Potential Significant Effects

Increased car usage and associated emissions are mitigated by providing permeable planned pathways. Increased hardstanding areas and associated flooding risk are mitigated by drainage proposals.

3.14.1 Construction Phase

The environmental effects of the Concept Layouts differ in detail only. Each has a positive effect for human beings for reasons which are set out elsewhere in this EIA Report and are otherwise neutral in relation to human health. Each Concept Layout has generally similar moderate impacts on land and landscape, including removal of a small number of trees and hedgerow and culverting an open drain but introducing additional planting. Option A and B have a less significant effect on the setting as it retains the hedge row. Options D, E, and F have the potential for negative impacts on biodiversity, due to the removal of the unviable hedgerow and culvert of the open drain. However, the addition of new planting and trees will invigorate the existing planting and biodiversity in the area.

3.14.2 Operational Phase

The Operational Phase of the proposed development will result in an increase in the population of the area, and it will have a positive impact on the long-term supply of housing in Dunboyne.

3.14.3 Cumulative Effects

All options have a slight effect on land and soil, as most of the areas for development formed part of grazing land. The preferred option has a slightly greater negative impact on biodiversity as it involves removing a small number of trees and hedgerow and culverting land drains. These will be replaced by new planting, as set out in the Landscape Design Report.

3.15 The Existence of the Project

The Construction Phase will last approximately 2 years. During the construction phase of the proposed development, there will be approximately a maximum of 100 construction workers at the peak of the construction works. Hence, for the duration of the Construction Phase of the proposed development there will be a short-term increase in construction employment in the area, which will have a positive impact, both directly and indirectly, on the local economy. The Operational Phase of the proposed development will result in an increase in the population of the area, and it will have a positive impact on the long-term supply of housing in Dunboyne. In addition to housing construction, the proposed development will have the potential to create employment in the local area through the proposed childcare facilities.

The provision of passive and active public open space with a mixture of recreational and amenity facilities will have a long-term, positive impact on the local human health and the socio-economic environment. The primary likely significant environmental impacts of the proposed development are fully addressed in the relevant specialist Chapters of this EIAR. These impacts relate to Population & Human Health, Land & Soil, Hydrology and Hydrogeology, Landscape & Visual, Noise & Vibration, as well as Air Quality & Climate associated with the proposed development. The proposed development has the potential for cumulative, secondary, and indirect impacts, these can be difficult to quantify due to complex inter-relationships. All interactions and cumulative impacts have been addressed in Chapter 14 Significant Interactions with cumulative impacts and interactions fully addressed in the relevant specialist Chapters of this EIAR.

3.16 Climate Change Preparation

The proposed scheme has been developed in consideration of future climate change impacts. The proposed construction will feature high levels of insulation to maximise energy efficiency. The proposed layout has been developed to encourage pedestrian and cycle connectivity between neighbourhoods. The crèche has been conveniently located for the development and the wider area to reduce reliance on car trips. It is also connected to the Park and ride by pathways for convenient drop off.

Existing mature trees have been retained and will enhance the new neighbourhoods and landscaped open spaces. Existing and new trees will facilitate shading in open spaces. The proposed surface water drainage strategy has been designed to reflect future expectations relating to climate.

3.17 Conclusion

Throughout the design evolution of the subject site, the advantages, and disadvantages of each early and alternative option were examined, with solutions considered in detail and the more favourable elements threaded through to the final and preferred strategy. As a result, it is our opinion that the proposed final layout and design strategy is the most appropriate scheme with the least environmental effects. The final scheme is consistent with both local and national planning policy and will create a new residential community with a strong identity, near a built-up urban environment.

Large Scale
Residential Development
at Dunboyne North, Co. Meath

Volume II

Environmental Impact Assessment Report

CHAPTER 4

Population and Human Health

August 2023

McCutcheon Halley
CHARTERED PLANNING CONSULTANTS

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4 Population & Human Health

4.1 Introduction

This chapter of the EIAR assesses the potential impacts of the proposed development on population and human health that are not covered elsewhere in the EIAR. It also details the proposed mitigation measures where necessary. The potential impacts on, and mitigation measures for, population and human health were assessed under the following headings: Do Nothing Scenario, Human Health (including health and safety), Population and Economic Activity, and Local Amenity.

4.2 Expertise & Qualifications

This chapter of the EIAR has been prepared by Saoirse Kavanagh, Executive Planning Consultant of McCutcheon Halley Planning Consultancy. Saoirse holds a Bachelor's degree in Arts (International), majoring in Geography, and a Master's in Planning and Sustainable Development. She has over 4 years' experience working with multi-disciplinary teams and has provided input into a variety of projects. In particular, she has co-ordinated the preparation of the following three Environmental Impact Assessment Reports (EIARs) including the completion of the Introduction, Alternatives, and Population and Human Health chapters.

- Cooldown Commons Strategic Housing Development, Citywest, Dublin.
- Parkside 5B Strategic Housing Development, Belmayne, Dublin.
- Clonattin Strategic Housing Development, Gorey, Co. Wexford.
- Mullingar Phase 1 and 2 LRD, Mullingar, Co. Westmeath

4.3 Proposed Development

The full description of the proposed development is outlined in Chapter 2 'Development Description' of this EIAR. To summarise, the proposed development will provide 267 no. residential units and a creche with 65 no. childcare spaces.

4.4 Methodology

This chapter has been prepared pursuant to Schedule 6 of the Planning and Development Regulations 2001 (as amended). Section 2 of Schedule 6 sets out the additional information relevant to the specific characteristics of the project required, which includes a description of the likely significant effects on the environment of the proposed development resulting from, among other things;

> *(IV) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters).*

The Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022) state that:

"… in an EIAR, 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 e.g., under the environmental factors of air, water, soil, etc."

Recital 22 to the EIA Directive provides that:

"in order to ensure a high level of protection of the environment and human health, screening procedures and environmental impact assessments should take account of the impact of the whole project in question, including, where relevant, its subsurface and underground, during the construction, operational and, where relevant, demolition phases."

The EPA Advice Notes (EPA 2003) recommend considering the following issues when assessing the potential impacts and effects of a proposed development on Population and Human Health:

- Economic Activity Likely to Lead to Projects – Will the development stimulate additional development and/or reduce economic activity, and if either, what type, how much and where?
- Social Consideration – will the development change the intensity of patterns and types of activities and land use?
- Land Use – will there be severance, loss of rights of way or amenities, conflicts, or other changes likely to ultimately alter the character and use of the surroundings?
- Tourism – will the development affect the tourism profile of the area?
- Health – have the vectors through which human health impacts could be caused been assessed, including adequate consideration of inter relationships between those assessments.

For the purposes of this assessment impacts on tourism have been scoped as the proposed project comprises of a residential development in a built-up area and the site does not have any intrinsic tourism value and is not in proximity to any important tourism or amenity resources.

4.4.1 Relevant Legislation & Guidance

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

- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022)
- Guidelines on the Information to be Contained in Environmental Impact Statements (EPA, 2002)
- Advise Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA, 2003).
- Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report (EU, 2017).

4.4.2 Study Area

The Study Area for the assessment of the potential impact on Population and Human Health comprises the Dunboyne (Meath) electoral division. The assessment of the local facilities is limited to Dunboyne town itself.

4.4.3 Site Surveys/Investigation

The appraisal of the likely significant effects of the proposed development on population and human health was conducted by reviewing the current socio-economic environment in the EIAR study area. This comprised site visits and visual assessments of the proposed site and the surrounding area, as well as an analysis of aerial photography and Ordnance Survey (OS) mapping.

Information was gathered with respect to the demographic and employment characteristics of the resident population within the relevant catchment area, sourced from the 2011 and 2016 Censuses. At the time of writing, the full 2022 census data was not available and therefore could not been used to inform this chapter. The data included information on population, structure, age profile and household size, number of persons at work, and the unemployment profile. A desktop survey of the following documents and websites also informed this:

- Meath County Development Plan 2021-2027
- Dunboyne North Masterplan – MP22
- Central Statistics Office (CSO) website
- Department of Education website

4.4.4 Consultation

Consultations with both the local authority and statutory bodies were also used to ensure that environmental issues, including socio-economic, recreational and amenity issues relating to the proposed development were addressed. Further information on the consultation process and responses received is provided in Appendix 1.1.

Meath Childcare Committee were also consulted in relation to the existing childcare capacity in the area. Phone surveys were completed with the primary and post-primary schools in Mullingar to determine their capacity.

4.5 Difficulties Encountered

No significant difficulties were encountered in accessing information during the preparation of this chapter. However, the full release of the 2022 CSO Census Data was not available when completing this chapter. As a result, the demographic analysis has relied primarily on the 2016 CSO Census Data.

4.6 Baseline Environment

The following provides a description of the receiving environment, with a focus on demography, land use and local amenity. The assessment of the effects on population and human health refers to those environmental topics under which human health effects may occur (e.g. noise, water quality, air quality, etc). Specific sections of this EIAR provide the baseline scenario relevant to the environmental effect being assessed.

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4.6.1 Policy Context

The Regional Spatial and Economic Strategy (RSES) for the Eastern and Midland Region notes that Dunboyne is located on the North-West Strategic Development Corridor and prioritises sequential development of zoned and serviced lands near the railway station and town centre and at Dunboyne North/M3 Parkway Station.

The Meath County Development Plan 2021-2027 Volume 2 includes a written statement and maps for the settlements within the County. A statement is included for Dunboyne, Clonee, and Pace. This statement acknowledges the strategic importance of Dunboyne as the only entire town within Meath that is located with the Metropolitan Area of Dublin. Section 5.1 identifies Dunboyne North adjacent to the M3 Parkway Park and Ride as a primary area for population growth over the lifetime of the development plan. The lands in this area are zoned for employment, commercial, and residential uses and a masterplan has been by Meath County Council for the area (i.e. Master Plan 22 Lands at Dunboyne North).

In line with the Development Plan, the Dunboyne North Masterplan was prepared outlining a 'live-work', transport-based approach to the development of the masterplan lands. The subject site is included in Phase 1A of the masterplan lands. The masterplan identifies that c.500 no. residential units can be accommodated on the Phase 1 residential and commercial zoned lands.

4.6.2 Population

The Development Plan notes that the town of Dunboyne had a population of 7,272 in 2016, which was a 4.5% increase on the 6,959 population of the town in 2011. The Development Plan projects that the town will have a population of 10,572 in 2027 and estimates that 2,002 no. housing units will be required for the town.

The population detail referenced in the Development Plan is based on the Dunboyne Settlement Area as defined in the 2016 census. The subject site is located outside this settlement boundary, to the north. For the purposes of this detail demographic assessment the Dunboyne (Meath) ED has been used. This ED includes the subject site and the rural area surrounding Dunboyne area, therefore encompassing a larger population than the town.

Figure 4.1 Dunboyne Settlement Area. Site location indicated by red star. Image Source: CSO Census Mapping

Figure 4.2 Dunboyne (Meath) ED area. Site location indicated by red star. Image Source: CSO Census Mapping

The Dunboyne (Meath) ED had a population of 10,094 in 2016. The population pyramid below demonstrates an even population profile with c. 7% to 8% of the population in age groups 0-4, 5-9, 10-14, 15-19, 30-34, 35-39, 40-44, 45-49, and 50-54. There is a noticeable break in this trend with just c. 6% of the population aged 20-24, 25-29. This is seen in towns throughout the country and likely represents these age groups moving to larger cities for further education and employment. The population beings to drop off after 55 as the population ages, but c. 10% of the population are aged over 65.

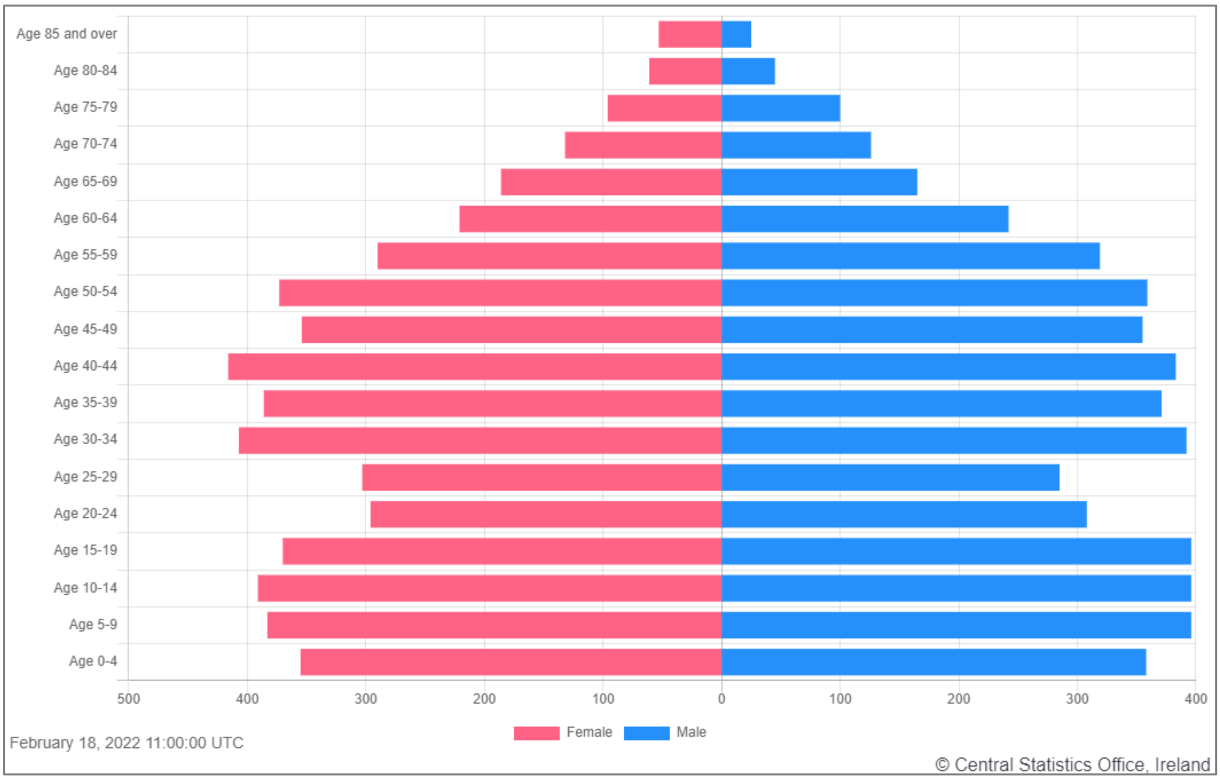

Figure 4.3 Dunboyne (Meath) ED 2016 Population Pyramid. Source: CSO Sap Map 2016.

4.6.3 Households

The Census Mapping provides details on the household types, the occupancy status of households, and the household sizes within the Dunboyne (Meath) ED, which are provided in the tables below.

The household type information demonstrates that 82.8% of households in Dunboyne are in houses and 15.8% are in apartments. This represents 87% of the population living in houses and 12% of the population living in apartments.

In terms of occupancy, 90% of dwellings in Dunboyne were occupied on the census night and 2% were temporarily absent. The remaining 8% were vacant.

In terms of the types of occupancy, 75.4% of households were owned (including those owned outright and those owned with a mortgage or loan) while 20.7% were rented (including those rented from private landlords, the local authority, and housing bodies).

In relation to household size, 31% households were 2 person households, 23% were 3 person households and 26% were 4 person households.

Table 4.1 Household Type. Source: Dunboyne (Meath) ED, CSO 2016

Household Type	Private Households	% Households	Number of Persons in Households	% Persons
House/Bungalow	2636	82.8	8761	87.0
Flat/Apartment	502	15.8	1171	11.6
Bed-Sit	2	0.1	6	0.1
Caravan/Mobile home	1	0.0	1	0.0
Not stated	43	1.4	133	1.3
Total	3184	100.0	10072	100.0

Table 4.2 Occupancy Status. Source: Dunboyne (Meath) ED, CSO 2016

Occupancy	Number	%
Occupied	3190	90.2
Temporarily absent	72	2.0
Unoccupied holiday homes	1	0.0
Other vacant dwellings	274	7.7
Total	3537	100.0

Table 4.3 Household Size. Source: Dunboyne (Meath) ED, CSO 2016

Household Size	Number of Families	% Families	Number of Persons	% Persons
2 Persons	815	31.1	1630	18.1
3 persons	589	22.5	1767	19.7
4 persons	691	26.3	2764	30.8
5 persons	395	15.1	1975	22.0
6 or more persons	133	5.1	846	9.4
Total	2623	100	8982	100

Table 4.4 Type of Occupancy. Source: Dunboyne (Meath) ED, CSO 2016

Occupancy Type	Number of Households	% Households	Number of Persons	% Persons
Owned with mortgage or loan	1394	43.80	5008	49.73
Owned outright	1007	31.64	2690	26.71

Occupancy Type	Number of Households	% Households	Number of Persons	% Persons
Rented from private landlord	514	16.15	1642	16.30
Rented from Local Authority	135	4.24	438	4.35
Rented from voluntary/co-operative housing body	11	0.35	19	0.19
Occupied free of rent	49	1.54	95	0.94
Not stated	73	2.29	179	1.78
Total	3183	100.00	10071	100.00

4.6.4 Employment

The Labour Force Survey provides details at a national level relating to employment and unemployment. The survey for Quarter 1 2023 demonstrates that the persons in employment has increased by 4.1% since Quarter 1 2022 and the persons unemployed has decreased by 12.7% over the same period.

Table 4.5 Labour Force Participation and Unemployment Rates

	Q1 2022	Q1 2023	% Change
Unemployed persons aged 15-74 years	126,700	110,700	- 12.7%
Unemployment Rate (%) (15-74 years)	4.8	4.1	
Persons in Labour Force	2,401,100	2,719,100	+ 4.1%
Labour Force Participation Rate (%) (15 years and over)	64.8	64.9	

60.6% of the Dunboyne (Meath) ED population were at work at the time of the 2016 census. 13.6% were students and 11.5% were retired with just 4.3% of the population unemployed.

Table 4.6 Economic Status. Source: Dunboyne (Meath) ED, CSO 2016

Economic Status	Male	Female	Total	% Total
At work	2570	2163	4733	60.6
Looking for first regular job	28	22	50	0.6
Unemployed having lost or given up previous job	174	162	336	4.3
Student	548	517	1065	13.6
Looking after home/family	19	549	568	7.3
Retired	458	438	896	11.5
Unable to work due to permanent sickness or disability	71	83	154	2.0
Other	3	10	13	0.2
Total	3871	3944	7815	100.0

Based on the 2016 census, 37.1% of the Dunboyne (Meath) ED population were at work in managerial and technical roles, 19.2% were in non-manual work, 13.6% were in skilled manual work, and 9.5% were in roles as professional workers.

Table 4.7 Socio-Economic Status. Source: Dunboyne (Meath) ED, CSO 2016

Status	Male	Female	Total	% Total
Professional workers	510	448	958	9.5
Managerial and technical	1847	1901	3748	37.1
Non-manual	732	1206	1938	19.2
Skilled manual	886	488	1374	13.6
Semi-skilled	463	341	804	8.0
Unskilled	148	124	272	2.7
All others gainfully occupied and unknown	435	565	1000	9.9
Total	5021	5073	10094	100.0

The commute time to work, school or college for the majority of the Dunboyne population was less than 30 minutes in 2016 (c. 55%), with 30% of the population's commute time under 15 minutes. This suggests that the majority of the location are attending school, college, and work locally. 18% had a commute time of between 30 minutes and 45 minutes and c. 8% had a commute time between 45 minutes and 60 minutes.

Table 4.8 Average Commute Time. Source: Dunboyne (Meath) ED, CSO 2016

Journey Time	Persons	%
Under 15 mins	2131	30.1
1/4 hour - under 1/2 hour	1751	24.7
1/2 hour - under 3/4 hour	1254	17.7
3/4 hour - under 1 hour	595	8.4
1 hour - under 1 1/2 hours	811	11.4
1 1/2 hours and over	203	2.9
Not stated	342	4.8
Total	7087	100.0

4.6.5 Community Facilities and Services

A Social Infrastructure Audit, School Demand Report, and Childcare Assessment were completed by McCutcheon Halley Planning and submitted with the application.

Th Social Infrastructure Audit identified the educational facilities, childcare facilities, healthcare facilities, sports and recreational facilities, arts and cultural facilities, and social, community and faith groups.

In terms of healthcare, the audit found that Dunboyne is served by a Health Centre, two health care facilities, two dentists, and four pharmacies. The majority of these are located within Dunboyne town centre with one pharmacy located in Dunboyne Business Park to the south of the site.

There are two community centres and one library with Dunboyne town centre, which provide a range of spaces for community groups and events.

There are 6 no. childcare facilities, four primary schools, and one post-primary school in Dunboyne. The following tables and figures provide details on the locations and capacities of these schools and childcare facilities.

The capacity of the childcare facilities and primary schools have been determined based on phone surveys completed in September 2023. The capacity of the post primary school has been estimated based on the difference between the enrolment figures for July 2021 and the 2022/23 academic year.

Table 4.9 List of Childcare Facilities in Dunboyne.

	Childcare Facility	Distance from Site	Capacity	Available Spaces
1.	Kidology Childcare	711m	100 full daycare 18 afterschool	5
2.	Small Steps	1.14km	9 sessional	0
3.	Sheila Murphy (Tiny Tots Montessori)	1.31km	11 sessional	0
4.	The ABC Club	1.13km	44 sessional	5
5.	Little Scholars Creche	1.33km	50 full daycare	0
6.	Avondale Playgroup	1.54km	20 sessional	0
		Total	383 no. spaces	10

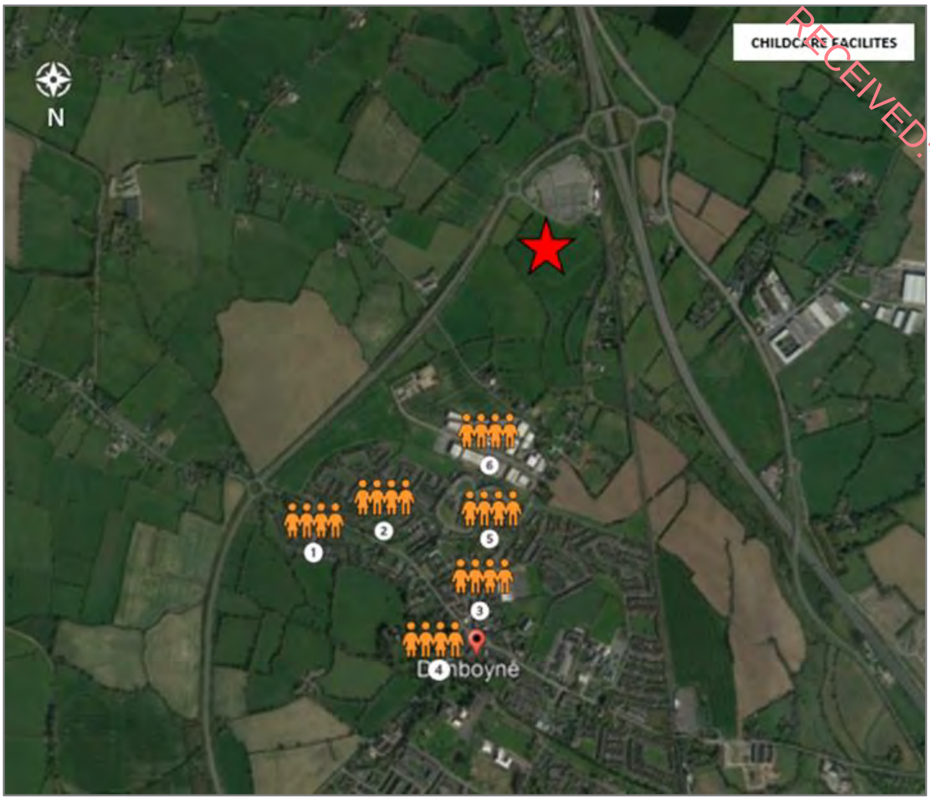

Figure 4.4 Location of Childcare Facilities in relation to subject site (red star).

Table 4.10 Primary Schools in Dunboyne

	Primary School	Distance from Site	2022/23 Enrolment	2023/24 Enrolment	Available Capacity
1.	St Peters National School	1.7km	90	102	0
2.	Dunboyne Junior Primary School	1.5km	451	451	0
3.	Dunboyne Senior Primary School	1.6km	512	485	80
4.	Gaelscoil Thulach na nÓg	2.0km	371	370	30
		Total	1424	1,408	110

Table 4.11 Post Primary Schools in Dunboyne

	Post Primary School	Distance from Site	July 2021	2022/23 Enrolment	2023/2024 Enrolment	Available Capacity*
1.	St Peters College	1.7km	1,229	1,224	Unknown	5
		Total	1,229	1,224	Unknown	5
*Based on difference between July 2021 enrolment and 2022/2023 enrolment figures.						

Figure 4.5 Locations of Schools in relation to subject site (red star)

4.6.6 Land Use and Local Amenity

An Architectural Conservation Area (ACA) is identified within Dunboyne Town centre, c. 1.5km south of the subject site. There are 35 no. protected structures and a number of National Monument Services' Zones of Archaeological Notification within Dunboyne. The nearest Natura 2000 site is the Rye Water Valley which is c. 5.9km southwest of the site.

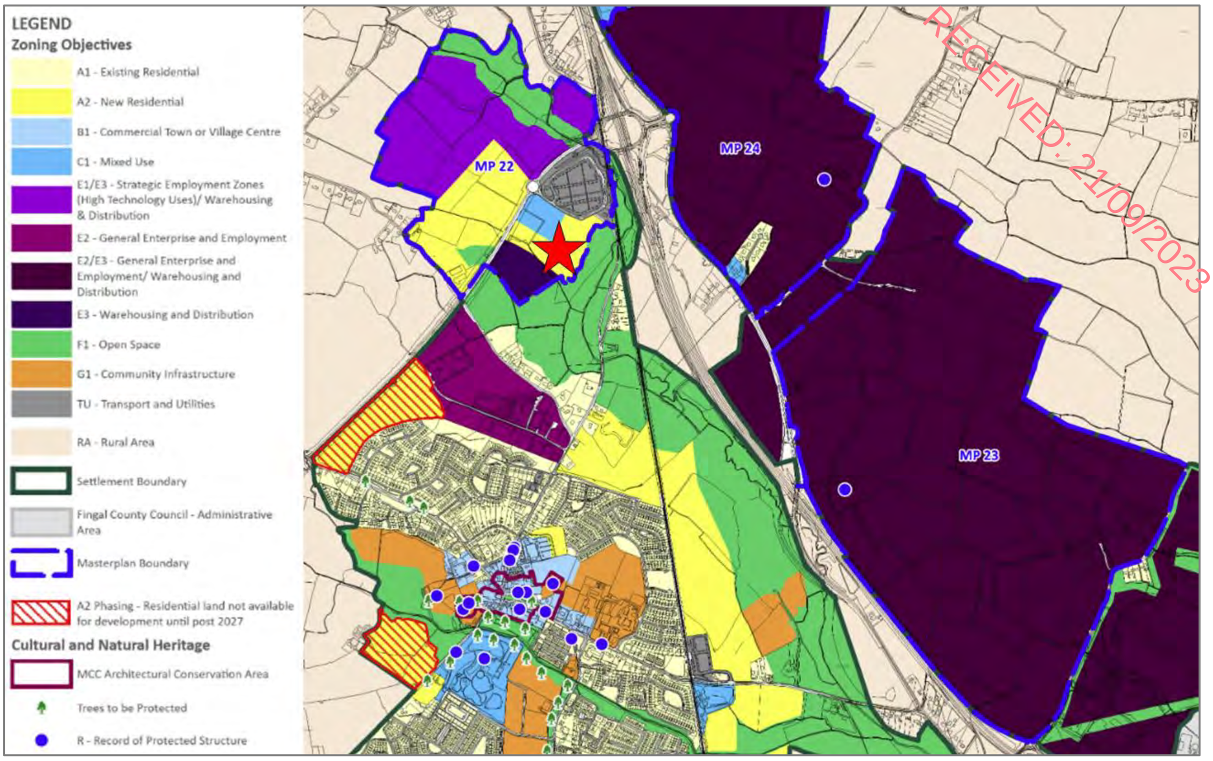

Figure 4.6 Extract from Dunboyne Heritage Map – Sheet 13(b). Site indicated by red star.

4.7 The 'Do nothing' Scenario

If the development were not to proceed there would be no immediate impact on the existing population, economic activity, or community services and facilities in the town. However, if the development does not occur there will be a shortfall in housing supply in the area which may negatively impact the continued sustainable growth of the town.

The site is zoned for residential development and the provision of housing on the subject site will support the core strategy and objectives of the Meath County Development Plan and the Dunboyne North Masterplan. If the development does not occur the zoning and objectives of the local planning policy will not be realised in the short term.

4.8 Potential Significant Effects

In identifying potential impacts and receptors, consideration was given to the proposed residential scheme and the identified receiving environment. The principal potential receptors that will be affected by the development proposals have been identified in the following sections.

- Residential Areas in Proximity
- Community Facilities and Services, including schools and creches.
- Local Amenity
- Economic Activities

There are several existing residential properties which have the potential to be impacted by the development, specifically the residents of:

- The house located to the northeast of the subject site.
- The nine houses located to the southeast of the subject site, accessed off the Navan Road close to the location of the proposed bridge.
- The fourteen houses located to the south of the site, accessed off Kennedy Road.

The existing facilities and services in Dunboyne have the potential to be impacted by the additional population that will be generated by the proposed development.

Owners and employees of other commercial activities may be impacted by the Proposed Development i.e. local business owners, industries, and adjacent farms. Consideration is given under economic activity to the potential impact on other neighbouring commercial activities.

It is important to note that an increase of tourism is not expected from the proposed development and is not expected to hinder any existing tourism areas.

4.8.1 Construction Phase

The construction of the proposed development is expected to be completed within 3 years. The expected hours of construction works will commence from 7am to 7pm Monday to Friday and from 7am to 2pm on Saturdays. No works will be undertaken on Sundays or Bank Holiday without the consent of Meath County Council. In total, there is expected to be a maximum 150 construction workers employed on the site.

4.8.1.1 Population and Settlement Pattern

The potential impacts arising during the construction phase relate to short term impacts to quality of life, including visual impact/amenity, noise, air quality, and transport. Where relevant, these impacts have been considered in the relevant chapters of the EIAR and will be minimised or mitigated where appropriate. It is unlikely that these impacts will be of a scale to either encourage people to move from the area or discourage people from moving to the area. No significant impacts are anticipated as a result of the construction phase of the development.

4.8.1.2 Economic Activity

The construction phase is anticipated to result in a temporary boost to the local economy as workers employed at the site can be expected to make use of local retail facilities and other services. If the application is successful, construction works will continue until the final phase of the development is completed by 2027. Approximately 150 will be employed on site for up to 3 years, and there will be indirect benefits to other industries as a result of demand for construction materials and services. The loss of the agricultural lands is anticipated to have a neutral effect as the lands were under the ownership of the applicant.

It is anticipated that the construction phase of the project will result in likely positive short term moderate effects locally and within the wider Dunboyne area.

4.8.1.3 Land Use and Local Amenity

The project is in accordance with the statutory zoning objective. There will be no severance of lands or loss of rights of way as a result of the proposed development. In general, the construction phase impacts on local amenity and receptors identified in proximity will be mainly related to noise, air quality and traffic. These are assessed within the relevant chapters of this EIAR. The potential impact on local heritage is assessed further in Chapter 13 Cultural Heritage of this EIAR.

4.8.1.4 Community Facilities and Services

The community facilities and services, including the schools and creches, are located to the south of the subject site within the town centre. Due to the distance from the site and the facilities and the intended route for construction traffic, the impact during the construction phase is expected to be slight, neutral.

4.8.1.5 Health

As with any construction site, there will be potential risk to health and safety in terms of injury or death of construction personnel on-site due to the usage of large, mobile machinery as well as heavy equipment and materials.

4.8.1.6 Cumulative

There is potential for the construction phase of the proposed development to overlap with the recently submitted planning applications to the north (references: 23/424 and 23/60065) which would increase the potential impacts on human health and population. Appropriate mitigation measures have been identified in the relevant EIAR chapters to minimise the potential negative impacts on human health.

4.8.2 Operational Phase

Due to the nature of the development, there will be few hazards associated with the operational phase of the project and therefore no potential significant negative impact in terms of health and safety.

4.8.2.1 Population

The proposed development will provide 267 no. residential units. Based on the national average household size of 2.74 (census 2022), the population of the proposed development is projected to be c. 732 no. people.

Based on the demographic analysis of the Dunboyne (Meath) ED, it can be therefore expected that c. 52 no. of the proposed development's population will be aged 0-4 (c. 7%), c. 169 will be aged 5-19, and c. 72 will be aged over 65 years.

The proposed creche has been designed to cater for the additional demand for childcare spaces generated by the proposed development. It is anticipated that there is sufficient capacity in the existing schools in Dunboyne town to cater for the additional primary and post primary school students expected from the proposed development.

4.8.2.2 Schools

The proposed development will result in a demand for school places at both primary and post-primary level which will accrue over the proposed 5-year delivery time.

It is worth noting that the enrolment projections for primary school are currently decreasing with the post primary enrolment figures projected to start decreasing from 2026.

The Department of Education published a report, *Regional Projections of Full Time Enrolments Primary and Second Level, 2021-2036* in November 2021. The report provides projections of full-time enrolment in first and second level schools for the eight NUTS 3 Regional Authority areas. The report includes six projection models (M1F1, M1F2, M2F1, M2F2, M3F1, and M3F2) which include different assumptions of fertility and migration. These projections are shown in the graphs below (extracts from A.1 and A.2 of the Department's report). It demonstrates that enrolment for primary schools is currently decreasing and set to decrease until 2032/33. Enrolment is expected to start increasing again from 2034/35.

The graphs also demonstrate that enrolment for post primary is currently increasing and will reach a peak in 2025/2026 before decreasing until approximately 2039/2040.

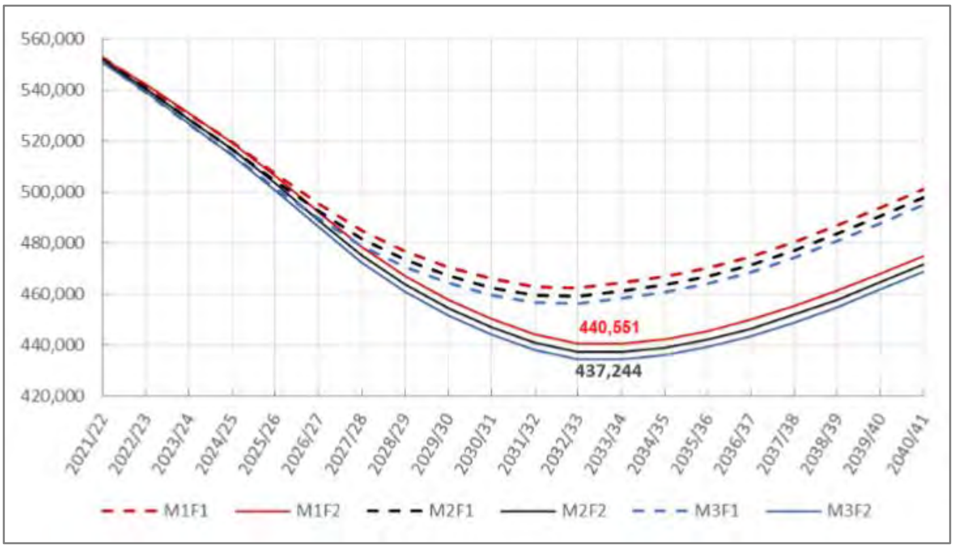

Figure 4.7 Projected Enrolment at Primary Level, 2021-2040. Source: Dept of Education

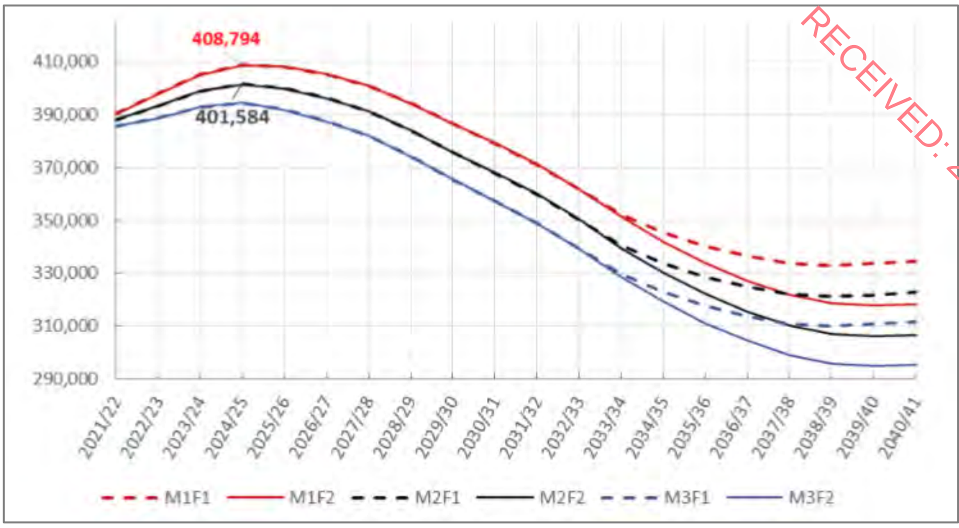

Figure 4.8 Projected Enrolment at Post-Primary Level, 2021-2040. Source: Dept of Education

The Department of Education and the Department of Further and Higher Education, Research, Innovation and Science published a report '*Education Indicators for Ireland'* in February 2022 which presents a comprehensive set of educational indicators for the education system in Ireland.

Part 1 of this report notes that primary school enrolments are on a downward trajectory, having peaked in 2018 while post primary enrolments continue to rise sharply, up 34,300 between 2017 and 2021. This is in line with the 2021-2036 projections published in November 2021.

The proposed development is projected to have a population of 732 no. people. Based on the local demographics, it is estimated that c. 12.2% of the population are of primary school age (aged 5-12). and 9.4% are of post primary school age (aged 13-18). Applying these percentages to the projected population it is estimated that the proposed development will have c. 89 no. primary school aged children and c. 69 no. post primary school.

It is noted that the one bed units are unlikely to include primary and post primary school aged children. If the 28 no. proposed 1 bed units are excluded, the proposal is projected to have 80 no. primary school aged children and 62 no. post primary school aged children.

Based on the information on enrolments provided by the existing schools in the area, there is sufficient capacity in the existing schools in Dunboyne to cater for this projected population.

4.8.2.3 Childcare Facilities

The 2001 Childcare Guidelines recommend the provision of 20 no. childcare spaces for every 75 no. residential units. Based on this standard, the proposed 267 no. residential units would require 72 no. childcare spaces. However, it is noted that one bed units are unlikely to require childcare spaces. The proposed development includes 28 no. 1 bed units and when these are excluded the 239 no. remaining units would require the 64 no. childcare spaces.

The proposed creche will provide 65 no. childcare spaces and is therefore considered sufficient to cater for the proposed development.

4.8.2.4 Household Type and Settlement Pattern

The proposed development provides a range of 2, 3 and 4 bed houses, apartments, and duplexes which will increase the range of housing options available in the Dunboyne area. The location of the proposed development adjacent to the M3 Parkway station and within the MP22 masterplan area will provide sustainable homes with reduced car dependency. The proposal is therefore expected to have an overall long-term, positive impact on the settlement pattern and housing options in Dunboyne.

4.8.2.5 Economic Activity and Employment

It is expected that the projected population from the proposed development will have a long term, slight, positive impact on the economic activity of Dunboyne. The new residents will support local businesses and services by providing additional customers for the area. There is also potential for new businesses to open up in the area with additional people bringing additional spending power and innovation.

4.8.2.6 Land Use and Local Amenity

The proposed development is in line with the site-specific zoning for residential development and will consist primary of residential units, a creche, and open spaces. The proposal will also provide a significant amenity space on the western part of the site and a pedestrian/cycle connection to the M3 Parkway rail that that will provide a significant, long-term, positive, impact to the existing residents and wider community.

Due to the distance from the protected structures in Dunboyne, the proposed development is expected to have a long-term, neutral, imperceptible, impact on the architectural heritage of Dunboyne.

The impact on Natura 2000 sites and biodiversity is assessed in Chapter 13 of this EIAR.

4.8.2.7 Community Facilities and Services

The projected population from the proposed development will support local community facilities and groups. It is anticipated that the proposed development will therefore provide a long-term, slight, positive impact on the local community facilities and services.

4.8.3 Cumulative Effects

As noted above, there is potential for the construction phase of the proposed development to overlap with the recently submitted planning applications to the north (references: 23/424 and 23/60065) which would increase the potential impacts on human health and population.

If these planning applications are granted and constructed, there is a potential for a significant, long-term, positive cumulative impact between the three applications as they will mark the beginning of the development of the MP22 masterplans lands.

It is also noted that an LRD application for 716 no. units was submitted to Meath County Council in August 2023 (reference: 23/816), located to the east of Dunboyne town centre. This application was made invalid but it is expected that another application will be submitted to Meath County Council shortly. The cumulative impact of this LRD with the current proposal will have a significant, long-term positive impact on settlement patterns and local community facilities and services.

4.9 Mitigation

4.9.1 Construction Phase Mitigation

Health and safety risks are the primary concern during the construction phase. These will be managed in accordance with Safety, Health, and Welfare at Work (Construction) Regulations, 2013. The design of the proposed development will be subject to safety design reviews to ensure that all requirements of the project are safe. A project supervisor for construction stage (PSCS) will be appointed and a contractor safety management program will be implemented to identify potential hazards associated with the proposed works. When issues are identified, corrective actions will be implemented to amend design issues prior to the issuance of final design for construction.

Temporary contractor facilities and areas under construction will be fenced off from the public with adequate warning signs of the risks associated with entry to these facilities. Entry to these areas will be restricted and they will be kept secure when construction is not taking place. Site lighting and camera security may be used to secure the site and any lighting will be set up with consideration of the adjoining property.

Measures to ensure public safety, with respect to construction traffic and the construction phase have been included in the be included in the Construction Traffic Management Plan and the Construction and Environment Management Plan submitted with the application. A final CTMP and CEMP will be agreed with the Planning Authority prior to commencement of development.

4.9.2 Operational Phase Mitigation

Measures to avoid potential negative impacts on Population and Human Health have been fully considered in the design of the project and are integrated into the final layout and design. Compliance with the layout and design will be a condition of the permitted development. As such no mitigation measures are required.

4.9.3 Cumulative Mitigation

No cumulative mitigation measures are required.

4.10 Residual Impact Assessment

4.10.1 Construction Phase

The proposed mitigation measures above and those included in the Construction and Environmental Management Plan will minimise the impacts on the population and human health during the construction phase of development. Any residual impacts are expected to be slight to imperceptible.

4.10.2 Operational Phase

It is anticipated that the proposed development will result in significant, long-term, positive impacts on the local economy and community. The provision of additional housing will increase the housing supply in the area and provide more options for people to live.

4.10.3 Cumulative Impact

The applications currently in the planning system on the masterplan lands will have a cumulative positive impact on the area if granted. The applications combined with this proposal will begin the development of the MP22 masterplan lands and will provide a high-quality neighbourhood for people to live and work.

4.11 Monitoring

No specific monitoring is proposed. In general, monitoring will be undertaken by the Building Regulations certification process and by the requirements of specific conditions of a planning permission. It is anticipated that monitoring of compliance with Health & Safety requirements will be undertaken by the Project Supervisor for the Construction Process (PSCP). Monitoring is outlined in the interacting Chapters 7 Air Quality and Chapter 9 Noise and Vibration.

4.12 Worst Case Scenario

In the event that all mitigation measures fail to hinder potential negative impacts, the possibility of an increase of traffic within the surrounding roads and junctions of the site can occur. Further, without these mitigation measures in place, noise caused by the construction of the proposed scheme may increase and can cause a disturbance to any residential dwellings and educational institutions in close proximity to the site. Further, when mitigation measures are not considered, there is the possibility of the impact on dust that can be carried throughout the site. Dust can expand beyond the site and create adverse effects on the neighbouring environment, including the neighbouring stream along the northwest of the subject site, residential dwellings, schools, as well as businesses within the study area. However, it is imperative that mitigation measures are implemented to ensure that the worst-case scenario does not occur. When considering the mitigation measures that will be in place, the event of a worst-case scenario is deemed to be unlikely.

4.13 Significant Interactions

4.13.1 Land and Soil

During construction works offsite removal of surplus soil will be required. The necessary mitigation measures will be implemented to address any nuisance issues associated with dust dispersion during this time. No public health issues associated with the land, soil, geology conditions at the site have been identified for the Construction Phase of the proposed development. Appropriate industry standard and health and safety legislative requirements will be implemented during the Construction Phase that will be protective of site workers.

4.13.2 Hydrology and Hydrogeology

No public health issues associated with the water (hydrology and hydrogeology) conditions at the proposed development site have been identified for the Construction Phase or Operational Phase of the proposed development.

Appropriate industry standards and health and safety legislative requirements will be implemented during the construction phase that will be protective of site workers.

4.13.3 Air Quality and Climate

Interactions between Air Quality and Population and Human Health have been considered as the Operational Phase has the potential to cause health issues as a result of impacts on air quality from dust nuisances and potential traffic derived pollutants. However, the mitigation measures employed at the proposed development will ensure that all impacts are compliant with ambient air quality standards and human health will not be affected. Furthermore, traffic related pollutants have been assessed and determined as imperceptible, therefore, air quality impact from the proposed development are not expected to have a significant impact on population and human health.

4.13.4 Noise and Vibration

The impact assessment of noise and vibration has concluded that additional noise associated with the operation of on-site machinery will be intermittent and will not create any major negative impacts beyond the site boundary. Mitigation and monitoring measures will be incorporated to further reduce the potential for noise generation form the proposed development.

4.13.5 Landscape and Visual

During the Construction Phase there will be visual changes associated with removal of some trees and hedgerows and emerging plant and machinery. During the Operational Phase there will be permanent visual changes to the landscape which may impact the residential dwellings surrounding the proposed development. A full impact assessment has been carried out in Chapter 10 Landscape and Visual Impact to quantify this impact.

4.13.6 Material Assets: Traffic and Transport

There can be a significant interaction between population and human health and traffic. This is due to traffic-related pollutants that may arise. In the current assessment, traffic derived pollutants which may affect Air Quality and thus Population and Human Health have been deemed as insignificant.

4.13.7 Material Assets: Service Infrastructure and Utilities

The improper removal, handling, and storage of hazardous waste could negatively impact on the health of construction workers. Extended power or telecommunications outages, or disruption to water supply or sewerage systems for existing properties in the area could negatively impact on the surrounding human population and their overall health.

4.14 References & Sources

- Meath County Development Plan 2021-2027
- Central Statistics Office (CSO) Census 2016 Data. Available at: https://visual.cso.ie/?body=entity/ima/cop/2016&boundary=C03736V04484
- Central Statistics Office (CSO) Census 2022 Summary Results. Available at: https://www.cso.ie/en/releasesandpublications/ep/p-cpsr/censusofpopulation2022-summaryresults/householdsizeandmaritalstatus/
- Primary School Enrolment Figures. Available at: https://www.gov.ie/en/collection/primary-schools/
- Post Primary School Enrolment Figures. Available at: https://www.gov.ie/en/collection/post-primary-schools/
- Pobal Maps Portal. Available at: https://maps.pobal.ie/

Large Scale
Residential Development
at Dunboyne North, Co. Meath

Volume II

Environmental Impact Assessment Report

CHAPTER 5

Land, Soil & Geology

August 2023

McCutcheon Halley
CHARTERED PLANNING CONSULTANTS

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5 Land, Soils & Geology

5.1 Introduction

This chapter describes the type of land, soils and geology likely to be encountered beneath and in the general area of the proposed development. It also addresses the potential effect of the proposed development on land, soils and geology together with the mitigation measures that will be employed to eliminate or reduce any potential effects. The proposed Large Scale Residential Development will consist of the construction of 267 no. residential units, a creche, a new link road between the R157 and the Old Navan Road including a bridge over the River Tolka, 2 no. signalised junctions, upgrade works and road improvements to the R157 and the M3 Parkway access road, and all associated site development works including drainage, landscaping, and boundary treatments. A full description is included in the statutory notices and in Chapter 2 of the EIAR.

5.2 Author Information and Competency

Kieran Lynch is a Chartered Environmental Scientist with over 20 years' experience in geotechnical engineering, contaminated land and waste management and who has prepared Land, Soils and Geology, Water, Waste, and Material Assets chapters for EIARs for housing developments, roads projects and other infrastructure projects. Kieran has co-ordinated and reviewed EIARs for various housing and infrastructure projects.

5.3 Study Assessment and Methodology

The following scope of works were undertaken by Atkins in order to complete the land, soils and geology assessment presented in this chapter;

- Desk-based study including review of available historical information; and,
- Site Walkover Survey by an experienced Geo-environmental Scientist.

This assessment has been completed in accordance with relevant best practice guidance from the Institute of Geologists of Ireland (IGI), '*Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements*' (IGI, 2013). The IGI guidance document is an updated version of the 2002 guidelines, '*Geology in Environmental Impact Statements, A Guide*' (IGI, 2002), which was revised to take account of legislative changes, and the operational experience developed by geoscientists in the production of relevant environmental assessments. This assessment has also been prepared with regard to the guidelines prepared by the Environmental Protection Agency (EPA) outlined in '*Revised Guidelines on the Information to be contained in Environmental Impact Statements*' published in 2015, *'Advice Notes on Current Practice (in the Preparation of Environmental Impact Statements)*' published in 2015, and also *'Guidelines on the information to be contained in Environmental Impact Assessment Reports'* published in May 2022.

The desk-based study involved reviewing information from the following sources: -

- GSI Datasets Public Viewer and Groundwater web-mapping (consulted 12/08/2023);
- Ordnance Survey web-mapping to assess the surface topography and landforms (consulted 12/08/2023);
- EPA Public Viewer and web mapping (consulted 12/08/2023);
- Google Maps Aerial photography (consulted 12/08/2023);
- Bing Maps Aerial photography (consulted 12/08/2023);
- Meath County Council Planning Maps (consulted 12/08/2023); and,
- Site specific information including available geotechnical borehole data.

No difficulties were encountered during the data collection and assessment stages of this land, soils and geology assessment.

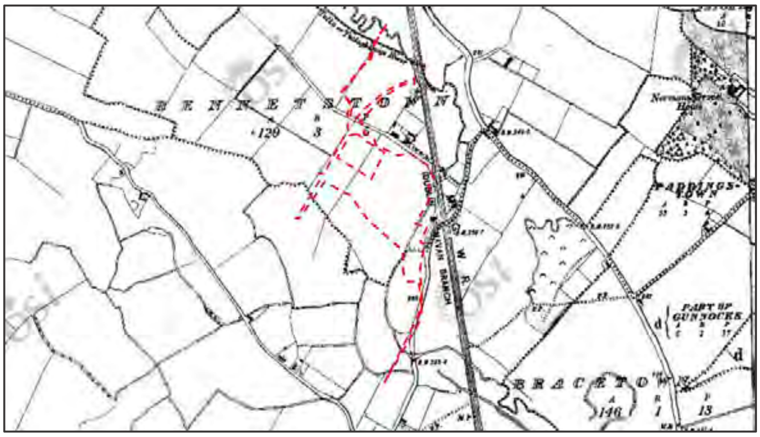
5.4 Receiving Environment

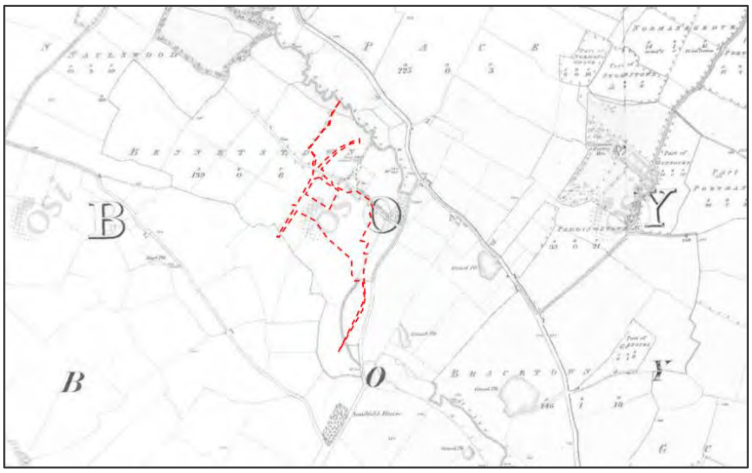
This section provides a description of the land, soils and geology in the general region of the proposed development and also takes account of the current and historic uses of the proposed development (hereafter referred to as the Site).

5.4.1 Site Development

A review of historic maps (including available 6-inch historic maps (1837-1842) and 25-inch historic maps (1888-1913), and aerial photographs (1995 to 2012) from the Ordnance Survey of Ireland) (OSI, 2023) and current aerial photography (Bing Maps, 2023) confirms that land use at the Site has generally been retained in agricultural use. The surrounding lands have developed since the early nineteenth century. A detailed summary of land use both in relation to the Site and surrounding lands is presented in Table 5.1.

Table 5.1 Historic Land Use Development - Summary

Site Location	Land Use
	1837-1842 6 Inch BW (OSI, 2023) The site is generally a greenfield site in agricultural use with the Dublin to Navan railway line just beyond the north-east boundary of the site. The River Tolka is shown north and east of the proposed development.

	1888-1913 Historic Map 25 Inch (OSI, 2023). No significant changes noted.
	Aerial Map 1995 (OSI, 2023). The 1995 aerial map shows the Site continuing to be agricultural in nature. Ribbon housing development is visible to the south and west with industrial development associated with the N3 to the east.
	Aerial Map 1999-2003 (GeoHive, 2023). Land use within the site area still used primarily for agricultural purposes. Lands to the east and south of the site have been developed further as residential and industrial lands which coincides with the expansion and development of Dunboyne Village.

	Aerial Map 2006-2012 (GeoHive, 2023) Significant development has taken place beyond the site boundary in the surrounding environment, with the M3 developed to the east, roundabout junction to the north and the R157 roadway within the western site area. A railway station has also been developed to the north of the site. It appears that a northern portion of the site may have temporarily been used as a compound / hardstanding area during the construction of these roadways.
	Aerial Map 2013-2018 (OSI, 2023). The M3 motorway, the M3 Parkway train station and carpark are under construction to the east and north of the site. The hardstanding / compound area in the north of the site has been removed and lands returned to agricultural use.
	Current Aerial Map (Bing, 2023) The M3 motorway, associated link roads, M3 Parkway train station and carparking have been fully constructed. Further industrial development is noted associated with the R147

5.5 Current Site Setting and Topography

5.5.1 Site Walkover Survey

A site walkover survey was carried out on 16th August 2023. The site walkover confirmed that the land slopes gently from a high point in the north towards the River Tolka to the east of the site and the drainage channel to the south of the site. The site is currently in grassland and used for agricultural grazing purposes. No onsite sources of contamination were noted and there was no residual evidence of the minor area to the north which was historically used as a construction compound. (See Plates 6.1 - 6.3 in Chapter 6 - Hydrology & Hydrogeology for photographs of the site.)

5.5.2 Soils

The development site is generally flat but slopes gently from approximately 73m AOD in the north to approximately 69m AOD in the south and east of the site close to the Tolka River, with the level of the Tolka River itself measured at approximately 67.8m AOD.

Based on the Teagasc soils database available on the GSI public data viewer, the dominant soil type underlying the Site and surrounding area is well drained mineral soils. Alluvium is present along the banks of the River Tolka to the east of the site. Small sections of made ground is shown to the very south extent of the rising main. Refer to Figure 5.1.

According to the GSI public data viewer (GSI, 2023), the primary superficial / quaternary sediments underlying the vicinity of the Site include:

- Till derived from limestone;
- Alluvium is located in the south-east portion of the site and the northern extents of the access road and route for the rising main associated with the River Tolka; and,
- Small area of urban soils to the very south.

Gravels derived from Limestones (GLs) are also located adjacent to the eastern portion of the Site. Refer to Figure 5.2.

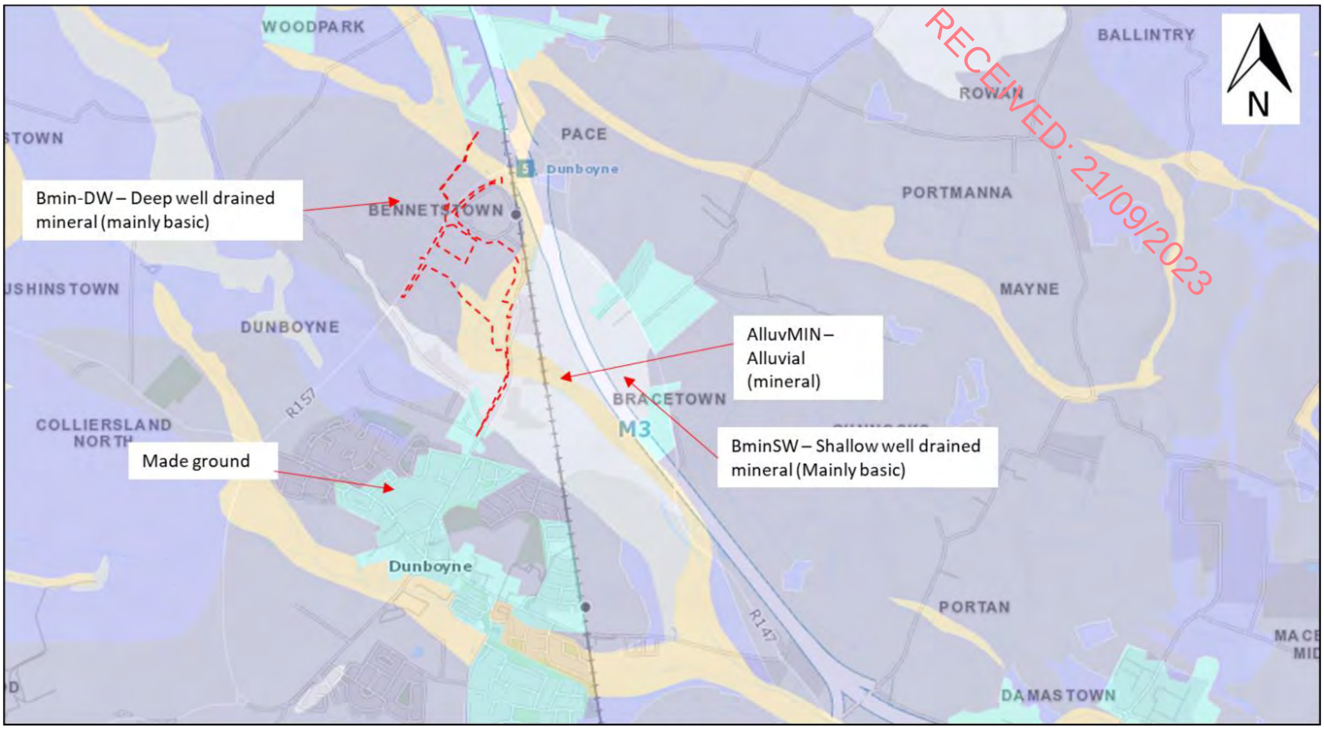


Figure 5.1 Teagasc Soil Maps (GSI, 2023)

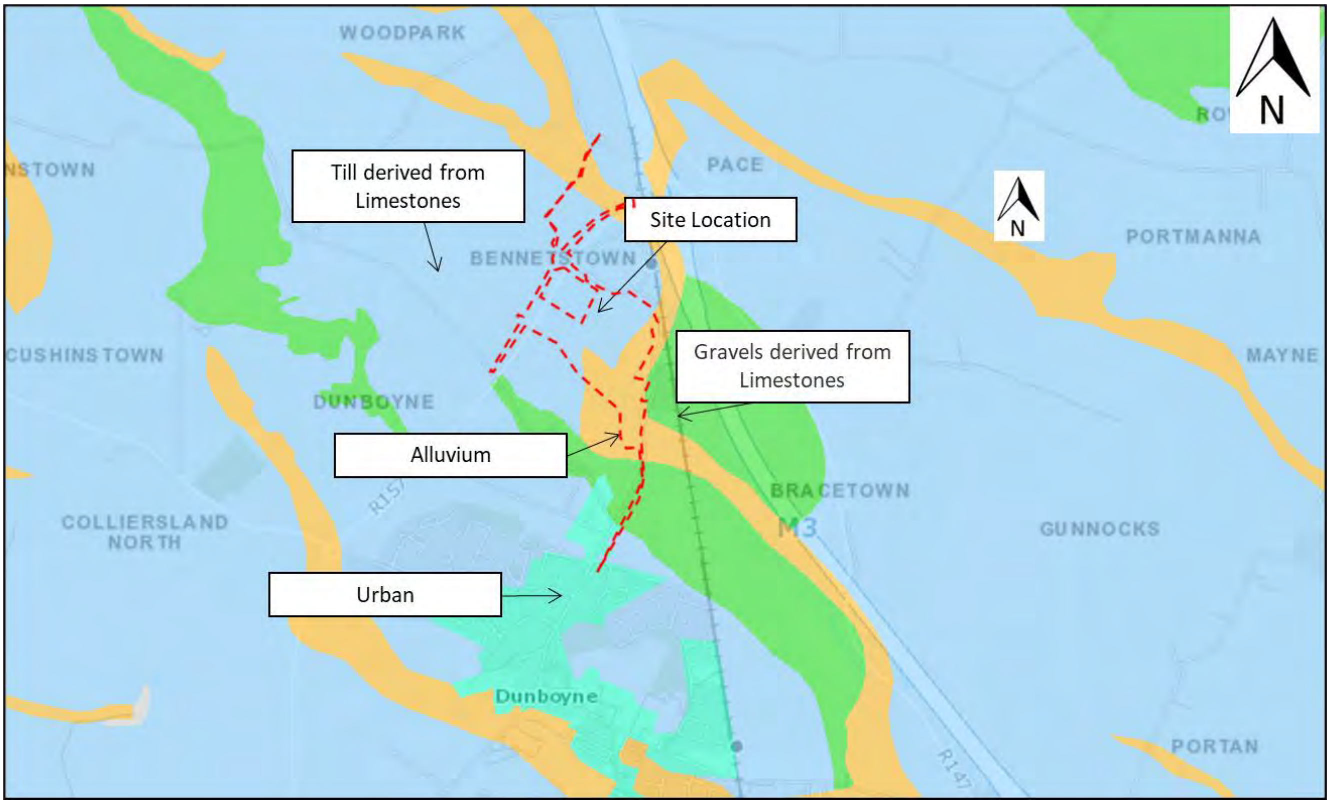


Figure 5.2 Superficial / Quaternary Deposits (GSI, 2023)

A ground investigation was carried out by Ground Investigations Ireland Ltd in February 2022 (GII 2022). The ground investigation comprised 5 no trial pits and 1no. cable percussion exploratory borehole as follows:

TP01 Trial pit extended to 4.5m bgl. Topsoil encountered to 0.4m bgl. Firm to very stiff silty sandy gravelly clays encountered to 4.5m bgl. Slow seepage at 2.1m bgl.

TP02 Trial pit extended to 4.5m bgl. Topsoil encountered to 0.45m bgl. Firm to very stiff silty sandy gravelly clays encountered to 4.5m bgl. Slow seepage at 1m bgl.

TP03 Trial pit extended to 4.5m bgl. Topsoil encountered to 0.4m bgl. Firm to very stiff silty sandy gravelly clays encountered to 4.5m bgl.

TP04 Trial pit extended to 3.5m bgl. Topsoil encountered to 0.45m bgl. Firm to very stiff silty sandy gravelly clays encountered to 3.5m bgl. Fast perched water ingress at 2m bgl.

TP05 Trial pit extended to 4m bgl. Topsoil encountered to 0.4m bgl. Firm to very stiff silty sandy gravelly clays encountered to 4m bgl.

BH01 Cable percussion borehole extended to 5.0m below ground level (bgl).Topsoil encountered to 0.4m bgl. Firm to very stiff silty sandy gravelly clays encountered to 5.0m bgl.

An additional ground investigation was carried out by Ground Investigations Ireland Ltd in July 2023 (GII 2023). The ground investigation comprised 3no. cable percussion exploratory boreholes as follows:

BH01 Cable percussion borehole extended to 5.7m below ground level (bgl) (66.60m AOD) terminating on possible boulders or bedrock. Topsoil encountered to 0.2m bgl. Firm to very stiff silty sandy gravelly clays encountered to 5.7m bgl. Groundwater monitoring standpipe installed to 5.7m bgl. No water strikes encountered during drilling works.

BH02 Cable percussion borehole extended to 6.0m bgl (64.4m AOD) terminating on possible boulders or bedrock. between 5.7 and 6m bgl. Topsoil encountered to 0.2m bgl. Firm to very stiff silty sandy gravelly clays encountered to 5.7m bgl. No water strikes encountered during drilling works.

BH03 Cable percussion borehole extended to 6.0m below ground level (bgl) (64.4m AOD) terminating on possible boulders or bedrock between 5.7 and 6m bgl. Topsoil encountered to 0.3m bgl. Firm to very stiff silty sandy gravelly clays encountered to 5.7m bgl. Groundwater monitoring standpipe installed to 5.7m bgl. Water strike at 2.1m (within sandy gravelly clay) rising to 1.5m after 20 minutes.

The location of the boreholes are shown on Figure 5.3 and Figure 5.4 following.

Figure 5.3 Ground Investigation Locations 2022 (GII, 2022)

Figure 5.4 Ground Investigation Locations 2023 (GII, 2023)

A copy of the ground investigation factual reports are included in Appendix 5.1.

Schematic cross sections showing the indicative ground profile for the proposed site are shown on Figures 5.5 to 5.6 below. These drawings are presented for illustrative purposes and conceptual understanding of general ground conditions, and are not to scale.

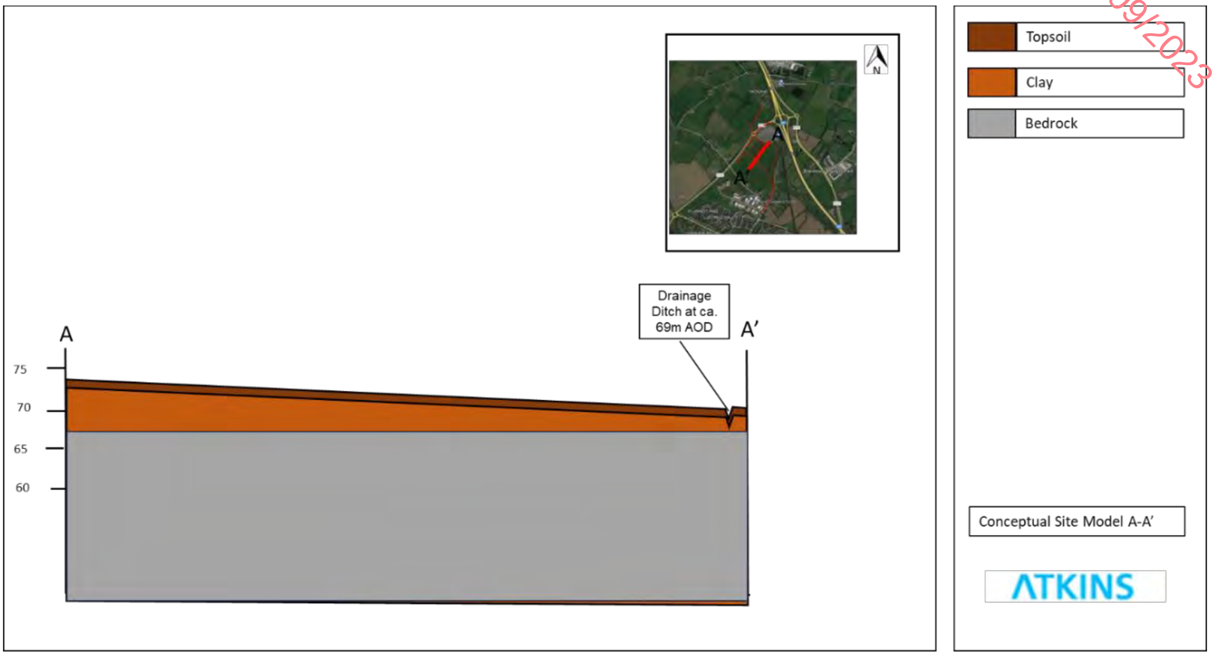


Figure 5.5 Schematic / Conceptual Cross section A-A' showing Summary Ground Conditions

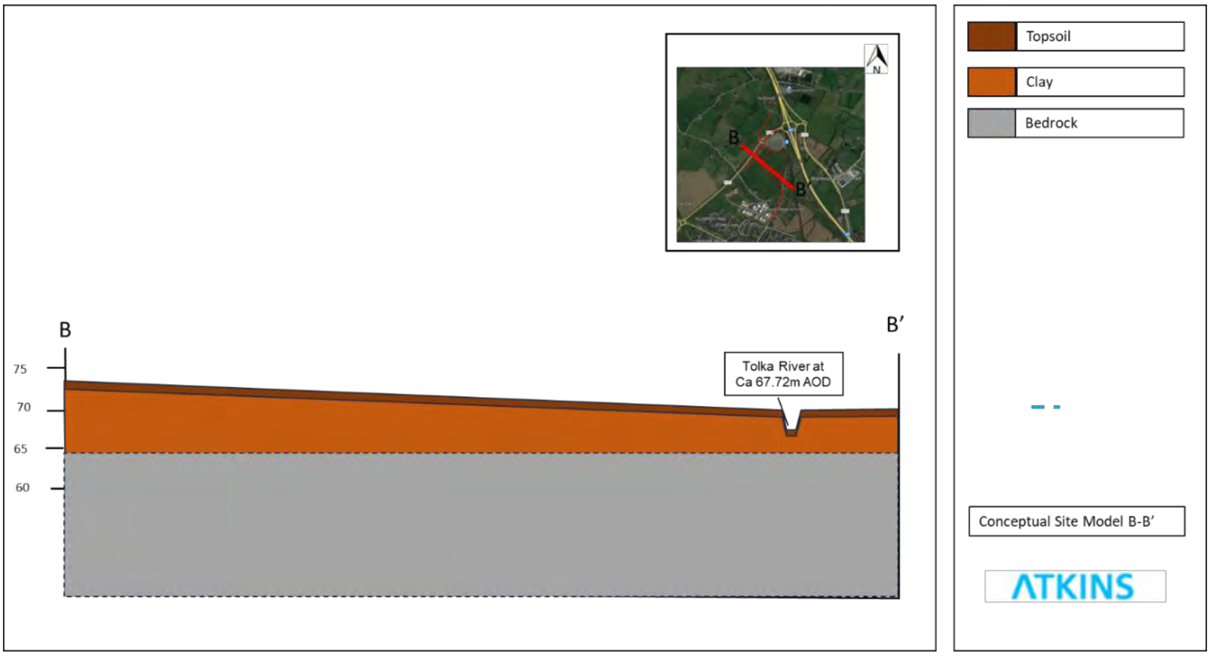


Figure 5.6 Schematic / Conceptual Cross section B-B' showing Summary Ground Conditions

5.5.2.1 Soil Quality / Contaminated Land

The site is generally a greenfield site and no made ground was encountered during the ground investigation.

A small section of the site appears to have been used for a site compound during the construction of the nearby railway station or motorway.

Environmental testing of soils was carried out following the 2023 site investigation (GII, 2023). The results of the environmental soil testing were screened (to determine potential human health risk) against generic assessment criteria for proposed residential land-use with consumption of home-grown vegetables. The screening assessment is included in Appendix 5.2. The human health screening indicates that the soils exceed the screening value at 1% organic matter for barium (56.8mg/kg) for residential sites with consumption of home-grown vegetables. No other exceedances are noted. However, the soils results do not exceed the relevant screening value for barium (1340 mg/kg) for residential sites without consumption of home-grown vegetables.

On a regional scale there are currently 3no. EPA licenced facilities within 2km of the Site, as follows;

- Padraig Thornton Waste Disposal Materials Recovery Facility W0206-01 ca. 500m SE of the proposed development;
- MSD International IEL P1073-01 a pharmaceutical facility ca. 1km north of the proposed development; and,
- Starrus Eco Holdings, Integrated Waste Management Facility (W0053-03) is located ca. 2km southwest of the Site.

Another potential source of contamination is the railway and M3 Parkway located just beyond the northern and eastern boundaries of the site.

8 no. other EPA licenced facilities in the wider area associated with the industrial area around Clonee include:

- Ireland Power Energy IEL P0569-01;
- IBM IELP0535-01;
- Astellas Ireland IEL P0007-03;
- Guerbet Ireland IEL P0050-02;
- Kepak Clonee IEL P0167-02;
- Clarochem Ireland P0125-02;
- Rottapharm IEL P0886-02; and
- Barclay Chemical Manufacturing IEL P0522-01.

All identified potential offsite contamination sources are presented in Figure 5.7 overleaf.

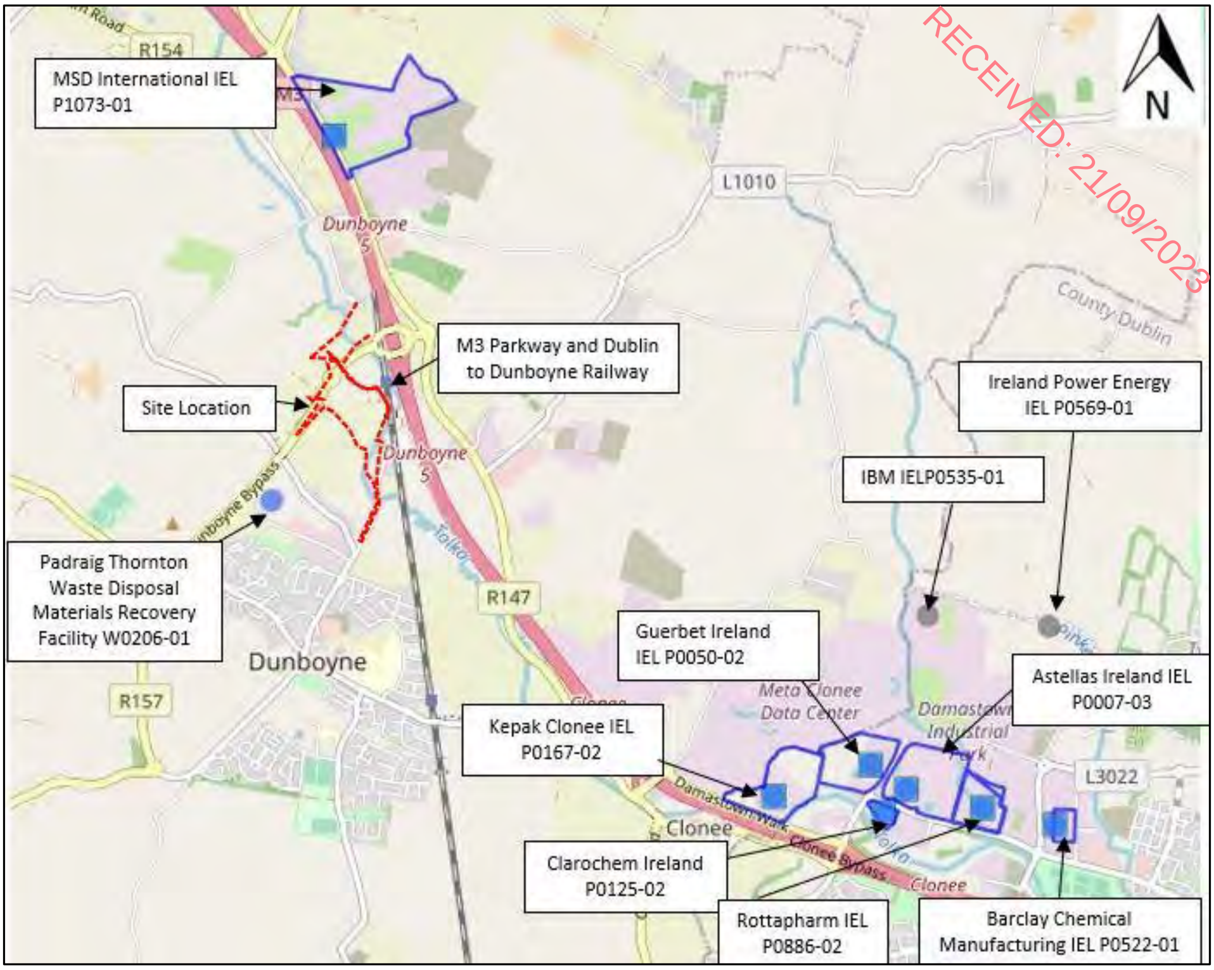


Figure 5.7 Potential Offsite Sources of Ground Contamination (EPA, 2023)

All potential onsite and offsite contamination sources have been fully evaluated. The minor area to the north used previously as a site compound constitutes a low risk of contamination. Offsite land use is not considered to be a likely significant source of contamination that may affect the proposed development.

5.6 Bedrock Geology

The GSI bedrock geology 100k map identifies the underlying bedrock of the Site as Dark Limestone and Shale of the Lucan Formation as presented on Figure 5.8 following. There are no bedrock outcrops mapped within the Site.

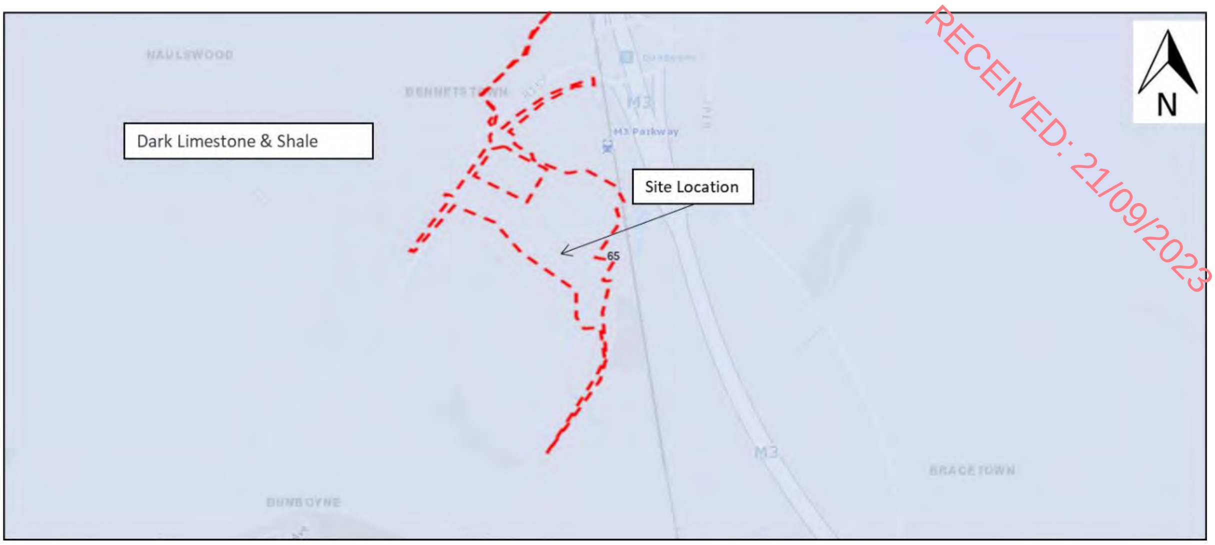


Figure 5.8 Bedrock Geology (GSI, 2023)

There are no reported karst features mapped within the Site or its environs.

Bedrock was not confirmed during the GII ground investigation (GII 2023), however possible boulders or bedrock were encountered at ca. 6m bgl.

According to the Dunboyne Water Supply Groundwater Source Protection Zones Report (GSI 2004): https://gsi.geodata.gov.ie/downloads/Groundwater/Reports/SPZ/MH_PWSS_SPZ_Dunboyne_June_2004_GSI.pdf bedrock would be expected to be encountered at approximate depths of between 5 and 10m bgl in the vicinity of the proposed development.

The closest geological heritage site to the Site is Louisa Bridge Cold Spring Geological Heritage area which is located 6.7 km south west of the proposed development. Huntstown Quarry is also located ca. 9km south east of the proposed development as shown in Figure 5.9 following. There is no connectivity to these sites and they are not considered further in this report.

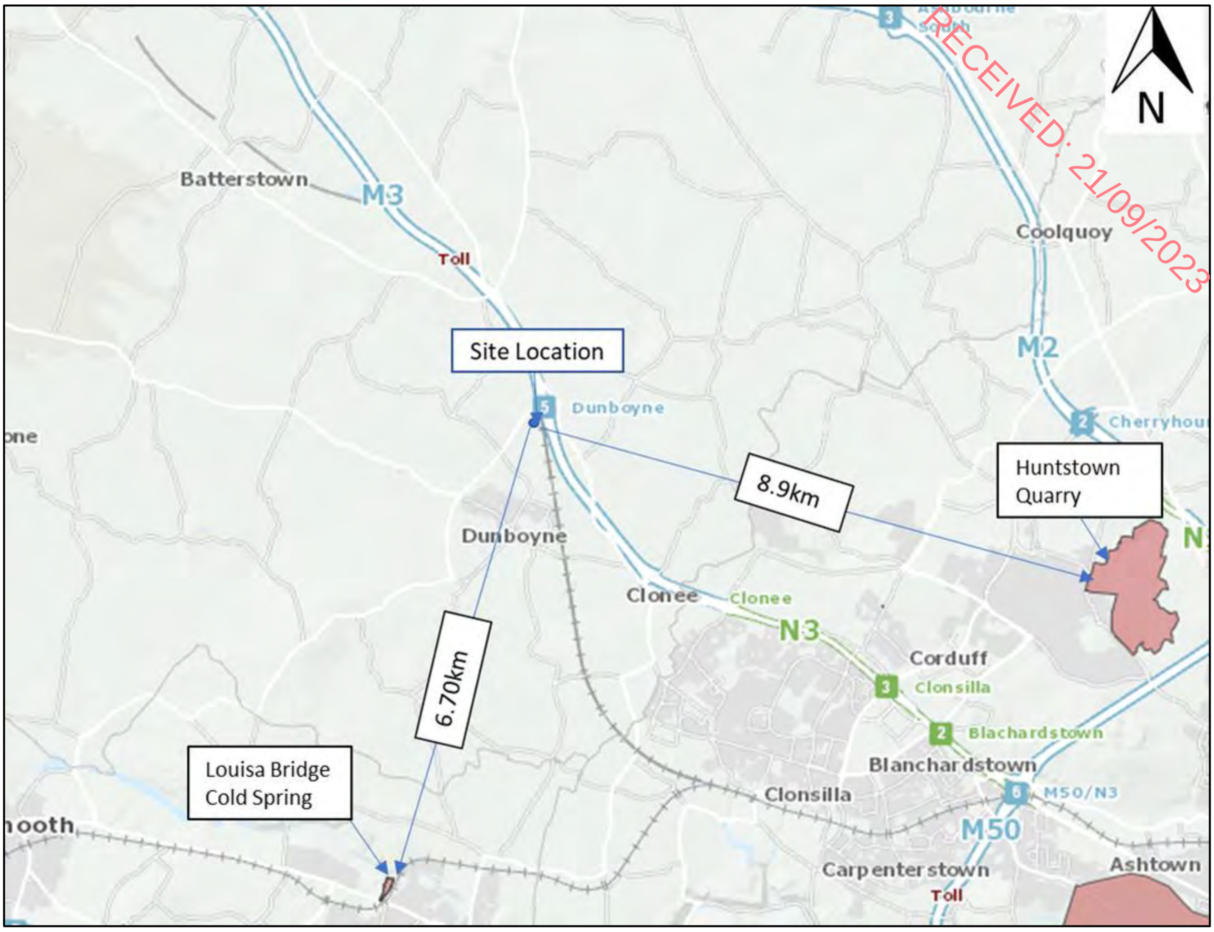


Figure 5.9 Geological Heritage Areas (GSI, 2023)

5.6.1 Geo-hazards

No landslide susceptibility issues are reported within the vicinity of the Site (GSI, 2023). Landslide susceptibility is '*unclassified*' for the majority of the Site with '*low (inferred)*' landslide susceptibility within the northern and southern sections of the Site. The closest reported landslide event is located ca. 2.9km south east of the Site at M3 Junction 4- Clonee associated with a motorway road cutting. Refer to Figure 5.10 overleaf.

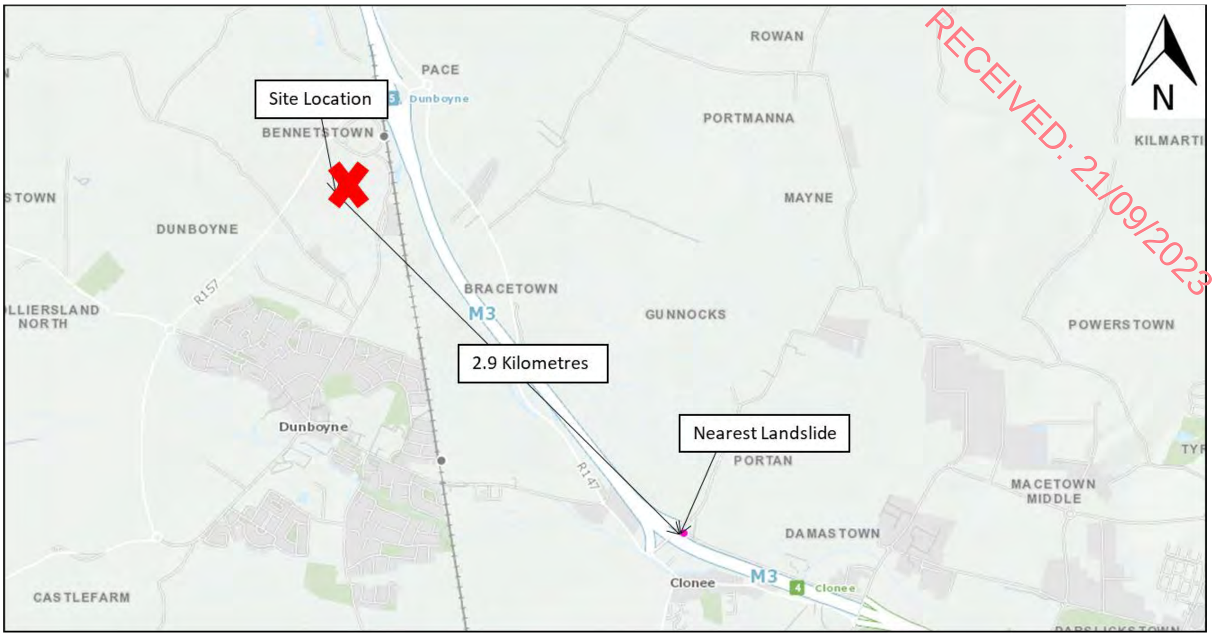


Figure 5.10 Landslide Susceptibility (GSI, 2023)

Available EPA radon maps shows that between five and ten per cent of the homes within the 10km grid square where the Site is located, have radon concentrations in excess of the national Reference Level of 200 bequerel per cubic metre (Bq/m^3) as shown in Figure 5.11 (EPA, 2023). However, in accordance with relevant building regulations, a radon barrier will be installed beneath all buildings to be constructed as part of the proposed development. Therefore, radon will not have any effect on the proposed development.

Smaller portions of the eastern and southern sections of the site are in areas of higher radon levels however these areas will incorporate open space and access roads.

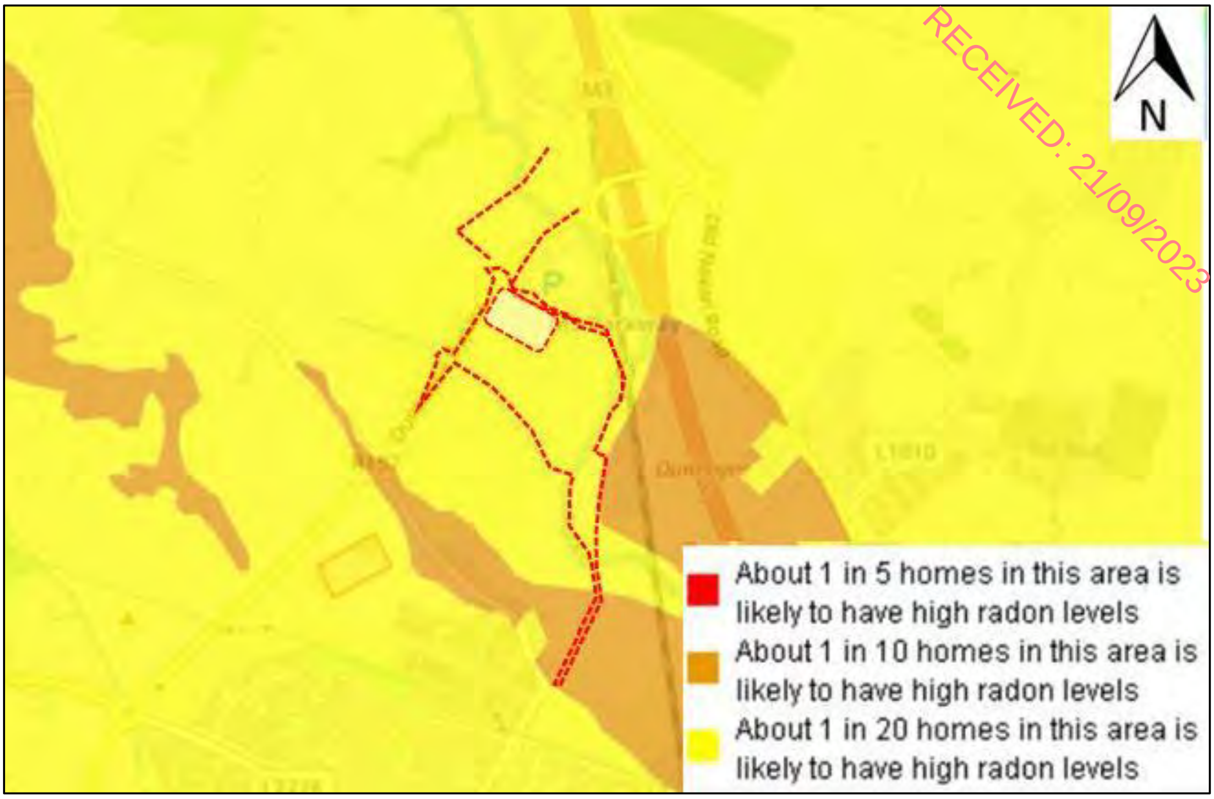


Figure 5.11 Regional Radon Levels (EPA, 2023)

5.7 Potential Effects of the proposed development

5.7.1 Construction Phase

5.7.1.1 Land (Including Land Take)

The current zoning for the Site within the Meath County Council Area is as follows:

A2- New Residential '*To provide for new residential communities with ancillary community facilities, neighbourhood facilities and employment uses as considered appropriate for the status of the centre in the Settlement Hierarchy.'*

Fl - Open Space '*To provide for and improve open spaces for active and passive recreational amenities'*

The effect on land take at the site is likely to have a slight negative effect on the environment of the area. This will be a permanent effect. However, the proposed development is in a zoned residential area to the north of the village of Dunboyne and immediately adjacent to excellent transport connections of the M3 and the M3 Parkway railway station. The eastern portion of the site is zoned as open space. This portion of the site will be retained as open space within the proposed development.

5.7.1.2 Soils and Geology

Activities during construction will primarily comprise stripping of topsoil across the Site, excavation of subsoil and pouring of foundations for the residential and commercial units, installation of the storm water (including attenuation tanks) and foul water drainage works, watermains and laying of cable ducts, and piling as required, including for the proposed bridge structure.

Tracked excavators will likely be sufficient to excavate soils for subsequent relocation to facilitate construction works. The extent of the excavation for the housing and duplexes is likely to be a maximum depth of 1m bgl. Piling will likely be required beneath the apartments to the north east of the site to a maximum depth of 6m bgl, and during the construction of the proposed bridge structure to a maximum depth of 20m bgl. The extent of excavation for service / utility trenches will vary; however, the general depth will be in the region of 0.7m. The maximum anticipated depth of excavation across the Site is anticipated to be 6mbgl. All excavations are anticipated to encounter firm to very stiff sandy gravelly clay. Piling for the apartment blocks may encounter bedrock.

The total volume of soil requiring excavation for the proposed development is expected to be ca. 40,000m^3. It is provisionally estimated that ca. 13,000m^3 of stripped topsoil will be generated. Topsoil and subsoil excavated from the site shall only be used in areas where there will be no potential for use to produce homegrown vegetables. Alternatively further environmental testing may be carried out, as detailed below.

It is anticipated that ca. 57,000m^3 of suitable engineering grade fill material (topsoil/ subsoil/ subbase / capping/building hardcore) will need to be imported to the Site.

All unsuitable soils will be removed and disposed of offsite to a suitably permitted / licenced waste recovery / disposal facility in accordance with relevant waste management legislation (including but not limited to the Waste Management Act of 1996, 2001 and 2003 and all subsequent waste management regulations as amended). It is provisionally estimated that 12,000m^3 of excavated soils will require offsite disposal.

During the construction phase of the development, the following potential effects on soils and bedrock could occur and have been assessed accordingly;

- Stripping of topsoil may result in exposure of the underlying subsoil layers to the effects of weather and construction traffic and may result in subsoil erosion and generation of sediment laden runoff;
- Soils beneath the proposed development may become unnecessarily compacted by machinery during construction;
- Topsoil and subsoil may become rutted and deterioration of the topsoil layer and any exposed subsoil layers may result in erosion and generation of sediment laden runoff;
- Dust generation can also occur during extended dry weather periods as a result of construction traffic;
- Soils and bedrock may be at risk of becoming contaminated through Site construction activity; in particular the risk of spillages and leakage of any fuel oils and paint. Potential human health risks to construction workers could also occur associated with any such spillages and leakage; and,

- Temporary onsite groundwater monitoring wells could provide a conduit for potential contamination of soils and bedrock through Site construction activity; in particular the risk of spillages and leakage of any fuel oils and paint.
- The environmental testing indicates that there is a potential human health risk from naturally occurring barium within the soils onsite if the soils are used in areas where there may be potential produce of homegrown vegetables. All topsoil and excavated soils on site shall only be used in areas where there will be no homegrown produce. Topsoil for use in private residential gardens, or gardens to be used by the creche, will be imported to the site and will be subject to pre-screening to ensure its suitability. Alternatively further environmental testing may be carried out across the site to identify areas of topsoil that may be suitable for use in these areas. Should such testing meet all required human health risk screening criteria (as presented in Appendix 5.2) this material may be used in private residential gardens, or gardens to be used by the creche, rather than imported topsoil.
- As a precautionary measure, no soils excavated from the localised former compound area in the northern portion of the site (Refer to Table 5.1.) will be reused onsite. All soil excavated from this particular area will be tested and removed offsite for disposal to a suitably permitted / licenced waste recovery / disposal facility in accordance with relevant waste management legislation (including but not limited to the Waste Management Act of 1996, 2001 and 2003 and all subsequent waste management regulations as amended).

The above effects are likely to result in moderate negative effect on receiving soils and/or bedrock; however, any effects are considered to be short-term and localised. Furthermore, mitigation measures will be implemented during the Construction Phase to reduce and/or avoid these potential effects, and to address any potential waste soil management issues.

5.7.1.3 Ground Stability

There is no evidence of significant historic landslides and there are no known karst features within the proposed development boundary. Industry standard health and safety practices will be implemented during the construction phase to address any potential ground stability issues associated with excavation, trenching and piling works. Therefore, no significant negative effect, associated with ground stability, is likely.

5.7.1.4 Operational Stage

The effect on land take is likely to have a slight negative permanent effect on the environment of the area; however, this change is consistent with existing and emerging trends.

The development will have an imperceptible, permanent effect on localised portions of soil and bedrock during the operational phase. The operational stage of the residential development consists of the typical activities in a residential area and will not involve further disturbance to the topsoil, subsoils and geology of the area.

5.8 Cumulative Effects

All relevant developments in the immediate environs of the proposed development, which have been approved but are not yet built or operational, have been considered. This section also considers relevant developments which have not yet been approved but which could if approved have a cumulative effect with the proposed development. There are a number of projects in the general area of the site under development however many of these comprise very small developments such as one off houses or change in use of buildings and will not have a likely cumulative effect with the proposed development and as such are not considered further. The following developments have been identified as having the potential to give rise to cumulative effects with proposed development.

- **Council Reference: P822022**.Decision to proceed dated 28/03/2023. The development is for a proposed link and access road connection between the Dunboyne Business Park and the R157. The proposed project includes junctions, footpaths, bus stops, public lighting, accommodation and fencing/boundary works, landscaping works, drainage/attenuation works, and ancillary infrastructure and utility works.
  This project is located ca. 600m south of the proposed Bennetstown LRD development and has the potential to be constructed at the same time as the proposed Bennetstown LRD development. A number of mitigation measures as identified within Section 5.9 of this report will be implemented as part of the Dunboyne LRD development. As a result there will be no significant effect on land, soils and geology and no likely significant effect when considered cumulatively with the proposed link and access road development.

- **Council Reference: 23424**. Further Information Requested The development will consist of: i. Construction of 3 no. office buildings with a cumulative gross floor area (GFA) of 13,729 sq.m ranging in height from 3 to 4- storeys and shall comprise the following: a. Building 1 (3,597 sq.m GFA) 3-storeys in height (12.35 metres to top of parapet), with a set back louvred screen 2m above parapet level. b. Building 2 (5,336 sq.m GFA) 4-storeys in height (16.125 metres to top of parapet), with a set back louvred screen 2m above parapet level. c. Building 3 (4,796 sq.m GFA) 4-storeys in height (16.125 metres to top of parapet), with a set back louvred screen 2m above parapet level. ii. Roof mounted solar PV panels (c. 180 sq.m combined area); iii. Provision of a 4-arm signalised junction replacing the existing Pace roundabout to include a new northern arm with segregated cycleway and footpath; iv. Access to the development is proposed from the new northern arm, with 6m wide internal access roads to serve the development; v. Upgrade works to the R157 and M3 Parkway access road to facilitate junction improvements; vi. A total of 275 surface car parking spaces including 14 disabled access bays and 55 electric car charging points; vii. 280 bicycle parking spaces in 3 secure cycle storage areas adjacent to the buildings; viii. Site signage is to be erected, all spot-lit and back-lit illuminated, including 2 no. type 1 entrance signs (6.15m x 2.4m) and 3 no. type 2 building signs (1.35m x 2.4m); ix. 3 standalone electricity substations; x. Foul sewer connection to existing public system including pumping station on site with rising mains along Kennedy Road and Navan Road; xi. Watermain connection to the north east of site at Pace for connection to Irish Water Infrastructure; xii. Permission is also sought for associated landscaping, boundary treatments, public lighting, plant, waste storage and all ancillary site and development works

This project is located immediately north of the proposed Bennetstown LRD development and has the potential to be constructed at the same time as the proposed Bennetstown LRD development. A number of mitigation measures as identified within Section 5.9 of this report will be implemented as part of the Bennetstown development. As a result there will be no significant effect on land, soils and geology from the Bennetstown development and no likely significant effect when considered cumulatively with this office development.

- **Council Reference: 23424**. Further Information Requested Application for a 10-year permission for development in the Townlands of Bennetstown, Pace, and Dunboyne. The subject site (2.79ha) encompasses an area of 0.87ha situated to the south-west of the M3 Parkway and south-east of the Dunboyne Bypass (R157) located in the Townland of Bennetstown, and the balance (1.92ha) located in the Townlands of Pace, Bennetstown and Dunboyne including the Dunboyne Bypass (R157) and M3 Parkway access, Kennedy Road and Navan Road for infrastructure works. The development will consist of: i. Construction of a single-storey commercial building with a cumulative gross floor space (GFS) of 2,160 sq.m comprising: a. A supermarket with delivery, store and service area (1,880 sq.m), including net retail floorspace of 1,510 sq.m, and b. 2 commercial units (combined 280 sq.m) to facilitate Class 1 (Shop), Class 2 (Financial, Professional and Other Services) or Café (food and beverage) uses. ii. Provision of a 4-arm signalised junction replacing the existing Pace roundabout to include a new northern arm with segregated cycleway and footpath; iii. Upgrade works to the existing R157 and M3 Parkway access road to facilitate junction improvements; iv. Access to the development is proposed via a new 3-arm priority-controlled junction from the upgraded southern arm of the proposed 4-arm signalised junction, with 6m wide internal access roads to serve the development; v. A total of 118 surface level car parking spaces including 6 disabled access bays and 4 electric car charging points; vi. 20 short-stay bicycle parking spaces; vii. 1 Electricity substation / switch room; viii. Foul sewer connection to existing public system including pumping station on site with rising mains along Kennedy Road and Navan Road; ix. Permission is also sought for hard and soft landscaping, lighting, attenuation and drainage and all ancillary site development works.
  This project is located immediately north of the proposed Bennetstown LRD development and has the potential to be constructed at the same time as the proposed Bennetstown LRD development. A number of mitigation measures as identified within Section 5.9 of this report will be implemented as part of the Dunboyne LRD development. As a result there will be no significant effect on land, soils and geology from the Dunboyne LRD development and no likely significant effect when considered cumulatively with this commercial development.

- **Dunboyne North Master Plan 2022**. The Master Plan considers the development of an overall site area of 74ha for residential, commercial, retail and open space in addition to upgraded roads and infrastructure services. There will be a permanent cumulative negative effect on land take. The land use will comply with the objectives of the Meath County Development Plan 2021-2027 and the requirements of the Dunboyne Masterplan and will be consistent with local land use trends. The development of the Master Plan lands will be phased and will not be developed at the same time as the Dunboyne LRD project and there will be no significant cumulative effect on soils and geology.

The overall cumulative effect on land, soils and geology will be adverse, long term and not significant.

5.9 Mitigation Measures

5.9.1 Construction Phase

Stripping of topsoil will be carried out in a controlled and carefully managed way and coordinated with the proposed staging for the development. At any given time, the extent of topsoil strip (and consequent exposure of subsoil) will be limited to the immediate vicinity of active work areas. Topsoil stockpiles will be protected for the duration of the works and will be located so as not to necessitate double handling.

The design of road levels and finished floor levels has been carried out in such a way as to minimise cut/fill type earthworks operations. The duration that subsoil layers are exposed to the effects of weather will be minimised. Disturbed subsoil layers will be stabilised as soon as practicable (e.g., backfill of service trenches, construction of road capping layers, construction of building foundations and completion of landscaping). Similar to comments regarding stripped topsoil, stockpiles of excavated subsoil material will be protected for the duration of the works. Stockpiles of subsoil material will be located separately from topsoil stockpiles. The Contractor will be responsible for ensuring these measures are fully implemented.

The excavation of material will be minimised as much as possible to reduce the effect on soils and geology. No material excavated from the former compound area at the north of the site shall be reused onsite.

Due to the exceedance in barium (albeit naturally occurring) identified onsite no soils shall be reused onsite as topsoil in gardens or areas with potential for homegrown vegetables without further environmental testing and confirmation of suitability for reuse in these areas.

Any surplus material, or materials which are deemed not suitable for onsite reuse will be classified in accordance with the EPA Guidance Document *'Waste Classification, List of Waste & Determining if Waste is Hazardous or Non-Hazardous'* (2015). It will be the Contractors responsibility to ensure that all waste soils are classified correctly and managed, transported and disposed of offsite in accordance with the requirements of the Waste Management Act 1996, as amended, the Waste Framework Directive 2008/98/EC of the European Parliament and Council on waste and any relevant subsequent waste management legislation.

As a precautionary measure, no soils excavated from the localised former compound area in the northern portion of the site (Refer to Table 5.1.) will be reused onsite. All soil excavated from this particular area will be tested and removed offsite for disposal to a suitably permitted / licenced waste recovery / disposal facility in accordance with relevant waste management legislation (including but not limited to the Waste Management Act of 1996, 2001 and 2003 and all subsequent waste management regulations as amended).

It will be the Contractors responsibility to ensure that a project specific Detailed Resource and Waste Management Plan is fully implemented onsite for the duration of the project.

Further mitigation measures for the prevention of soil / bedrock contamination during construction are proposed below. The Contractor will be responsible for ensuring these measures are fully implemented:

- In advance of commencement of the Construction Stage, all onsite monitoring wells (as identified in the Site Investigation Reports (GII, 2022, 2023) presented in Appendix 5.1, will be fully decommissioned by an experienced borehole specialist in accordance with relevant guidelines, 'Good practice for decommissioning redundant boreholes and wells' (UK Environment Agency, 2012);
- Earthworks / piling plant and vehicles delivering construction materials to Site will be confined to predetermined haul routes around the Site for each phase of the proposed development;
- The need for vehicle wheel wash facilities will be assessed by the Contractor depending on the phasing of works and onsite activity and will be installed as needed, near any Site entrances and road sweeping implemented as necessary to maintain the road network in the immediate vicinity of the Site;
- Dust suppression measures (e.g., dampening down) will be implemented as necessary during dry periods;
- All excavated materials will be stored away from the excavations / immediate works area, in an appropriate manner at a safe and stable location. The maximum height of temporary stockpiles will be 3m;
- A comprehensive monitoring and supervisory regime including monitoring of all excavations and stability assessments as required will be put in place to ensure that the proposed construction works do not constitute a risk to the stability of the Site;
- The employment of good construction management practices will serve to minimise the risk of pollution from construction activities at the proposed development in line with the Construction Industry Research and Information Association (CIRIA) publication entitled, Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors, CIRIA - C532 (2001) which are also detailed in Chapter 6 - Hydrology & Hydrogeology; and,
- Specifically, regarding pollution control measures, the following will be adhered to;
  - Fuels, lubricants and hydraulic fluids for equipment used on the construction Site, as well as any solvents, oils, and paints will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to best codes of practice;
  - Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the proposed development for disposal or re-cycling;
  - Any spillage of fuels, lubricants or hydraulic oils will be immediately contained and the contaminated soil removed from the proposed development and properly disposed of;
  - All Site vehicles used will be refuelled in bunded and adequately sealed and covered areas in the construction compound area;
  - All plant and machinery will be serviced before being mobilised to Site;
  - No plant maintenance will be completed on Site, any broken-down plant will be removed from Site to be fixed;
  - Refuelling will be completed in a controlled manner using drip trays at all times;

- Mobile bowsers, tanks and drums will be stored in secure, impermeable storage areas away from open water;
- Fuel containers will be stored within a secondary containment system, e.g., bunds for static tanks or a drip tray for mobile stores;
- Containers and bunding for storage of hydrocarbons and other chemicals will have a holding capacity of 110% of the volume to be stored;
- Ancillary equipment such as hoses and pipes will be contained within the bund;
- Taps, nozzles or valves will be fitted with a lock system;
- Fuel and chemical stores including tanks and drums will be regularly inspected for leaks and signs of damage;
- Drip-trays will be used for fixed or mobile plant such as pumps and generators to retain oil leaks and spills;
- Only designated trained operators will be authorised to refuel plant on Site;
- Procedures and contingency plans will be set up to deal with emergency accidents or spills;
- An emergency spill kit with oil boom, absorbers etc. will be kept on-site for use in the event of an accidental spill. A specific team of staff will be trained in the use of spill containment;
- Appropriate PPE including appropriate gloves, must be worn at all times by operatives onsite during the construction phase.
- Strict supervision of contractors will be adhered to in order to ensure that all plant and equipment utilised on-Site is in good working condition. Any equipment not meeting the required standard will not be permitted for use within the Site. This will minimise the risk of soils and bedrock becoming contaminated through Site activity; and,
- The highest standards of Site management will be maintained and utmost care and vigilance followed to prevent accidental contamination or unnecessary disturbance to the Site and surrounding environment during construction. A named person will be given the task of overseeing the pollution prevention measures agreed for the Site to ensure that they are operating safely and effectively.

Mitigation measures outlined in Chapter 6 - Hydrology & Hydrogeology are also applicable to the protection of soils and geology during the construction phase.

The above mitigation measures will be incorporated (as required) during Detailed Design Stage and will form part of a site-specific Construction Environmental Management Plan (CEMP) which will be implemented during the Construction Stage (including initial Site preparatory / enabling works).

Following mitigation measures the effects on lands, soils and geology will be slight negative permanent and not significant.

5.9.2 Operational Phase

No material excavated from the former compound area at the north of the site shall be reused onsite. Due to the exceedance in barium (albeit naturally occurring) identified onsite no soils shall be reused onsite as topsoil in gardens or areas with potential for homegrown produce during the operational phase without further environmental testing and confirmation of suitability for reuse in these areas.

No further mitigation measures will be required during the operational phase.

5.10 Monitoring Requirements

5.10.1 Construction Phase

A comprehensive monitoring and supervisory regime including monitoring of all excavations and stability assessments as required will be put in place to ensure that the proposed construction works do not constitute a risk to the stability of the Site.

Further environmental testing will be carried out across the site if any excavated soils are to be used in areas where there may be plant uptake . All soils being removed offsite will be subject to hazardous waste screening and waste acceptance criteria screening before being moved offsite.

5.10.2 Operational Phase

No monitoring will be required during the operational phase.

5.11 Residual Effects

5.11.1 Construction Phase

The effect on land take is likely to have a slight negative permanent effect on the environment of the area; however, this change is consistent with existing and emerging trends.

Implementation of the measures outlined above will ensure that potential moderate effects of the proposed development on soils and the geological environment do not occur during the construction phase, and that any residual effects (with the exception of offsite soil removal) will be slight negative and short term in duration.

The primary residual effect is the potential removal of non-suitable topsoil and subsoil (native soil and made ground) for offsite disposal (via. excavation and piling). This material would likely be classified as non-hazardous (EWC Code - 17 05 04). The majority of soil is likely to be suitable for disposal as inert material to an appropriate local authority permitted / EPA licenced waste facility. The relevant local authority registered, permitted and /or EPA licenced waste facilities will be operated and managed according to the relevant conditions of their waste permits or EPA waste licences. The Contractor will ensure that all waste soils are classified correctly (as per relevant EPA (2015) Guidance) and managed, transported and disposed of offsite in accordance with the requirements of the Waste Management Act 1996, as amended, the Waste Framework Directive 2008/98/EC of the European Parliament and Council on waste and any relevant subsequent waste management legislation. The residual effect with respect to offsite soil removal is therefore likely to be slight negative and permanent.

The overall cumulative effect on land, soils and geology with the Master Plan land development will be adverse, long term and not significant.

5.11.2 Operational Phase

The effect on land take is likely to have a slight negative permanent effect on the environment of the area; however, this change is consistent with existing and emerging trends.

The development will have an imperceptible, permanent effect on localised portions of soil and bedrock during the operational phase.

5.11.2.1 Land, Soils and Geology and Human Health

Potential human health risks associated with quality effects to soils arising from the proposed development during the Operational Phase have been identified as follows;

- Potential risk to human health from slightly elevated (albeit naturally occurring) barium through homegrown vegetable consumption. However, this risk will be addressed by implementation of the mitigation measures outlined previously.

Taking account of the baseline setting and the proposed mitigation measures, no significant human health risks associated with exposure to contaminants (via. direct contact, ingestion or inhalation) resulting from the proposed development are anticipated.

5.12 'Do Nothing Scenario'

The Site is currently agricultural land. The do-nothing scenario will have a neutral and imperceptible effect on the Site with regards to land, soils and geology.

5.13 Reinstatement

All temporary construction compounds and Site entrances are to be removed upon completion of the construction phase. Such areas are to be reinstated in accordance with the landscape architects plan and engineer's drawings. All construction waste and / or scrapped building materials are to be removed from Site on completion of the construction phase. Oil, fuel etc. storage areas are to be decommissioned on completion of the construction phase. Any remaining liquids are to be removed from Site and disposed of at an appropriately licenced waste facility.

5.14 Risk of Major Accidents and Disaster

The proposed development is not in close proximity to any higher or lower tier Seveso sites. All mitigation measures as identified above will be employed during the construction and the operational phase of the development. There will be no risk of major accidents or disasters associated with the construction and operational phase of the proposed development.

5.15 Interactions

5.15.1 Land, Soils and Geology

- **Air Quality & Climate** - Potential effects on the receiving Land, Soils and Geology environment could also affect air quality conditions present. However, the mitigation measures described in Chapter 5 - Land, Soils & Geology, and those relevant in Chapter 7 - Air Quality, and Chapter 8 - Climate, will ensure that this will not occur.
- **Hydrology & Hydrogeology** - Potential effects on the receiving land, soils and geology environment could also affect hydrology and hydrogeology conditions present. However, the mitigation measures described in Chapter 6 - Hydrology & Hydrogeology, and those relevant in Chapter 5 – Land, Soils & Geology will ensure that this will not occur.
- **Material Assets Service Infrastructure & Utilities-** Potential effects on the receiving land, soils and geology environment could also affect material assets. However, the mitigation measures described in Chapter 5 – Land, Soils and Geology, and those relevant in Chapter 12 - Material Assets: Service Infrastructure & Utilities will ensure that this will not occur.
- **Human Health Risk -** Potential human health risks associated with quality effects to soils arising from the proposed development during the Operational Phase have been identified as follows;
  - Potential risk to human health from slightly elevated (albeit naturally occurring) barium through consumption of homegrown vegetables. However, this risk will be addressed by implementation of the mitigation measures outlined in Chapter 5 - Land, Soils and Geology.

Taking account of the baseline setting and the proposed mitigation measures, no significant human health risks associated with exposure to contaminants (via. direct contact, ingestion or inhalation) resulting from the proposed development are anticipated.

5.16 References

Bing Maps Aerial photography (consulted 12/08/2023);

Environmental Protection Agency (EPA 2022) 'Guidelines on the information to be contained in Environmental Impact Assessment Reports' published in May 2022.

Environmental Protection Agency EPA (2023) Public Viewer and web mapping (consulted 12/08/2023);

Institute of Geologists of Ireland (IGI 2013), 'Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements' .

Geological Survey of Ireland (GSI 2023) GSI Datasets Public Viewer and Groundwater web-mapping (consulted 12/08/2023);

Ground Investigations Ireland (GII 2022)- Dunboyne LRD Ground Investigation Report

Ground Investigations Ireland (GII 2023)- Dunboyne LRD Ground Investigation Report

Google Maps Aerial photography (consulted 12/08/2023);

Ordnance Survey web-mapping to assess the surface topography and landforms (consulted 12/08/2023);

Meath County Council Planning Maps (consulted 12/08/2023); and,

Meath County Council County Development Plan 2021-2027

Large Scale
Residential Development
at Dunboyne North, Co. Meath

Volume II

Environmental Impact Assessment Report

CHAPTER 6

Hydrology and Hydrogeology

August 2023

McCutcheon Halley
CHARTERED PLANNING CONSULTANTS

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6 Hydrology & Hydrogeology

6.1 Introduction

This chapter describes the existing surface water and groundwater regime likely to be encountered beneath and in the general vicinity of the proposed development. It also addresses the potential impact of the proposed development on hydrology (i.e. surface water) and hydrogeology (i.e. groundwater) together with the mitigation measures that will be employed to eliminate or reduce any potential impacts. The proposed Large Scale Residential Development will consist of the construction of 267 no. residential units, a creche, a new link road between the R157 and the Old Navan Road including a bridge over the River Tolka, 2 no. signalised junctions, upgrade works and road improvements to the R157 and the M3 Parkway access road, and all associated site development works including drainage, landscaping, and boundary treatments. A full description is included in the statutory notices and in Chapter 2 of the EIAR.

6.1.1 Author Information and Competency

Deirdre Larkin is a Chartered Geologist (IGI PGeo No. 223; EurGeol No 1064) and Hydrogeologist with over 19 years' experience in the preparation of hydrogeological and hydrological assessments. She has project managed the preparation of numerous EIARs for housing, roads and infrastructure projects and has prepared the Water and Land Soils and Geology chapters of EIARs for various schemes.

Kieran Lynch is a Chartered Environmental Scientist with over 20 years' experience in geotechnical engineering, contaminated land and waste management and who has prepared Land Soils and Geology, Water, waste and Material Assets chapters for EIARs for housing developments, roads projects and other infrastructure projects. Kieran has co-ordinated and reviewed EIARs for various housing and infrastructure projects.

6.1.2 Reference to Guidelines Relevant to Discipline

This assessment has been completed in accordance with relevant best practice guidance from the Institute of Geologists of Ireland (IGI), 'Guidelines for the Preparation of Soils, Geology and Hydrogeology chapters of Environmental Impact Statements' (IGI, 2013). The IGI guidance document is an updated version of the 2002 guidelines, 'Geology in Environmental Impact Statements, A Guide' (IGI, 2002), which was revised to take account of legislative changes, and the operational experience developed by geoscientists in the production of relevant environmental assessments. This assessment has also been prepared with regard to the guidelines prepared by the Environmental Protection Agency (EPA) outlined in 'Revised Guidelines on the Information to be contained in Environmental Impact Statements' published in 2015, 'Advice Notes on Current Practice (in the Preparation of Environmental Impact Statements)' published in 2015, and also 'Guidelines on the information to be contained in Environmental Impact Assessment Reports' published in May 2022.

6.1.3 Study Assessment and Methodology

The following scope of works was undertaken by Atkins in order to complete this assessment: -

- Desk-based study including review of available historical information; and,
- A Site Walkover Survey carried out by an experienced Hydrogeologist on the 16th August 2023.

The purpose of the desk-based task was to characterise the current hydrological and hydrogeological setting of the Site. Relevant background information was compiled, specifically from the following data sources;

- Bing Maps Aerial photography (consulted 10/08/2023);
- Meath County Council County Development Plan 2021-2027 (MCC 2021);
- Environmental Protection Agency (EPA) web mapping (consulted 10/08/2023);
- Geological Survey of Ireland (GSI) Datasets Public Viewer and Groundwater web mapping (consulted 10/08/2023);
- GSI '*Dublin GWB: Summary of Initial Characterisation'* (GSI, 2004);
- Google Maps Aerial photography (consulted 10/08/2023);
- Office of Public Works National Flood Hazard mapping web Site (consulted 10/08/2023);
- Ordinance Survey of Ireland (OSI) web mapping (consulted 10/08/2023);
- National Parks and Wildlife Service (NPWS) Map Viewer (consulted 10/08/2023);
- Water Framework Directive (WFD) Ireland web mapping (consulted 10/08/2023);

Separately, a Flood Risk Assessment (FRA) has been prepared by IE Consulting (2023) (Doc. Ref: IE2510_Report_5368) in accordance with the following guidance document; '*The Planning System and Flood Risk Management – Guidelines for Planning Authorities*' DOEHLG 2009, and comprised the following key phases: -

- Initial Flood Risk Assessment:
- Detailed Flood Risk Assessment; and,
- Assessment of Hydrological Impact of Proposed Development.

A full copy of the Flood Risk Assessment (IE Consulting, 2023) (Doc. Ref: IE2510_Report_5368) has been submitted as part of this planning application.

6.1.4 Difficulties Encountered in Compiling Information

No difficulties were encountered during the data collection and assessment stages of this Water assessment.

6.2 Receiving Environment

6.2.1 Site Development

A review of historic maps (including available 6-inch historic maps (1829-41), 25-inch historic maps (1897-1913), Cassini 6-inch historic maps 1830-1930 and aerial photographs (1995 to 2012) from the Ordnance Survey of Ireland) (OSI 2023) and current aerial photography (Bing Maps, 2023) confirms that the subject lands at the Site have been primarily used for agricultural purposes in the past, and this use continues to the present day. It is noted that a minor portion of the site was used as a temporary compound / hardstanding area previously, as detailed further in Chapter 5. Developments in the wider area include the construction of the M3 Motorway and associated link roads and the construction of the M3 Parkway Railway station and associated carpark on the Dublin to Dunboyne railway line to the north of the proposed development. A detailed summary of land use both in relation to the Site and surrounding lands is presented in Chapter 5 - Land, Soils and Geology.

6.2.2 Current Site Setting and Topography

The development site is generally flat but slopes gently from approximately 73m AOD in the north to approximately 69m AOD in the south and east of the site close to the Tolka River, with the level of the Tolka River itself measured at approximately 67.8m AOD.

The site walkover survey, carried out on 16th August 2023, confirmed that the site is currently used for agricultural grazing and slopes from north down towards the south east and the River Tolka and towards the drainage ditch further south. Water was present in the drainage channel however flow rate was very low. Refer to Plates 6.1 to 6.3 below.

Plate 6.1 River Tolka to the East of the Site (showing Railway bridge crossing point)

Plate 6.2 One of the numerous Drainage Ditches along a field in the central portion of the Site

Plate 6.3 Greenfield Setting with land gently sloping to the South / South east.

Based on OSI ground elevation contours, the land topography in the wider area is generally within 70mOD to 80mOD, with a gentle fall from the Northwest to the Southeast, towards Dunboyne Town.

6.2.3 Potential Contamination Sources

The Dublin to Dunboyne Railway and the M3 Parkway railway station and carpark are located to the north and east of the site.

On a regional scale there are currently 3no. EPA licenced facilities within 2km of the Site, (refer to Figure 5.7 in in Chapter 5 - Land, Soils and Geology) as follows;

- Padraig Thornton Waste Disposal Materials Recovery Facility W0206-01, located ca. 500m Southeast of the proposed development;
- MSD International IEL P1073-01 a pharmaceutical facility, located ca. 1km north of the proposed development; and,
- Starrus Eco Holdings, Integrated Waste Management Facility (W0053-03), located ca. 2km southwest of the Site.

8 no. Other EPA licenced facilities in the wider area associated with the general industrial area around Clonee include:

- Ireland Power Energy IEL P0569-01;
- IBM IELP0535-01;
- Astellas Ireland IEL P0007-03;
- Guerbet Ireland IEL P0050-02;
- Kepak Clonee IEL P0167-02;
- Clarochem Ireland P0125-02;
- Rottapharm IEL P0886-02; and,
- Barclay Chemical Manufacturing IEL P0522-01.

Ground investigations were carried out by GII (2022) (2023) and confirm that the site is greenfield in nature, albeit slightly elevated background levels of naturally occurring barium have been identified within the soils onsite. All potential onsite and offsite contamination sources have been fully evaluated. The minor area within the site boundary to the north used previously as a site compound constitutes a low risk of contamination. Offsite land use is not considered to be a likely significant source of contamination that may impact on the proposed development. Refer to Chapter 5 - Land, Soils and Geology.

6.2.4 Flood Risk

A Flood Risk Assessment (FRA) has been prepared as part of the supporting assessments required for this planning application. During the preparation of this planning application, pre-application consultation with Meath County Council has been undertaken which has informed the flood risk assessment.

A copy of the Flood Risk Assessment Report prepared by IE Consulting (2023) (Doc. Ref: IE2510_Report_5368) has been submitted as part of this planning application.

Key conclusions presented in the detailed technical report (IE Consulting, 2023) are summarised as follows:

- A Site Specific Flood Risk (SSFRA) assessment, appropriate to the type and scale of development proposed, and in accordance with 'The Planning System and Flood Risk Management Guidelines – DoEHLG-2009' has been undertaken.
- The proposed development site has been screened, scoped and assessed for flood risk in accordance with the above guidelines.
- The primary flood risk to the proposed development site can be attributed to a fluvial flood event in the River Tolka located in the eastern area of the proposed development site. The site is not at risk of pluvial, tidal or groundwater flooding.
- A detailed assessment of potential fluvial flood risk has been undertaken for the proposed development site. A linked 1D-2D hydraulic model has been developed of the River Tolka, Naulswood Stream and Drainage Channel using Flood Modeller software. The model has been developed utilising surveyed watercourse cross sectional data and LiDAR data for the area.
- The analysis indicates that an area of the proposed development site adjacent to the eastern boundary may be susceptible to inundation during a 1% AEP (1 in 100 year – Flood Zone 'A') and a 0.1% AEP (1 in 1000 year – Flood Zone 'B') fluvial flood event.
- In consideration of the findings of this Site Specific Flood Risk Assessment, and in the context of 'The Planning System & Flood Risk Management Guidelines – 2009' the eastern area of the proposed development site falls within a delineated fluvial Flood Zone 'A' and Flood Zone 'B'.
- Secondary flood risk can also be attributed to a potential surcharge due to a blockage in the bridge located on the River Tolka approximately 240m downstream of the site. Additional hydraulic analysis indicates an increase in water levels of up to 0.104m adjacent to the proposed development site when a 50% blockage is applied to the downstream bridge for the 1% AEP (1 in 100 year) MRFS event. The increase in water levels as a result of a potential blockage is lower than the peak 0.1% AEP (1 in 1000 year) flood levels predicted within the site. Therefore, blockage of the bridge does not pose an additional flood risk to the proposed development site. Overall, the secondary flood risk to the site is considered to be low.
- In order to ensure a sustainable development of the site and to reduce flood risk to the site it is proposed to limit any highly vulnerable development (residential dwelling houses, crèche, etc.) to within Flood Zone 'C'. It is not proposed to undertake any highly vulnerable development within Flood Zone 'A' or Flood Zone 'B'. It is also proposed to raise the proposed development access road above the predictive 0.1% AEP (1 in 1000 year flood) levels in the southern area of the site.
- The following infrastructure and accommodation works are proposed along the Drainage Channel and the River Tolka within the boundary of the proposed development site:
    - Proposed Drainage Channel Work

- Drainage Channel shall be realigned over a length of 74m in the south-eastern area of the site. This is to reduce the length of a culvert crossing under the proposed access road.
- The upstream end of the Drainage Channel shall be piped to facilitate the proposed development layout.
- Three additional culverts shall be provided along the Drainage Channel for access to the development.
- Two Field Drain culverts shall be provided under the northern end of the proposed access road either side of the R157 road. This is to ensure any conveyance routes along the field drains in these locations are maintained.
- Two existing culverts on the Drainage Channel shall be removed.

- Proposed River Tolka Works & Mitigation Measures
  - A 13m span bridge shall be constructed over the River Tolka. The bridge soffit level is 69.883m OD, which is above the 1% AEP, 0.1AEP and 1% AEP MRFS flood levels for the defended and undefended flood events.
  - Three 13m wide structures shall be constructed on the western floodplain of the River Tolka. These shall provide additional conveyance of flood waters on the western bank during an extreme fluvial flood event.
  - An 8m wide structure shall be constructed on the eastern floodplain of the River Tolka. This shall provide additional conveyance of flood waters during an extreme fluvial flood event on the eastern bank.
  - Flood Storage Compensation shall be provided in the western floodplain. The volume of additional storage provided is 5848m3.
  - The existing earth berm located within the site boundary shall be removed and replaced with a new berm site back from the river bank. This shall provide additional flood storage on the eastern bank of the river. The crest level of the berm shall be 71.00m OD, which is above the maximum existing crest level of 70.91m OD.

- The above measures will ensure the primary fluvial flood risk to surrounding people and property will not increase as a result of the proposed development which is in consideration that the proposed earth berm is in place.
- The proposed works described above were incorporated into the hydraulic model. The undefended and defended scenario hydraulic models were then run in consideration of the predictive 1% AEP (1 in 100 year), 0.1% AEP (1 in 1000 year) and the 1% AEP (1 in 100 year) MRFS events. In consideration of the Proposed Development Undefended Scenario is no increase in the extent of flooding outside the proposed development site boundary in consideration of the 1% AEP (1 in 100 year) and the 1% AEP (1 in 100 year) MRFS events. In this regard, and in consideration of the undefended scenario, there no increase in 1% AEP (1

in 100 year) or 1% AEP (1 in 100 year) MRFS flood risk to adjacent lands or properties due to the proposed development.

- There is a very minor increase to the 0.1% AEP (1 in 1000 year) flood extents at a specific location in the south-western area of the floodplain. However, it is important to note that the Proposed Development Undefended Scenario presented above is only in consideration of potential secondary and residual flood risk and not in consideration of primary and direct flood risk. Potential secondary and residual flood risk is presented only as a requirement of 'The Planning System & Flood Risk Management Guidelines' and only in consideration that the proposed earth berm and remaining existing earth berm are not in place as part of the proposed development works. In reality the site of the proposed development and adjacent lands and properties will benefit from the proposed earth and existing earth berm.
- In consideration of the Proposed Development Defended Scenario is no increase in the extent of flooding outside the proposed development site boundary in consideration of the 1% AEP (1 in 100 year), 0.1% AEP (1 in 1000 year) and the 1% AEP (1 in 100 year) MRFS events. In this regard, and in consideration of the Defended scenario, there no increase in 1% AEP (1 in 100 year), 0.1% AEP (1 in 1000 year) or 1% AEP (1 in 100 year) MRFS flood risk to adjacent lands or properties due to the proposed development.
- The proposed development is considered to comply with the requirements of the Justification Test for development management.
- In consideration of the proposed development scenario, flood risk to and from the development is considered to be Low. The development as proposed is not expected to result in an adverse impact to the hydrological regime of the area or increase flood risk elsewhere.

6.2.4.1 Drainage Design and Climate Change

The drainage design incorporates climate change factors as follows:

- Design check carried out to ensure that no site flooding for 1:30 year return period plus 20% of Climate Change;
- The attenuation design has been based on the 1:100 year Return Period plus 20% Climate Change required storage volume; and,
- Pluvial flood risk is sufficiently addressed by the proposed development which is designed to accommodate surface water runoff from a 100-year period storm plus climate change.

6.2.5 Hydrology

A drainage ditch runs along the southern / eastern boundary of the site towards the River Tolka in a channel at approximately 69m AOD. Part of this drainage channel will be culverted as part of the proposed development. The River Tolka bisects the alignment of the rising mains from the Site. The River Tolka flows in a south-easterly direction along the Site boundary and through the Site.

2no. tributaries of the Tolka River flow in a South-easterly direction ca. 200m (Naulswood) and ca. 500m (unnamed) from the Site. The Dunboyne River is located ca. 1km South-east of the Site. The Pinkeen Stream is located ca. 1km east of the Site and flows in a South-easterly.

Hydrological features in the general vicinity of the Site are presented in Figure 6.1.

Figure 6.1 Hydrological Features in the general vicinity of the Site (Source: EPA, 2023)

Louisa Bridge Cold Spring Geological Heritage area is located 6.7km south west of the proposed development. Huntstown Quarry geological heritage area is located ca. 9km east of the Site, as detailed further in Chapter 5 - Land, Soils and Geology. The proposed development will not have any impact on these sites due to distance and absence of hydrological connectivity. As detailed in Chapter 13 - Biodiversity and the AA Screening Report (Enviroguide Consulting, 2023) and Natura Impact Statement (Enviroguide Consulting, 2023) submitted as part of this planning application, the nearest European site is Rye Water Valley Special Area of Conservation (SAC) which is located ca. 5.9km South-west of the Site. No hydrological connection exists to this protected site. A hydrological connection exists through the River Tolka to a number of European sites associated with Dublin Bay located ca. 20km Southeast of the Site. These Include North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA, and North Bull Island SPA.

6.2.5.1 Surface Water Quality

The EPA maintains a database of surface water features including rivers and lakes as well as water quality and risk status in accordance with the Water Framework Directive (WFD). The purpose of the WFD is to protect and enhance all waters including rivers, lakes, estuaries, coastal waters and groundwater as well as water dependent wildlife and habitats. This involves improving or maintaining current water quality status with the aim of achieving '*Good*' status for all waters; and mitigating against the risk of a decline in the water body quality status. The site is located within the Tolka WFD sub-catchment of the Liffey and Dublin Bay WFD surface water catchment.

The River Tolka and Naulswood Stream have been assigned '*Poor*' surface water quality status by the EPA, for the 2013 to 2018 monitoring period (EPA, 2023), as presented in Figure 6.2. The water courses are '*at risk*' of failing to meet the relevant WFD objectives for these surface waterbodies by 2027 (EPA, 2023).

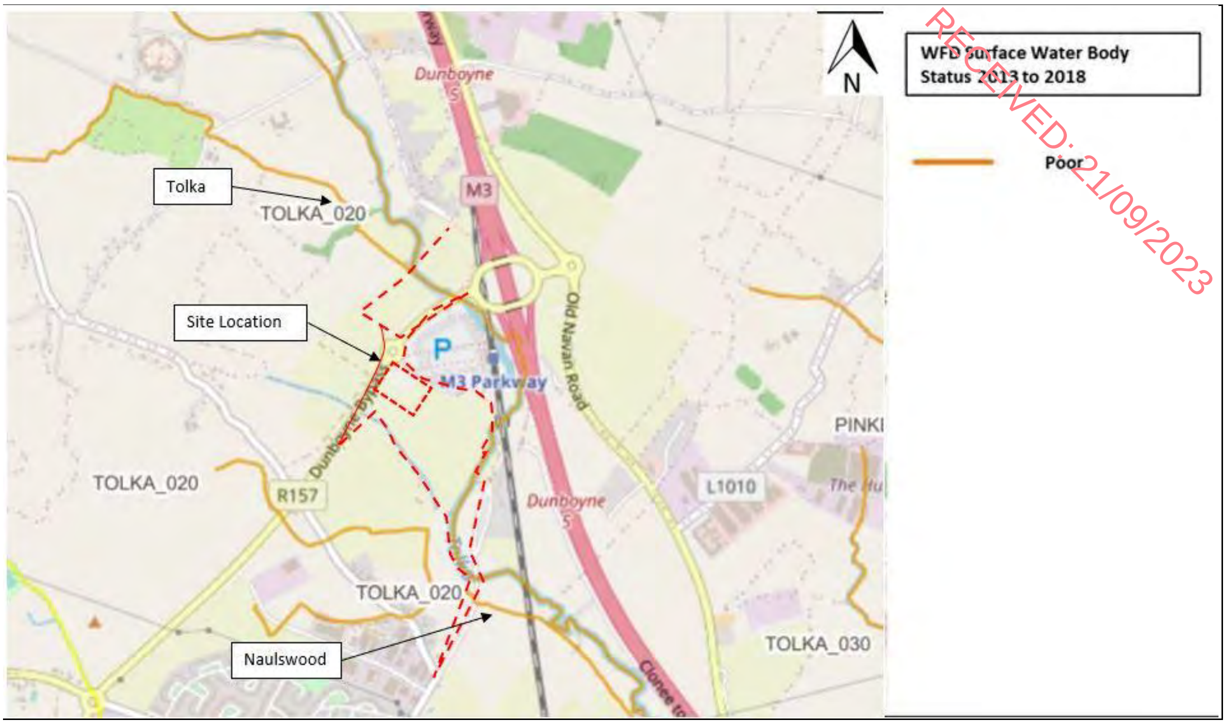

Figure 6.2 Regional Surface Water Quality in the general vicinity of the Site (Source: EPA, 2023)

6.2.6 Hydrogeology

6.2.6.1 Aquifer Characteristics

The GSI provides a methodology for aquifer classification based on resource value (regionally important, locally important and poor) and vulnerability (extreme, high, moderate or low). Resource value refers to the scale and production potential of the aquifer whilst vulnerability refers to the ease with which groundwater may be contaminated by human activities (vulnerability classification is primarily based on the permeability and thickness of subsoils), as presented in Table 6.1.

Table 6.1 Groundwater Vulnerability Rating Table (Source: GSI, 1999)

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

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

Groundwater vulnerability is an indication of how easily the aquifer can become contaminated by human activity. It is dependent on the thickness and permeability of the overlying soils and depth to the water table. For example, a bedrock aquifer with minimal thickness of overburden or with a thin layer of permeable overburden will be more vulnerable to contamination than a bedrock aquifer which has a thick layer of low permeability overburden. Extreme groundwater vulnerability is also associated with karst landforms as these are a direct pathway for water and contaminants to enter the aquifer from the surface.

Groundwater vulnerability (in the bedrock aquifer) is predominantly Low (L) in the western and southern portion of the Site, and Moderate (M) in the eastern portion of the Site with a small area of high vulnerability to the very east of the site, as presented in Figure 6.3 (GSI, 2023).

The GSI has devised a system for classifying bedrock aquifers and gravel aquifers in Ireland based on the size and hydrogeological characteristics of these aquifers. The three main classifications for bedrock aquifers are Regionally Important Aquifers (R), Locally Important Aquifers (L) and Poor Aquifers (P) (which are further subdivided based on the productivity of the aquifer). Based on the GSI public data viewer (GSI, 2023) the bedrock beneath the general vicinity of the Site is classified as a locally important aquifer (LI) – bedrock which is moderately productive only in local zones, as presented in Figure 6.4 (GSI, 2023).

The general vicinity of the Site is within the Dublin Groundwater Body (GWB). The Groundwater Body (GWB) is the relevant management unit under the WFD. Groundwater bodies are subdivisions of large geographical areas of aquifers so that they can be effectively managed in order to protect the groundwater and linked surface waters (GSI, 2023). According to the '*Dublin GWB: Summary of Initial Characterisation'* document (GSI, 2004), the majority of groundwater flow in this GWB will occur in the top few metres of the bedrock aquifer, along a weathered zone in a lateral direction towards the coast and also towards the River Liffey. The dominant recharge process will be diffuse recharge from water percolating through the overlying tills and into the aquifer. Groundwater will discharge directly to the sea along the coast. The GWB will also discharge to the over lying streams and rivers as baseflow (GSI, 2004). There are no karst features within a 10km radius of the proposed development (GSI 2023). Based on the geological setting of the receiving environment, there is no potential for karst features (such as fractures or epikarst) to be present beneath the Site. Accordingly, the potential for karst connectivity, and groundwater flow via. conduit pathways does not warrant consideration as part of this assessment.

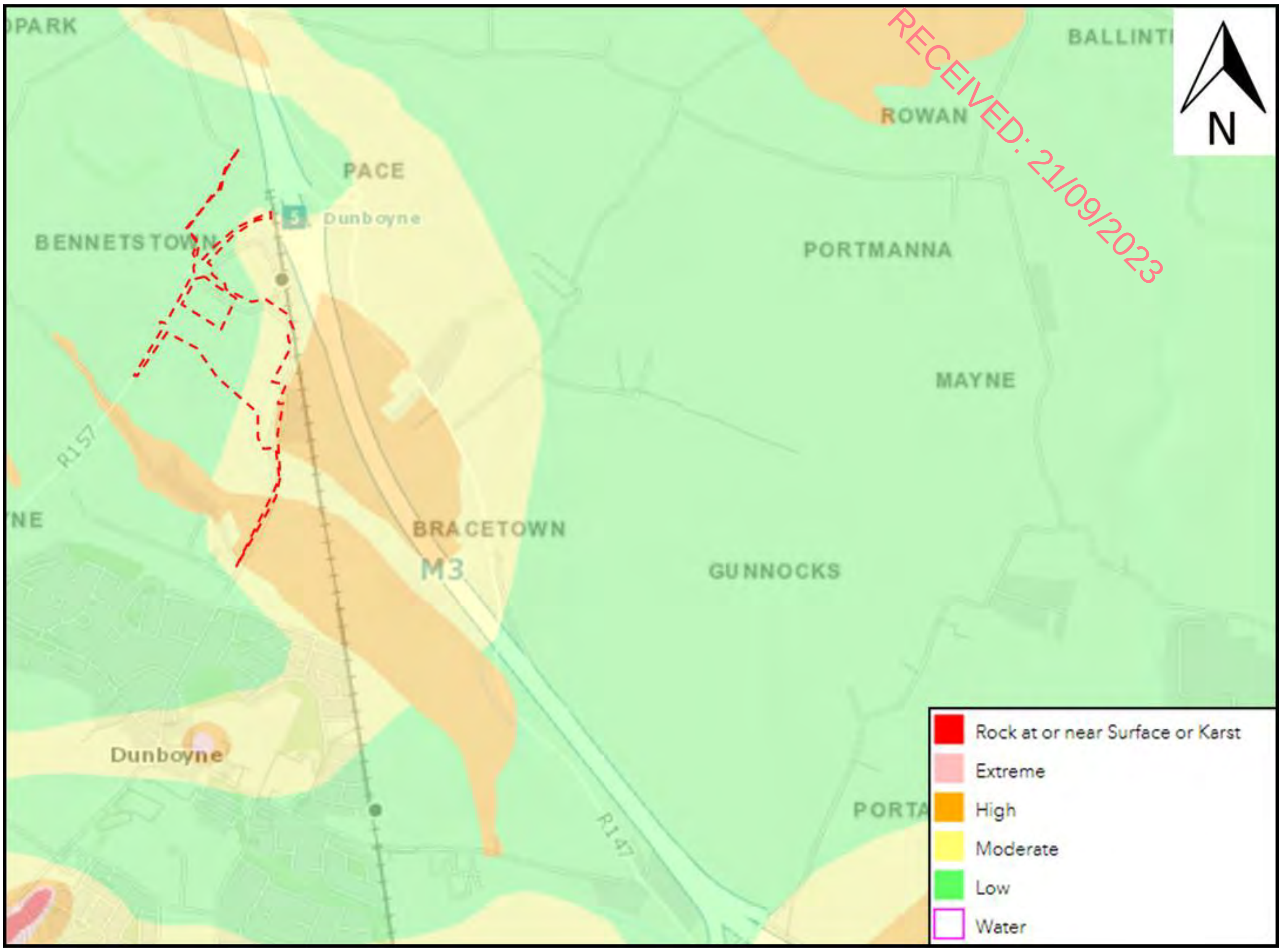

Figure 6.3 Regional Groundwater Vulnerability Rating (Source: GSI, 2023)

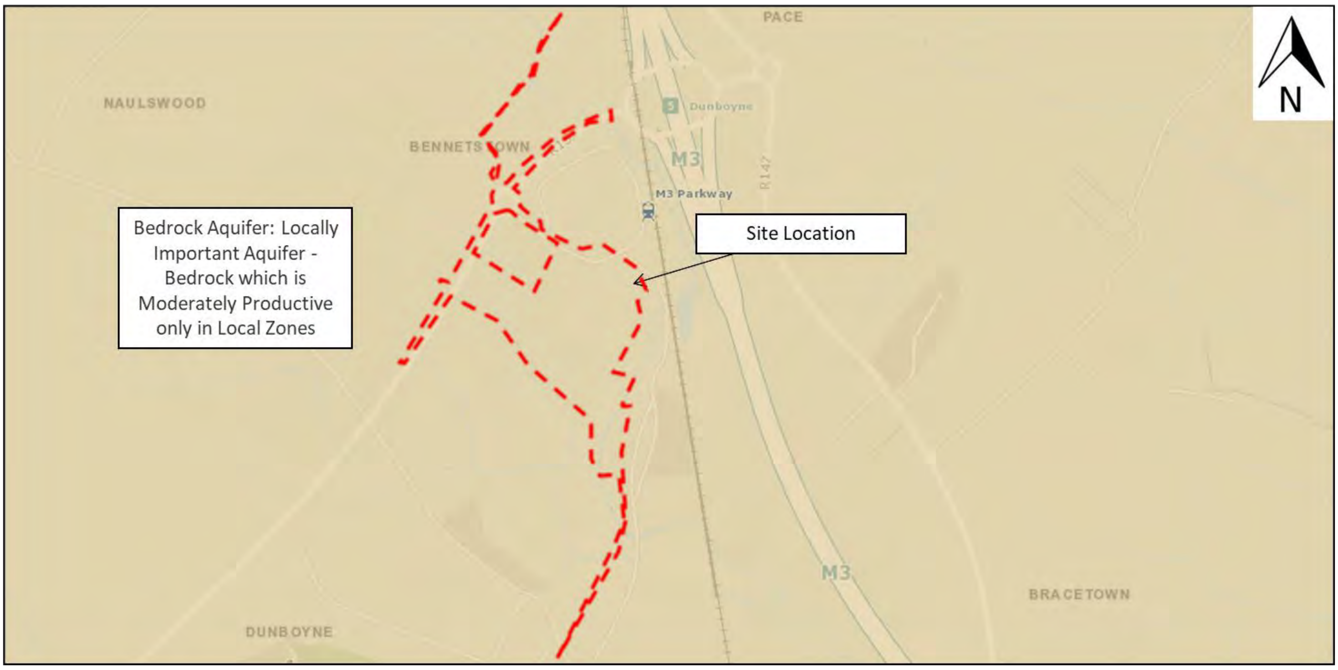

Figure 6.4 Regional Aquifer Classification (Bedrock Aquifer) (Source: GSI, 2023)

6.2.6.2 Groundwater Recharge

Recharge is the amount of rainfall which infiltrates to ground and replenishes groundwater levels in the bedrock and gravel aquifers. It is dependent on the following key factors: effective rainfall (i.e. total rainfall less evaporation and surface water run-off), transpiration (i.e. uptake by vegetation) and aquifer characteristics (i.e. how easily the aquifer can accept water and store it). Additionally, not all effective rainfall will contribute to recharge due to impermeable materials in urbanised areas and associated drainage and water management infrastructure. The average recharge rate to the locally important bedrock aquifer beneath the general vicinity of the Site is reported to be low, ca. 1-50mm/yr to the west of the Site and ca. 50-100mm/yr to the east of the Site (GSI, 2023). This was verified by in-situ soakaway testing undertaken by GII (2022) (refer to Appendix 5.1) where according to GII (2022) *'At all the locations the water level dropped too slowly to allow calculation of 'f' the soil infiltration rate. These locations are therefore not recommended as suitable for soakaway design and construction'.*

6.2.6.3 Groundwater Levels and Flow Direction

Groundwater is anticipated to be encountered within approximately 5-8.5m of the ground surface in the general vicinity of the Site according to the Dunboyne Water Supply Groundwater Source Protection Zones Report (GSI 2004)[1].

A water strike was encountered at 2.10mbgl in borehole BH03 (within sandy gravelly clay) during the site investigation (GII 2023) undertaken in July 2023. The perched water level rose to 1.5m after 20 minutes. Based on available site specific ground investigation information (refer to Appendix 5.1), this perched water layer is not hydraulically connected to the deeper bedrock aquifer due to the presence of low permeability clay on top of the bedrock aquifer beneath the site (refer to Figure 6.8).

Groundwater flow is likely to follow topography in a south easterly direction towards the River Tolka, and in a southerly direction towards the Naulswood Stream.

6.2.6.4 Groundwater Use & Available Resource

The GSI maintains a record of groundwater abstractions consisting of wells and springs, in addition to designated drinking water protection zones (referred to as Source Protection Areas). According to the GSI database, the southern portion of the site is located within the inner source protection zone (SI) for Dunboyne Public Water Supply (GSI, 2023) as shown on Figure 6.overleaf.

[1] https://gsi.geodata.gov.ie/downloads/Groundwater/Reports/SPZ/MH_PWSS_SPZ_Dunboyne_June_2004_GSI.pdf

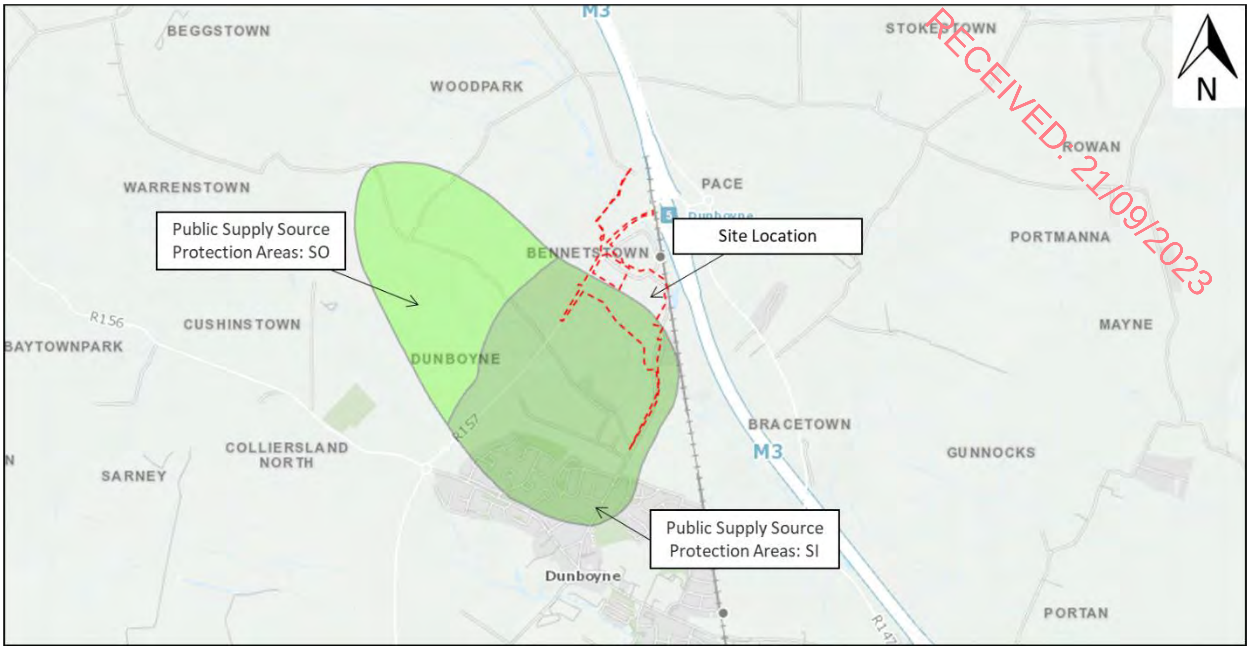

Figure 6.5 Source Protection Zones in The Vicinity of the Site (Source: GSI, 2023)

Based on the GSI database, there are 31no. wells and springs located within the general vicinity of the Site. The details of the 31no. abstraction wells are summarised in Table 6.2 and presented in Figure 6.6. Surface springs are also reported to be present within the general vicinity of the Site (albeit a location accuracy of 5km is noted) (GSI, 2023). Public supply wells (PW1, PW2, PW4) for the Dunboyne Public Water Supply are located adjacent to the southern portion of the site, as presented in Table 6.2.

Table 6.2 GSI Groundwater Abstractions Within Study Area (GSI, 2023)

Abstraction ID	Abstraction Type	Location Accuracy (m)	Approximate Location (relative to the Site)	Depth (m)	Yield (m^3/d)	Use
2923NWW378	Borehole	2000	Possible overlap with the Site	57.9	16.4	Domestic
2923NWW18	Dug well	50	10m N	Unknown	Unknown	Unknown
2923NWW411	Borehole	20	20m N	48.7	Unknown	Domestic
2923NWW463	Dug well	100	50m N	6.1	16.4	Public Supply
2923NWW179	Dug well	50	100m E	5.8	Unknown	Unknown
2923NWW412	Dug well	20	100m E	3	Unknown	Other
2923NWW178	Unknown	50	100m E	Unknown	Unknown	Public Supply
2923NWW180	Unknown	50	150m E	9.1	Unknown	Unknown
2923NWW413	Dug well	20	150m S	2.4	Unknown	Domestic
2923NWW414	Borehole	20	150m S	31.1	Unknown	Domestic
2923NWW405	Borehole	20	200m S	61	Unknown	Unknown

Abstraction ID	Abstraction Type	Location Accuracy (m)	Approximate Location (relative to the Site)	Depth (m)	Yield (m^3/d)	Use
2923NWW388	Borehole	50	50-100m S	60	115	Public Supply (PW1)
2923NWW404	Infiltration Gallery	20	100m S	6	330	Other
2923NWW389	Borehole	50	100m S	60	175	Public Supply (PW2)
2923NWW403	Borehole	20	100m S	122	535	Public Supply (PW4)
2923NWW182	Borehole	50	250m E	12	Unknown	Unknown
2923NWW415	Borehole	20	300m S	Unknown	Unknown	Other
2923NWW416	Borehole	20	300m S	7.3	Unknown	Domestic
2923NWW417	Dug well	20	300m S	2.4	Unknown	Domestic
2923NWW418	Dug well	20	300m S	2.2	Unknown	Domestic
2923NWW419	Dug well	20	300m S	3.1	Unknown	Domestic
2923NWW177	Dug well	50	350m S	1.8	Unknown	Unknown
2923NWW420	Dug well	20	350m SW	3.6	Unknown	Agricultural
2923NWW421	Borehole	20	400m SW	15.2	Unknown	Other
2923NWW357	Borehole	1000	500m NW	27.4	87	Domestic
2923NWW176	Borehole	50	500m NW	Unknown	Unknown	Unknown
2923NWW183	Unknown	50	500m E	36.6	Unknown	Unknown
2923NWW187	Dug well	50	750m E	6.7	Unknown	Unknown
2923NWW186	Borehole	50	750m E	57.9	Unknown	Unknown
2923NWW185	Dug well	50	750m E	Unknown	Unknown	Unknown
2923NWW119	Dug well	50	1300m E	3.7	Unknown	Unknown

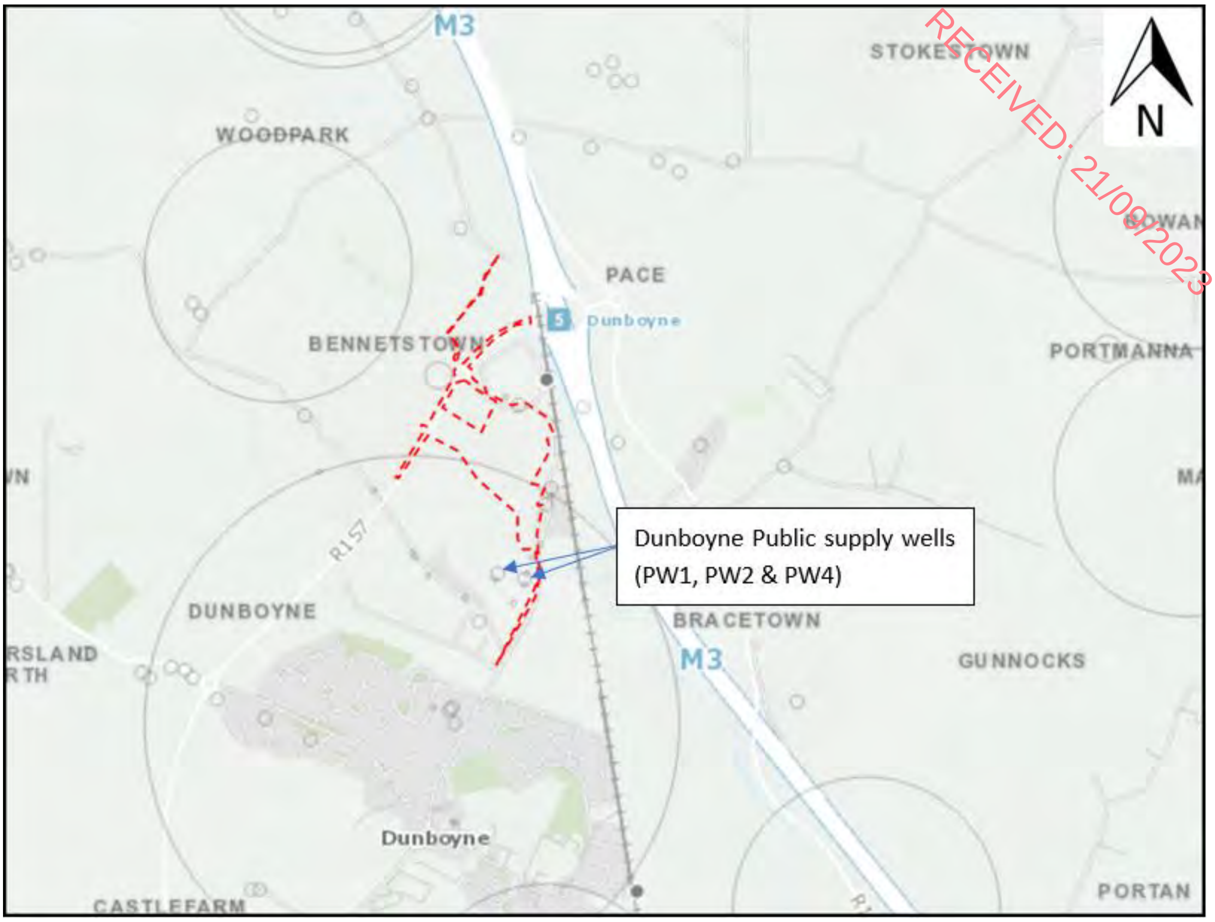

Figure 6.6 Registered Groundwater Wells in The Vicinity of the Site (Source: GSI, 2023)

6.2.6.5 Groundwater Quality

The European Communities Environmental Objectives (Groundwater) Regulations, (S.I. 9 of 2010) came into effect on 27th January 2010. The aim of the Regulations is to achieve the environmental objectives established for groundwater by Article 4 (1) (b) of the Water Framework Directive (2000/60/EC). The 2010 Regulations set down groundwater quality standards for nitrate (50mg/L) and active substances in pesticides in Schedule 4 and also established threshold values for pollutants or indicators of pollutants in Schedule 5. Under these regulations the EPA shall also assign a status of '*Good'* or '*Poor'* to those bodies of groundwater where available data and knowledge allows.

The WFD water quality status for the Dublin GWB is classified as '*Good'* for the 2013 to 2018 monitoring period (EPA, 2023), as presented in Figure 6.7. The risk of failing to meet the relevant WFD objectives for this GWB by 2027 (EPA, 2023) is under review.

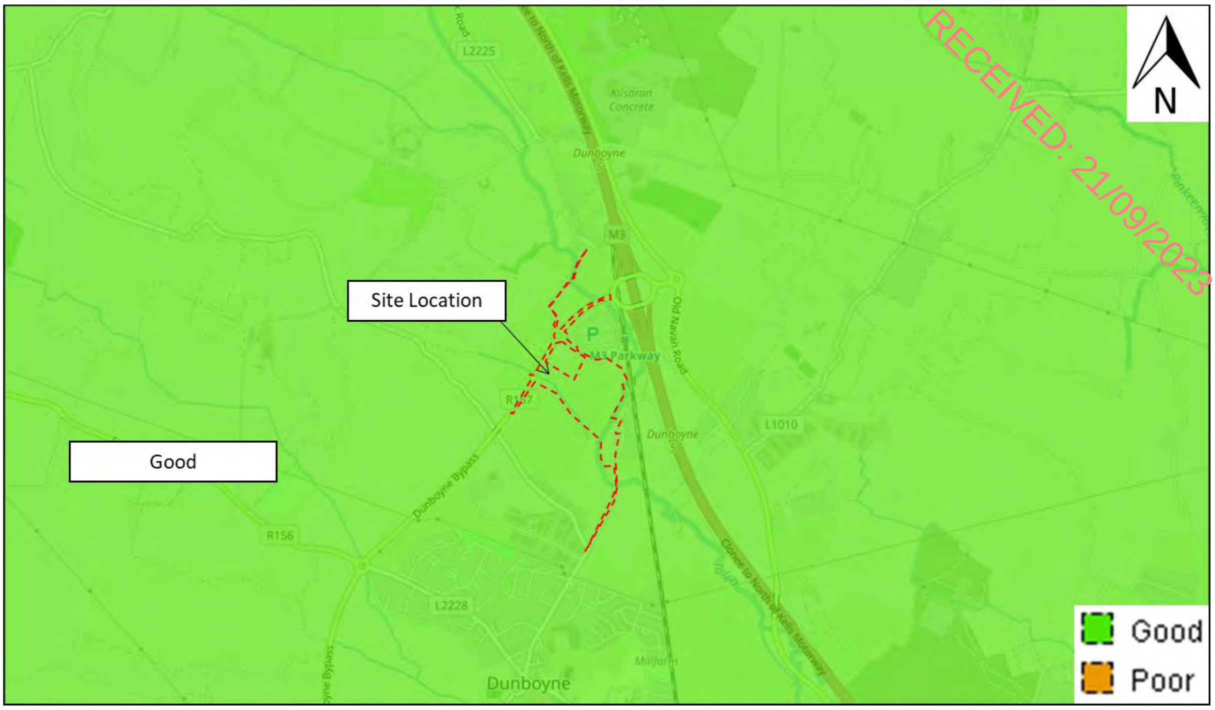

Figure 6.7 Regional Groundwater Quality in the general vicinity of the Site (Source: EPA, 2023)

An assessment of groundwater quality within the general vicinity of the Site was undertaken as part of the preparation of a Groundwater Source Protection Zone Report for the Dunboyne Water Supply (GSI, 2004). According to the GSI in 2004, water quality at PW1, PW2 and PW4 in Dunboyne was excellent with no bacterial contamination (E. coli) and all the major cations, anions and trace elements were within the relevant statutory limits at the time, with the exception of iron and manganese which occur naturally. Calcium and sulphate levels were noted to be above the guide values. The levels of nitrates were very low and within background levels for County Meath.

Based on a review of available Uisce Éireann (Uisce Éireann, 2023) results[2], drinking water quality for the Dunboyne Water Supply is excellent with no exceedances of the relevant limits for key chemical / indicator parameters, metals or bacteriological parameters during the period 2022-2023.

6.3 Potential Effect of the Proposed Development

6.3.1 Hydrological and Hydrogeological Conceptual Site Model

In addition to flood risk, the following criteria are typically applied when evaluating potential impacts to the water environment: -

- Effects on surface water / groundwater quality; and,
- Effects on surface water flows / groundwater resources.

[2] Results (water.ie)

The risk of any impacts to Huntstown Quarry geological heritage area (located ca. 9km east of the Site) have been screened out, as detailed previously.

In terms of surface water flows / groundwater resources, the following effects have the potential to arise as a result of the proposed development and are considered below:

- The Site is located within the inner source protection zone for the Dunboyne Public Water Supply (PWS). There are no known onsite abstraction wells. According to the GSI (2023) database, there are 10no. groundwater wells located within 150m of the Site, with Public supply wells (PW1, PW2, PW4) for the Dunboyne Public Water Supply located adjacent to the southern portion of the Site.
- There will be no significant change to rainfall recharge rates at the proposed development, given the fact that the site is currently underlain by low permeability clay, as verified by in-situ permeability testing undertaken at the site (GII, 2022). SuDS measures have been included within the design of the proposed development where feasible. No onsite groundwater abstraction is proposed during the operational phase. Based on the proposed design, typical excavation depths and encountered ground conditions beneath the Site, permanent dewatering will not likely be required during the operational phase. Any dewatering as required during the construction phase, will be temporary, localised and will be subject to the preparation of a Site-specific dewatering plan. Therefore there will be no impact to the Dunboyne Public Water Supply in terms of available groundwater supply (via. combined zone of contribution) or sustainable groundwater yields at each supply well.
- Surface water / Storm water generated from the proposed residential development will be conveyed through a proposed storm water network including SuDS and a detention basin (sealed at the base). The restricted discharge from the proposed site will be conveyed via. a new storm water sewer within the site before discharge to the existing ditch that is proposed to be culverted and diverted at the southern boundary, which flows into the receiving River Tolka. The proposed storm water discharge system has been designed to broadly follow the existing topographic levels and characteristics of the current natural drainage catchment regime. This will minimise any impacts to existing rainfall recharge rates at the Site (and accordingly groundwater levels beneath the Site, and surface water flows in the River Tolka) as a result of the proposed development.
- The maximum anticipated depth of excavation across the Site will be 6mbgl. Pilling will be required to a maximum depth of 6m during the construction of the apartment blocks and 20m during the construction of the proposed bridge structure. The bridge will be constructed using conventional construction methods as follows: 1) Construct/cast precast beams at an established precast yard in Ireland; 2) Establish piling equipment and install piles (including excavation as required); 3) Construct the foundation and abutments to beam seat level; 4) Transport and place precast beams with appropriately sized crane equipment; 5) Cast the top slab and deck diaphragms (with formwork supported off beams); 6) Construct wing/return walls; 7) Backfill behind abutments and wingwalls; 8) Install bridge parapets, kerbs, and footpaths; 9) Complete roadworks and implement any necessary scour protection measures; and 10) Landscaping and completion of the road reserve.

- Bedrock may be encountered locally across the site during construction;
- Excavations may encounter perched water. There is a likelihood that deeper excavations and piling may encounter groundwater locally; and,
- The River Tolka runs through a section of the site to the east and south east and could be impacted by construction works, particularly the construction of the proposed bridge which has a clear span of 12m and traverses a section of the river.

In assessing potential water quality impacts, the EPA advocates a 'risk-based approach', and states that 'the principal aim in dealing with contaminated land and groundwater related issues is to secure the protection of human health, water bodies (including groundwater) and the wider environment' (EPA, 2013). In accordance with this risk-based approach a preliminary Source-Pathway-Receptor (SPR) model has been derived for the Site.

Perched water (where encountered) is likely to be localised and based on site-specific geological records, is not present laterally across the Site.

Four key receptors (in terms of surface water /groundwater quality) have therefore been identified as follows;

- Dunboyne Public Water Supply (PWS);
- Bedrock aquifer beneath the Site (a locally important aquifer (LI) – bedrock which is moderately productive only in local zones); and
- River Tolka along the eastern boundary of the site and is also within the southern portion of the site and hydraulically connected European sites located ca. 20km Southeast of the Site, namely North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA; and North Bull Island SPA.
- There is the potential for flooding associated with the River Tolka.

Given the design measures proposed, and the findings of the modelling undertaken as part of the Flood Risk Assessment prepared by IE Consulting (2023) , '*flood risk to and from the development is considered to be low'. The development as proposed is not expected to result in an adverse impact to the hydrological regime of the area or increase flood risk elsewhere'.* Therefore there will not be a significant adverse impact to or from proposed development arising from flood risk. Flood risk will not be considered further as part of this impact assessment.

The focus of this assessment will therefore be on potential groundwater quality and surface water quality impacts associated with the proposed development in addition to flood risk. A preliminary Hydrogeological Conceptual Site Model (CSM) has been derived for the Site (based on all available information obtained during the Site walkover survey, desk based literature review and site-specific geological records). This model, presented in Figure 6.8, represents the current conceptual understanding of surface water / groundwater processes and interactions in the vicinity of the Site. It should be noted that cross section in Figure 6.8 is presented for schematic, conceptual purposes only and is not to scale.

Based on relevant IGI guidance (2013) the generic type of geological/hydrogeological environment into which the proposed development will be placed has been determined as Type D – *Sensitive geological / hydrogeological environments* defined by the IGI as *'potentially unstable geological environments, groundwater source protection zones, karst'*.

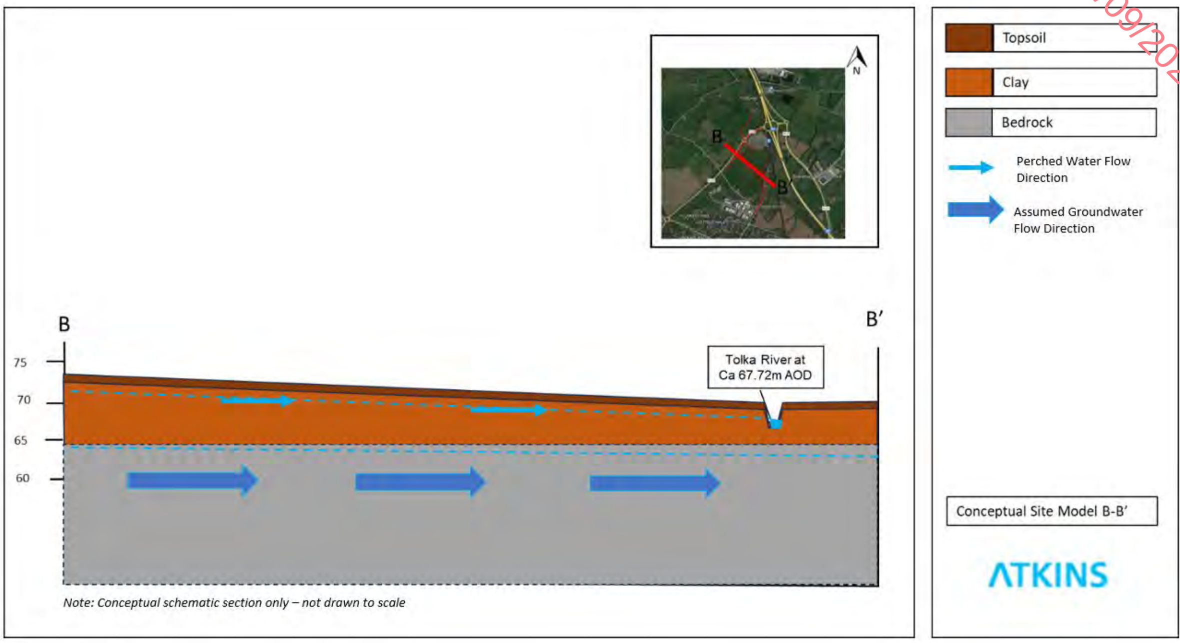

Figure 6.8 Hydrogeological Conceptual Site Model – Section B – B'

6.3.2 Characteristics of the Proposed Development

The proposed Large Scale Residential Development will consist of the construction of 267 no. residential units, a creche, a new link road between the R157 and the Old Navan Road including a bridge over the River Tolka, 2 no. signalised junctions, upgrade works and road improvements to the R157 and the M3 Parkway access road, and all associated site development works including drainage, landscaping, and boundary treatments. A full description is included in the statutory notices and in Chapter 2 of the EIAR.

6.3.2.1 Storm Water Drainage Design

The proposed surface water network will discharge to the existing ditch that is proposed to be culverted and diverted at the southern boundary.

The drainage network was modelled and tested against different critical storms using the standard catchment rainfall profiles from the Flood Studies Report (FSR) within the Causeway Software to inform the final drainage design which is based on the following criteria:

- Return period of 2 years;
- Design check carried out to ensure that o pipe surcharging for 2 year return period;
- Design check carried out to ensure that no site flooding for 1:30 year return period plus 20% of Climate Change;

- Time of entry taken as 4 mins as per Modified Rational Method;
- Annual Average Rainfall; M5-60: 15.300mm; Ratio: 0.273; and,
- Climate Change: 20%.

Although the average ground slope is greater than 1% the pipe network has been designed for a 2-year return period, which is in accordance with section C5.1 of the Sewers for Adoption seventh Edition. The surface water drainage scheme for the development has been designed taking account of the existing hydraulic regime, with 3no. key catchments identified, SW1, SW2 and SW3. Further details are presented in the 'Planning Submission Report to Engineering Services Report (Paul McGrail Consulting Engineers Limit, 2023) and the planning drawings which are submitted as part of this planning application.

6.3.2.2 SuDs Measures

It is proposed to use a sustainable urban drainage system (SuDS) approach to stormwater management throughout the site where possible. The overall strategy aims to provide an effective system to mitigate the adverse effects of urban stormwater runoff on the environment by reducing runoff rates, volumes and frequency, reducing pollutant concentrations in stormwater. The SUDs features proposed are as follows:

- Modular Permeable Paving - Porous surfacing (paving block or open graded material) has been designed on private parking spaces and driveways. This porous surfacing can treat rainwater, at source, and allow infiltration through to an underlying porous sub-base where water can be stored within the voids of the sub-base before being slowly released to the drainage collection system through natural flow via the porous medium. This type of permeable paving system includes a permeable geotextile at its base and also includes an outlet to the surface water system. These systems will allow some form of storage for small rainfall events and will result in infiltration, water evaporation and adsorption in small quantities, therefore there will be less run-off from these areas in small rainfall events thus mimicking the natural response for this catchment. As well as reducing the amount of run-off from the surface, permeable paving will slow down the rate of runoff from the pavement in extreme rainfall events contributing to attenuation of flows. In addition, permeable paving will increase the quality of water which is intercepted by the system through filtration, biodegradation, pollutant adsorption and settlement and retention of solids, also the reduction in peak flows to the outfall will enhance settlement and biodegradation of pollutants.
- Swales - Located next to roadways, these features have been applied to the road layout along the kerb line.
- Detention Basins - Surface storage basin that provides attenuation of stormwater runoff and also facilitates some settling of particulate pollutants. The proposed detention basin located at the northern boundary and will provide the 1:100-year Return Period plus 20% Climate Change required storage volume for catchment area SW1. Detention basins will be sealed at the base to reduce the risk of impact to groundwater in the unlikely event of a fire or other major accident which may cause release of contaminants, during the operational phase.

- Petrol interceptor - A Treatment equipment for where relative low risk areas, offering a suitable means of treatment and oil separation which may be present due to minor leaks from vehicles and accidental spillage. Petrol interceptors have been designed before the inlet chamber of each attenuation feature and have sufficient capacity to cater for each catchment area.
- Hydrobrake flow control - The Hydro-Brake® Flow Control is a self-activating vortex flow control device that reduce the stormwater runoff to greenfield flow rates. Hydrobrake has been proposed on the outlet chamber of detention basin. This would allow the drainage system to be temporarily contained in the unlikely event of a fire or other major accident which may cause release of contaminants, during the operational phase.

Further details are presented in the 'Planning Submission Report to Engineering Services Report (Paul McGrail Consulting Engineers Limit, 2023) and the planning drawings which are submitted as part of this planning application.

6.3.2.3 Watermain Design

The proposed network has been designed to comply with Irish Water specification. Individual houses will have their own connections to the distribution main via service connections and boundary boxes. Individual service boundary boxes will be of the type to suit Irish Water and to facilitate possible future domestic meter installation. The water main layout and details are in accordance with Irish Water Connection and Developer Services, 'Code of Practice for Water Infrastructure' and 'Water Infrastructure Standard Details'.

Based on the design of the proposed development, average water demand is estimated to be 1.61 litres per second (l/s) or ca. 139 cubic meters per day (m3/d), with a maximum peak water demand of 8.06 l/s or ca. 696 m3/d during the operational phase. A Pre-Connection Enquiry has been submitted to Uisce Eireann and the Confirmation of Feasibility has been granted by Uisce Eireann.

Further details are presented in the 'Planning Submission Report to Engineering Services Report (Paul McGrail Consulting Engineers Limit, 2023) and the planning drawings which are submitted as part of this planning application.

6.3.2.4 Foul Drainage Design

The proposed foul sewer network will connect to the proposed foul sewer pumping station located at the southern boundary which will discharge to the existing Uisce Eireann foul sewer network. The foul water drainage system for the proposed development has been designed in accordance with the Irish Water Code of Practice and will be separate to the surface water drainage system. The foul water from the development will discharge via soil vent pipes within the buildings by gravity flow before connecting into the proposed foul sewer pumping station. The foul sewerage for each house will have a separate connection to the proposed 225mm and 150mm diameter foul sewer along the road. A Pre-Connection Enquiry has been submitted to Uisce Eireann and the Confirmation of Feasibility has been granted by Uisce Eireann.

Further details are presented in the 'Planning Submission Report to Engineering Services Report (Paul McGrail Consulting Engineers Limit, 2023) and the planning drawings which are submitted as part of this planning application.

6.3.3 Potential Effects on Water during the Construction phase

There is a potential for degradation in groundwater and surface water quality resulting from potential pollution caused by construction activities e.g. plant, fuel/ chemical spillage etc., particularly during excavations for the proposed residential units, creche, foul services, storm water drainage system, watermain services, attenuation tanks, and internal roads and during piling (as required). The extent of the excavation for the housing and duplexes is likely to be a maximum depth of 1m bgl. The maximum anticipated depth of excavation across the Site is anticipated to be 6mbgl. The maximum anticipated depth of piling will be ca. 20m. During the construction phase of the proposed development, the following potential effects on surface water or groundwater quality could occur: -

- Accidental spillages or leaks onsite in the vicinity of exposed groundwater / surface water pose a potential pollution risk as follows;
  - Groundwater may be encountered during construction particularly during the excavation for and the installation of deeper attenuation tanks/ foundations. Perched water beneath the Site, particularly in any areas where it is intercepted, would be highly vulnerable to water quality impacts through accidental spillages or leaks of oils, fuels, paints or chemicals. This could result in likely very significant adverse reversable impacts directly to the quality of groundwater receptors (i.e. bedrock aquifer and Dunboyne PWS), and likely slight adverse temporary effects indirectly (via. groundwater migration) to the quality of surface water receptors (i.e. River Tolka).
- Piling will be required. This could result in likely very significant adverse reversable impacts directly to the quality of groundwater receptors (i.e. bedrock aquifer and Dunboyne PWS), and likely slight adverse temporary effects indirectly (via. groundwater migration) to the quality of surface water receptors (i.e. River Tolka).
- General Site activities during the construction phase associated with cement handling and pouring, pose a potential pollution risk as follows;
  - Such general site activities could result in likely very significant adverse reversable effects (via. groundwater pathways) directly to groundwater quality beneath the Site (i.e. bedrock aquifer and the Dunboyne PWS) and indirectly to surface water quality in the River Tolka,
- Inadequate soil / storm water management during the construction phase, poses a risk of excess loadings of suspended solids to the River Tolka. This could result in likely significant adverse temporary effects directly to surface water quality in the River Tolka.

Mitigation measures will be implemented during the construction phase to reduce these potential impacts, and to address any potential water management issues; these are listed below in Section 6.5.

6.3.4 Potential Impacts on Water during the Operational Phase

During the operational phase of the development, the following potential impacts on surface water or groundwater quality could occur;-

- Groundwater and surface water receptors (i.e. bedrock aquifer, the River Tolka, Public Water Supply) could be at risk from occasional fuel / oil leaks along the access roads and paved areas. The volumes arising from any such spills / leaks are likely to be very minor and taking account of the localised nature of such events, along with the fact that the Site is underlain by low permeability clay, the potential risk to the underlying bedrock aquifer is low. The drainage design includes for detention basins (sealed at the base to prevent discharge to groundwater) with all discharge passing via. petrol interceptors to manage surface water drainage and surface water quality before final discharge to the existing ditch that is proposed to be culverted and diverted at the southern boundary, and ultimately, the River Tolka. The drainage system has been designed to ensure there is protection to the natural flow regimes of the watercourse, and to ensure that no significant adverse effects occur to the receiving water quality of the River Tolka, or to receiving groundwater within the underlying bedrock aquifer. Potential risks to the River Tolka, the bedrock aquifer, and the Public Water Supply during the operational phase are negligible and do not warrant further consideration.
- Identified groundwater and surface water receptors could be at risk of quality impacts in the unlikely scenario of an unplanned event (traffic collision, emergency onsite fuel / oil spill, fire water arising from a property fire). The risk of such an event occurring is low given that the majority of traffic into and within the proposed development will be local residents / crèche users, and the proposed development will be designed, constructed and maintained in accordance with all relevant statutory building and fire safety requirements. Given the fact that the Site is underlain by low permeability clay and taking account of the proposed surface water drainage design (including detention basins which are sealed at the base), potential adverse impacts to groundwater or surface water receptors (i.e. bedrock aquifer, the River Tolka, Public Water Supply) are negligible, and unlikely to occur, and do not warrant further consideration.
- Groundwater and surface water receptors are at risk of becoming contaminated through routine Site maintenance activity during the operational phase. Maintenance of the residential units, creche, open space / amenity areas, car parking areas, access roads and paved areas, utilities, foul, watermain and storm water drainage system, and detention basins may result in small quantities of lubricant oils, fuel and chemicals being brought to the Site. In the highly unlikely event of a spill this could result in slight adverse effect directly to the quality of groundwater receptors including the Dunboyne PWS, and (via. perched water migration) to the surface water quality of the River Tolka. Mitigation measures will be implemented during the operational phase to avoid these potential impacts.

6.4 Cumulative Effects

All relevant developments in the immediate environs of the proposed development, which have been approved but are not yet built or operational, have been considered. This section also considers relevant developments which have not yet been approved but which could if approved have a cumulative effect with the proposed development. There are a number of projects in the general area of the site under development however many of these comprise the very small developments such as one off houses or change in use of buildings and will not have a likely cumulative effect with the proposed development and as such are not considered further. The following developments have been identified as having the potential to give rise to cumulative effects with proposed development.

- **Council Reference: P822022.** Decision to proceed dated 28/03/2023. The development is for a proposed link and access road connection between the Dunboyne Business Park and the R157. The proposed project includes junctions, footpaths, bus stops, public lighting, accommodation and fencing/boundary works, landscaping works, drainage/attenuation works, and ancillary infrastructure and utility works.

  This project is located ca. 600m south of the proposed Bennetstown LRD development and has the potential to be constructed at the same time as the proposed Bennetstown LRD development. A number of mitigation measures as identified within section 10.6 of this report will be implemented as part of the Dunboyne LRD development. As a result there will be no significant effect on hydrology and hydrogeology and no likely significant effect when considered cumulatively with the proposed link and access road development.

- **Council Reference: 23424. Further Information Requested** The development will consist of: i. Construction of 3 no. office buildings with a cumulative gross floor area (GFA) of 13,729 sq.m ranging in height from 3 to 4- storeys and shall comprise the following: a. Building 1 (3,597 sq.m GFA) 3-storeys in height (12.35 metres to top of parapet), with a setback louvred screen 2m above parapet level. b. Building 2 (5,336 sq.m GFA) 4-storeys in height (16.125 metres to top of parapet), with a setback louvred screen 2m above parapet level. c. Building 3 (4,796 sq.m GFA) 4-storeys in height (16.125 metres to top of parapet), with a setback louvred screen 2m above parapet level. ii. Roof mounted solar PV panels (c. 180 sq.m combined area); iii. Provision of a 4-arm signalised junction replacing the existing Pace roundabout to include a new northern arm with segregated cycleway and footpath; iv. Access to the development is proposed from the new northern arm, with 6m wide internal access roads to serve the development; v. Upgrade works to the R157 and M3 Parkway access road to facilitate junction improvements; vi. A total of 275 surface car parking spaces including 14 disabled access bays and 55 electric car charging points; vii. 280 bicycle parking spaces in 3 secure cycle storage areas adjacent to the buildings; viii. Site signage is to be erected, all spot-lit and back-lit illuminated, including 2 no. type 1 entrance signs (6.15m x 2.4m) and 3 no. type 2 building signs (1.35m x 2.4m); ix. 3 standalone electricity substations; x. Foul sewer connection to existing public system including pumping station on site with rising mains along Kennedy Road and Navan Road; xi. Watermain connection to the north east of site at Pace for connection to Irish Water Infrastructure; xii. Permission is also sought for associated landscaping, boundary treatments, public lighting, plant, waste storage and all ancillary site and development works.

  This project is located immediately north of the proposed Bennetstown LRD development and has the potential to be constructed at the same time as the proposed Bennetstown LRD development. A number of mitigation measures as identified within section 10.6 of this report will be implemented as part of the Dunboyne LRD development. As a result there will be no significant effect on hydrology and hydrogeology from the Bennetstown development and no likely significant effect when considered cumulatively with this office development.

- **Council Reference: 23424. Further Information Requested** Application for a 10-year permission for development in the Townlands of Bennetstown, Pace, and Dunboyne. The subject site (2.79ha) encompasses an area of 0.87ha situated to the south-west of the M3 Parkway and south-east of the Dunboyne Bypass (R157) located in the Townland of Bennetstown, and the balance (1.92ha) located in the Townlands of Pace, Bennetstown and Dunboyne including the Dunboyne Bypass (R157) and M3 Parkway access, Kennedy Road and Navan Road for infrastructure works. The development will consist of: i. Construction of a single-storey commercial building with a cumulative gross floor space (GFS) of 2,160 sq.m comprising: a. A supermarket with delivery, store and service area (1,880 sq.m), including net retail floorspace of 1,510 sq.m, and b. 2 commercial units (combined 280 sq.m) to facilitate Class 1 (Shop), Class 2 (Financial, Professional and Other Services) or Café (food and beverage) uses. ii. Provision of a 4-arm signalised junction replacing the existing Pace roundabout to include a new northern arm with segregated cycleway and footpath; iii. Upgrade works to the existing R157 and M3 Parkway access road to facilitate junction improvements; iv. Access to the development is proposed via a new 3-arm priority-controlled junction from the upgraded southern arm of the proposed 4-arm signalised junction, with 6m wide internal access roads to serve the development; v. A total of 118 surface level car parking spaces including 6 disabled access bays and 4 electric car charging points; vi. 20 short-stay bicycle parking spaces; vii. 1 Electricity substation / switch room; viii. Foul sewer connection to existing public system including pumping station on site with rising mains along Kennedy Road and Navan Road; ix. Permission is also sought for hard and soft landscaping, lighting, attenuation and drainage and all ancillary site development works.

  This project is located immediately north of the proposed Bennetstown LRD development and has the potential to be constructed at the same time as the proposed Bennetstown LRD development. A number of mitigation measures as identified within section 10.6 of this report will be implemented as part of the Dunboyne LRD development. As a result there will be no significant on hydrology and hydrogeology from the Dunboyne LRD development and no likely significant effect when considered cumulatively with this commercial development.

- **Dunboyne North Master Plan 2022**. The Master Plan considers the development of an overall site area of 74ha for residential, commercial, retail and open space in addition to upgraded roads and infrastructure services. There will be a requirement for consent from Irish Water for each phase of the development that there is capacity in the network to accommodate each phase. Stormwater from each phase of the development will be a greenfield runoff rates. There will be no change to rainfall recharge rates from future developments. All future developments and phases will be subject to Flood Risk Assessments. As such there may be adverse cumulative effects on hydrology and hydrogeology which not significant and permanent.

6.5 Mitigation Measures

The mitigation factors and measures for the control of pollution and protection of surface water and groundwater quality are described below.

6.5.1 Construction Phase

With regard to groundwater and surface water quality impacts the following mitigation measures are proposed. The Contractor will be responsible for ensuring these measures are fully implemented:

- In advance of commencement of the Construction Stage, all onsite monitoring wells (as identified in the Ground Investigation Reports (GII, 2022) (GII, 2023) presented in Appendix 5.1 will be fully decommissioned by an experienced borehole specialist in accordance with relevant guidelines, '*Good practice for decommissioning redundant boreholes and wells'* (UK Environment Agency, 2012);
- The construction management of the Site will take account of the recommendations of the Construction Industry Research and Information Association (CIRIA) guidelines 'Control of Water Pollution from Construction Sites' and 'Groundwater control - design and practice' and CIRIA 2010 'Environmental Good Practice on Site' to minimise as far as possible the risk of pollution;
- All of the mitigation measures (for the protection of soils and geology) listed in Chapter 5 will be implemented onsite during the construction phase;
- Any groundwater temporarily dewatered during the excavation works for the proposed attenuation tanks and for building foundations and during piling (as required), will be treated via. the installation of a temporary in-situ water treatment system;
  - This system should be designed and sized to ensure that all pumped groundwater water is treated via. a temporary attenuation pond, prior to discharge to a selected onsite location (via. a temporary soakaway).
  - The Contractor will be required to provide a Site-specific dewatering plan, clearly setting out proposed excavation methodology, estimated dewatering rates, details of proposed treatment system, and discharge location. The discharge location will be selected in the northern most section of the site and outside the source protection zone for Dunboyne PWS. No groundwater discharge will be permitted within the area designated as the source protection zone for Dunboyne PWS.
- The Contractor will be responsible for ensuring that the existing drainage network, specifically along the existing road, and as required elsewhere across the site, will be suitably protected (via. the use of physical barriers and / or the implementation a Site-specific water run-off management plan as required);
- Neither groundwater nor surface water runoff from the working areas will be permitted to discharge directly to the environment (e.g., existing ditches or River Tolka). Runoff generated within the site during construction will be filtered and treated to remove hydrocarbons and

sediment. Total Suspended Solids (TSS), pH/EC and colour will be monitored daily and outlets from sedimentation ponds will incorporate a turbidity monitor with alarm at a high level.

- During localised construction works along the existing drainage ditch in the west and south of the Site (to facilitate the culverting of parts of the ditch and construction of headwalls/outfalls), a construction methodology will be drawn up. This will detail the approach to the construction and installation of culverts along the southern drainage ditch (both the western and eastern sections). Any such works e.g., re-profiling of ditch and channel, are to take part in dry weather conditions, when the ditch bed is dry, to minimise sedimentation of watercourses downstream. Any minor volumes of stripped soils from these works will be stockpiled a minimum distance of 10m from the channel and will be appropriately covered. A temporary stormwater management system will be implemented by the Contractor.

- In order to prevent any potential surface water / groundwater impacts via. release of hydrocarbon / chemical contaminants the following standard measures will be implemented:
  - Fuels, lubricants and hydraulic fluids for equipment used on the construction Site, as well as any solvents, oils, and paints will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to best codes of practice;
  - Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the proposed development for disposal or re-cycling;

- The Construction Phase CEMP will collate and set out the environmental control measures required to minimise, and control adverse environmental impacts associated with the Proposed Development. It is intended that the CEMP will be a live document, which will capture all Construction Phase environmental mitigation measures included within the EIAR, NIS and any other measures which become apparent through the EIA consultation process and/or are prescribed through planning conditions etc. The CEMP will include enabling and decommissioning works.

- The CEMP will include an Emergency Response Plan (ERP) based on the Contractor's Risk Assessment, to be reviewed and approved by the Project Ecologist. The ERP will include (but not limited to): Training of relevant staff, including cover staff, in the implementation of the ERP and the use of spill kits; Procedures to be undertaken in the event of the release of any sediment into a watercourse, or any spillage of chemicals, fuel, oil or other hazardous materials or wastes; Procedures to be undertaken in the event of any non-compliance incidents with any permit or licence, or other such risks that could lead to a pollution incident, including flood risks; The number, specification and location of all spill kits which shall be carried/kept on the site; and Information on clean-up and reporting procedures.

- A response procedure to deal with any accidental pollution events will be clearly outlined within the ERP. Any spillage of fuels, lubricants or hydraulic oils will be immediately contained and the contaminated soil removed from the proposed development and properly disposed of in accordance with all relevant waste management legislation;

- All Site vehicles used will be refuelled in bunded and adequately sealed and covered areas in the construction compound area.
- Strict supervision of contractors will be adhered to in order to ensure that all plant and equipment utilised on-Site is in good working condition. Any equipment not meeting the required standard will not be permitted for use within the Site. This will minimise the risk of groundwater becoming contaminated through Site activity.
- All oil stored on Site for construction vehicles will be kept in a locked and bunded area;
- Generators, pumps and similar plant will be placed on drip-trays to prevent contamination;
- All Site vehicles used will be refuelled in bunded areas;
- All temporary construction fuel tanks will also be located in a suitably bunded area and all tanks will be double skinned. Relevant Material Safety Data Sheets along with oil absorbent materials will be kept on Site in close proximity to any fuel storage tanks or bowsers during proposed Site development works; and,
- All fuel / oil deliveries to on-Site oil storage tanks will be supervised, and records will be kept of delivery dates and volumes.

- In order to prevent any potential surface water / groundwater impacts via. release of cementitious materials the following measures will be implemented where poured concrete is being used on Site;
  - The production, transport and placement of all cementitious materials will be strictly planned and supervised. Site batching/production of concrete will not be carried out on Site and therefore these aspects will not pose a risk to the waterbodies present, namely any temporarily exposed perched water, and the River Tolka;
  - Shutters will be designed to prevent failure. Grout loss will be prevented from shuttered pours by ensuring that all joints between panels achieve a close fit or that they are sealed;
  - Any spillages will be cleaned up and disposed of correctly;
  - Where concrete is to be placed by means of a skip, the opening gate of the delivery chute will be securely fastened to prevent accidental opening;
  - Where possible, concrete skips, pumps and machine buckets will be prevented from slewing over water when placing concrete;
  - Mixer washings and excess concrete will not be discharged directly into the drainage network, or any drainage ditches, surface water bodies or exposed groundwater; and,
  - Surplus concrete will be returned to batch plant after completion of a pour.
- Foul drainage from Site offices and Site compounds will be directed to the existing wastewater network or will be contained and disposed of off-site in an appropriate manner and in accordance with the relevant statutory regulations; and,

- Silt fencing will be installed 1m back from the land drain and the River Tolka and no works will be carried out between the silt fencing and the drain or river.
- The location of the site compound will be selected to avoid areas at risk of flooding from the River Tolka and the inner source protection zone for the Dunboyne PWS, and a minimum distance of 50m from proposed piling locations associated with the construction of the apartment blocks and the bridge structure over the River Tolka.
- There will be no bulk storage of fuels onsite. Chemicals, oils or hazardous materials shall be stored in fully bunded containers and outside areas at risk of flooding from the River Tolka, and the inner source protection zone for the Dunboyne PWS, and a minimum distance of 50m from proposed piling locations.
- Surface water monitoring (as detailed in Section 6.6) will be carried out at key locations along the River Tolka, before, during and after the Construction Phase to ensure water quality is monitored during the proposed works including during the construction of the proposed bridge structure.

The above mitigation measures will form will be included and further developed by the Contractor within the project-specific Detailed CEMP which will be in operation during the construction phase.

All Mitigation Measures as detailed within the Natura Impact Statement (Enviroguide Consulting, 2023) submitted as part of this planning application, which include specific mitigation measures during the proposed installation of the bridge over the River Tolka, will be fully implemented during the Construction Phase.

Following the implementation of these mitigation measures the likely effect on the water environment during construction will be slight adverse not significant and short term.

6.5.2 Operational Phase

With regard to groundwater and surface water quality impacts the following mitigation measures are proposed;

- All of the mitigation measures (for the protection of soils and geology) listed in Chapter 5 will be implemented onsite during the Construction Stage;
- All plant and equipment utilised onsite during maintenance works should be checked and in good working condition. Any equipment not meeting the required standard will not be permitted for use within the Site. Relevant maintenance contractors will be responsible for ensuring that these measures are fully implemented;
- Any minor volumes of fuel, oil or chemicals required during routine maintenance works will be brought to and from Site by the maintenance contractor. While temporarily onsite all chemicals will be kept in secure and bunded areas, with relevant Material Safety Data Sheets available onsite. Any fuel / oil tanks temporarily stored on Site will be located in a suitably bunded area and all tanks will be double skinned, with oil / chemical absorbent materials held onsite in close proximity to the tanks. Relevant maintenance contractors will be responsible for ensuring that these measures are fully implemented;

- In the unlikely event of a fuel / oil or chemical spill / leak during routine maintenance works, emergency spill response measures will be implemented with the aim of limiting the volume spilled and recovering as much of the lost product as possible (relevant maintenance contractors will be responsible for ensuring that these measures are fully implemented); and,
- A maintenance programme for the proposed surface water drainage system should be implemented. The Contractor, in consultation with the Client and the design team, will be responsible for ensuring that these measures are fully implemented.

Following the implementation of these mitigation measures the likely effect on the water environment will be negligible not significant and long term.

6.6 Monitoring Requirements

6.6.1 Construction Phase

Surface water quality monitoring and visual inspections will be carried out along the River Tolka, at the following key locations:

- upstream of the proposed development;
- along the site boundary; and.
- downstream of the proposed development.

The monitoring programme will include the following;

- Water quality monitoring will be undertaken using both field analysis and laboratory analysis based on the following frequency:
  - **Baseline Sampling** - 2no. baseline monitoring events (field measured parameters and laboratory analysis) at each surface water monitoring location including sampling at the watercourse's closest point to construction activities prior to commencement of any site works including enabling or construction works;
  - **Construction Phase Sampling** – monthly monitoring events (field measured parameters and laboratory analysis) at each surface water monitoring location (including sampling at the watercourse's closest point to construction activities) during site construction works.
  - **Post Construction Phase Sampling** – 2no. monitoring events (field measured parameters and laboratory analysis) at each surface water monitoring location (including sampling at the watercourse's closest point to construction activities) following completion of all construction works.
  - **Additional Sampling as needed** - Any additional monitoring events (field measured parameters and laboratory analysis) in the unlikely event of an environmental incident onsite, or in the vicinity of the construction works, or as advised by the Site Environmental Manager / Project Ecologist.
- During each surface water sampling event the following methodology will apply;

  - Surface water sampling must be carried out in accordance with the EN ISO 5667-6:2016/A11:2020 -Water quality - Sampling - Part 6: Guidance on sampling of rivers and streams (ISO 5667-6:2014).
  - Field notes will be recorded at each location including any olfactory or physical evidence of contamination. Specific precautions must be taken to ensure no potential for cross contamination (including the use of disposable nitrile gloves during sample handling at each location and the decontamination of equipment as required between sample locations).
  - Grab samples will be taken at each proposed surface water monitoring location using a telescopic pole (comprising a sample container and telescopic rods) and sample containers provided by the laboratory.
  - All surface water samples will be labelled appropriately, stored in chilled cooler boxes prior to same day dispatch to a UKAS certified laboratory for analysis, and tracked through completed Chain Of Custody documentation.
- The following field measured parameters will be recorded at each location using a calibrated field probe: Temperature (°C); Electrical Conductivity (µS/cm); pH; Total Dissolved Solids (ppm); Total Suspended Solids (ppm); Dissolved Oxygen (mg/l); Turbidity.
- The following suite of laboratory analysis will be carried out on each surface water sample: Total Dissolved Solids; Total Suspended Solids; Biochemical Oxygen Demand; Chemical Oxygen Demand; Alkalinity (Total); Hardness (as $CaCO_3$); Total Petroleum Hydrocarbons - Total TPH >C6-C40; and any additional key parameters as may be required. This suite may be added to by the Site Environmental Manager / Project Ecologist as required during the monitoring programme.
- All analytical results must be screened against the Generic Assessment Criteria (GAC) for surface water quality: Surface Water Regulations - S.I. No. 272 of 2009 as amended (2012 – 2022), and any additional relevant statutory or best practice requirements.
- All monitoring records, results and assessments will be held onsite for the duration of Construction Phase and will be made available to relevant stakeholders upon request if required.

6.6.2 Operational Phase

A maintenance programme for the proposed surface water drainage system including swales, detention basins, petrol interceptors, and hydrobrake flow control systems as required should be implemented during the operational phase.

6.7 Residual Impacts

The development as proposed shall not result in a significant adverse effect to the existing hydrological regime of the area. The development will not increase flood risk to areas outside of the landowners' holdings, nor create unacceptable levels of flood risk within the proposed development. The proposed development is therefore considered to be appropriate from a flood risk perspective.

The Proposed Development will have no significant adverse effects on the qualifying interests / special conservation interests, and on the integrity and extent of the relevant European sites, namely North Dublin Bay SAC, South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA. See Chapter 13 - Biodiversity and the AA Screening Report and Natura Impact Statement (Enviroguide Consulting, 2023) submitted as part of this planning application.

Taking account of the relevant mitigation measures, the residual impact to groundwater quality and surface water quality resulting from potential pollution caused by Site activities e.g. plant, fuel/ chemical spillage etc. or associated with cement handling and pouring during the construction phase is slight adverse and short-term. The residual impact to surface water quality, resulting from excess loadings of suspended solids, via. inadequate onsite soil / storm water management, during the construction phase is slight adverse and short-term, taking account of the relevant mitigation measures. Any dewatering as required during the construction phase, will be temporary and will be subject to the preparation of a Site-specific dewatering plan, which clearly sets out proposed excavation methodology, estimated dewatering rates, details of proposed treatment system, and discharge location. The discharge location will be selected in the northern most section of the site and outside the source protection zone for Dunboyne PWS. No groundwater discharge will be permitted within the area designated as the source protection zone for Dunboyne PWS. Therefore, dewatering will have no residual adverse impact on groundwater quality or surface water quality.

In summary, anticipated residual adverse impacts on surface water or groundwater will be short-term and slight adverse during the Construction Phase of the proposed development, given the mitigation measures proposed.

Taking account of the relevant mitigation measures, the residual effect on groundwater quality and surface water quality resulting from occasional / routine Site maintenance works during the Operational Phase is slight adverse, temporary and is unlikely to occur. The residual effect on groundwater quality and surface water quality resulting from occasional fuel / oil leaks along the access roads and paved areas during the operational phase is also slight adverse and temporary, taking account of the relevant mitigation measures. The residual effect on groundwater and surface water resulting from unplanned events during the operational phase (traffic collision, emergency onsite fuel / oil spill, or fire water arising from a property fire), taking account of the relevant design measures and mitigation measures, is slight adverse, temporary, and unlikely to occur. In summary, anticipated residual adverse impacts on surface water or groundwater will be temporary and slight adverse, given the mitigation measures proposed during the Operational Phase of the proposed development.

Therefore, taking account of proposed mitigation measures, no significant adverse effects are anticipated to the receiving water environment arising from the proposed development during the construction or operational phases. On a regional scale, the proposed development will not affect the current status of the River Tolka, and as required under the European Communities Environmental Objectives (Surface Waters) Regulations, 2009 (as amended 2012-2022). Similarly, the proposed development will not affect the current '*Good*' groundwater quality status of the Dublin Groundwater Body as required under the European Communities Environmental Objectives (Groundwater)

Regulations, 2010, as amended 2016. Taking account of design measures and proposed mitigation measures, no significant adverse effects are anticipated to baseline drinking water quality for the Dunboyne Water Supply, which is excellent with no exceedances of the relevant limits for key chemical / indicator parameters, metals or bacteriological parameters during the period 2022-2023.

6.8 'Do Nothing Scenario'

If the proposed residential development is not undertaken the baseline water environment would remain unchanged. The 'do-nothing' scenario would result in neutral impacts with regards to hydrology and hydrogeology.

6.9 Reinstatement

All temporary construction compounds and Site entrances are to be removed upon completion of the construction phase. Such areas are to be reinstated in accordance with the landscape architects plan and engineer's drawings. All construction waste and / or scrapped building materials are to be removed from Site on completion of the construction phase. Oil, fuel etc. storage areas are to be decommissioned on completion of the construction phase. Any remaining liquids are to be removed from Site and disposed of at an appropriately licenced waste facility.

6.10 Interactions

Water attributes interact with other environmental attributes are summarised as follows: -

- **Population & Human Health** - Potential impacts on the receiving hydrology and hydrogeology environment could also impact on human health. However, the mitigation measures described in Chapter 6 - Hydrology and Hydrogeology, and those relevant in Chapter 4 - Population and Human Health will ensure that this will not occur.
- **Biodiversity** - Potential impacts on the receiving hydrology and hydrogeology environment could also impact on biodiversity conditions present. However, the mitigation measures described in Chapter 6 - Hydrology and Hydrogeology, and those relevant in Chapter 13 - Biodiversity will ensure that this will not occur.
- **Air Quality & Climate** - Potential impacts on the receiving hydrology and hydrogeology environment could also impact on air quality conditions present. However, the mitigation measures described in Chapter 6 - Hydrology and Hydrogeology, and those relevant in Chapter 7 - Air Quality and Chapter 8 - Climate will ensure that this will not occur.
- **Land, Soils & Geology** - Potential impacts on the receiving hydrology and hydrogeology environment could also impact on land, soils and geology conditions present. However, the mitigation measures described in Chapter 6 - Hydrology and Hydrogeology, and those relevant in Chapter 5 - Land, Soils and Geology will ensure that this will not occur.
- **Material Assets Service Infrastructure & Utilities** - Potential impacts on the receiving hydrology and hydrogeology environment could also impact on material assets. However, the mitigation measures described in Chapter 6 - Hydrology and Hydrogeology, and those relevant in Chapter 12 - Material Assets: Service Infrastructure & Utilities will ensure that this will not occur.

6.11 References

Bing Maps Aerial photography (consulted 12/08/2023);

Enviroguide Consulting (2023) AA Screening Report;

Enviroguide Consulting (2023) Natura Impact Statement Report:

Environmental Protection Agency (EPA 2022) 'Guidelines on the information to be contained in Environmental Impact Assessment Reports' published in May 2022.

Environmental Protection Agency EPA (2023) Public Viewer and web mapping (consulted 12/08/2023);

Geological Survey of Ireland (GSI 2023) GSI Datasets Public Viewer and Groundwater web-mapping (consulted 12/08/2023);

Geological Survey of Ireland / Meath County Council (GSI / MCC 2004) / Dunboyne Water Supply Groundwater Source Protection Zones Report;

Geological Survey of Ireland (GSI 2004) / Dunboyne Groundwater Body (GWB) – Summary of Initial Characterisation

Ground Investigations Ireland (GII 2022)- Dunboyne LRD Ground Investigation Report

Ground Investigations Ireland (GII 2023)- Dunboyne LRD Ground Investigation Report

Google Maps Aerial photography (consulted 12/08/2023);

IE Consulting (2023) Site Specific Flood Risk Assessment (Doc. Ref: IE2510_Report_5368);

Institute of Geologists of Ireland (IGI 2013), 'Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements' .

Ordnance Survey web-mapping to assess the surface topography and landforms (consulted 12/08/2023);

Meath County Council Planning Maps (consulted 12/08/2023);

Meath County Council County Development Plan 2021-2027;

Paul McGrail Consulting Engineers Limit (2023) Engineering Services Report

Uisce Éireann Public Viewer and web mapping (consulted 25/08/2023) – Water Supply Zone (WSZ) Results for Dunboyne 2022 & 2023

Large Scale
Residential Development
at Dunboyne North, Co. Meath

Volume II

Environmental Impact Assessment Report

CHAPTER 7

Air Quality

August 2023

McCutcheon Halley
CHARTERED PLANNING CONSULTANTS

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7 Air Quality

7.1 Introduction

This chapter of the EIAR was prepared to assess the potential significant effects on air quality as a result of the proposed development at Bennetstown, Dunboyne, Co. Meath.

It should be read in conjunction with Chapter 12 'Material Assets: Traffic and Transport'.

7.2 Expertise & Qualifications

This chapter was completed by Aisling Cashell, an Environmental Consultant in the air quality section of AWN Consulting Ltd. She holds a BA and an MAI in Civil, Structural and Environmental Engineering from Trinity College Dublin. She is a member of Engineers Ireland. She has experience in mapping software, primarily in ArcGIS and she specialises in the area of air quality, climate and sustainability.

Ciara Nolan also assisted in drafting and reviewing this chapter. Ciara is a Senior Environmental Consultant in the Air Quality section of AWN Consulting. She holds a BSc in Energy Systems Engineering from University College Dublin and has also completed an MSc in Applied Environmental Science at UCD. She is a Member of the Institute of Air Quality Management (MIAQM) and the Institute of Environmental Science (MIEnvSc). She specialises in the fields of ambient air monitoring, indoor air monitoring, EIA and air dispersion modelling.

7.3 Proposed Development

The subject site is located within the townland of Bennetstown to the north of Dunboyne town. The proposed development will consist of a mix of residential units and all associated site works. The site is phase 1 of a larger masterplan area. Future phases of development will be situated to the west of the subject site. A full description of the proposed development is outlined in Chapter 2 'Site Location & Project Description' of this EIAR.

7.3.1 Aspects Relevant to this Assessment

During the construction phase construction dust emissions have the potential to impact air quality. Dust emissions will primarily occur as a result of site preparation works, earthworks and the movement of trucks on site and exiting the site. There is also the potential for engine emissions from site vehicles and machinery to impact air quality. Construction phase impacts will be short-term in duration.

Engine emissions from vehicles accessing the site have the potential to impact air quality during the operational phase of the development through the release of NO_2, PM_{10} and $PM_{2.5}$. Operational phase impacts will be long-term in duration.

7.4 Methodology

7.4.1 Relevant Legislation & Guidance

The principal guidance and best practice documents used to inform the assessment of potential impacts on Air Quality is summarised below.

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning & Local Government, 2018);
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017);
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022b);
- Advice Note on Preparing Environmental Impact Statements – Draft (EPA, 2015);
- Guidance on the Assessment of Dust from Demolition and Construction Version 1.1 (Institute of Air Quality Management (IAQM), 2014);
- TII Guidance *Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* (TII, 2022a) and TII Road Emissions Model (REM) online calculator tool (TII, 2022b).

7.4.1.1 Ambient Air Quality Standards

In order to reduce the risk to health from poor air quality, National and European statutory bodies, the Department of the Environment, Heritage and Local Government in Ireland and the European Parliament and Council of the European Union, 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 based on compliance with the appropriate standards or limit values. The applicable standards in Ireland include the Air Quality Standards Regulations 2022, which incorporate European Commission Directive 2008/50/EC, which has set limit values for numerous pollutants with the limit values for NO_2, PM_{10}, and $PM_{2.5}$ being relevant to this assessment. Council Directive 2008/50/EC combines the previous Air Quality Framework Directive (96/62/EC) and its subsequent daughter directives (including 1999/30/EC and 2000/69/EC) and includes ambient limit values relating to $PM_{2.5}$. The applicable limit values for NO_2, PM_{10}, and $PM_{2.5}$ are set out in Table 7.1.

Table 7.1 Ambient Air Quality Standards & TA Luft

Pollutant	Regulation Note1	Limit Type	Value
Dust Deposition	TA Luft (German VDI 2002)	Annual average limit for nuisance dust	350 mg/m²/day
Nitrogen Dioxide	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 $PM_{2.5}$)	2008/50/EC	Annual limit for protection of human health	25 μg/m³ $PM_{2.5}$

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, the IT4 targets by 2030 and the final targets by 2040 (shown in Table 7.2). 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.

Table 7.2 WHO Air Quality Guidelines

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	50 μg/m^3	50 μg/m^3	25 μg/m^3
		Annual limit for protection of human health	30 μg/m^3	20 μg/m^3	10 μg/m^3
PM (as PM_{10})		24-hour limit for protection of human health	75 μg/m^3	50 μg/m^3	45 μg/m^3
		Annual limit for protection of human health	30 μg/m^3	20 μg/m^3	15 μg/m^3
PM (as $PM_{2.5}$)		24-hour limit for protection of human health	37.5 μg/m^3	25 μg/m^3	15 μg/m^3
		Annual limit for protection of human health	15 μg/m^3	10 μg/m^3	5 μg/m^3

7.4.1.2 Dust Deposition Guidelines

The concern from a health perspective is focused on particles of dust, which are less than 10 microns, and the EU ambient air quality standards outlined in Section 7.4.1.1 have set ambient air quality limit values for PM_{10} and $PM_{2.5}$.

With regard 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.

However, guidelines for dust deposition, the German TA-Luft standard for dust deposition (non-hazardous dust) (German VDI, 2002) sets a maximum permissible emission level for dust deposition of 350 mg/m^2/day averaged over a one-year period at any receptors outside the site boundary. The TA-Luft standard has been applied for the purpose of this assessment based on recommendations from the EPA in Ireland in the document titled 'Environmental Management Guidelines - Environmental Management in the Extractive Industry (Non-Scheduled Minerals) (EPA, 2006). The document recommends that the TA-Luft limit of 350 mg/m^2/day be applied to the site boundary of quarries. This limit value can be implemented with regard to dust impacts from construction of the Proposed Development.

7.4.2 Site Surveys/Investigation

No on-site surveys were required for the air quality assessment. The baseline air quality environment was established using available long-term EPA monitoring data for representative locations (see Section 7.6.2).

7.4.3 Consultation

A Section S32B meeting with Meath County Council was held on 20/07/2023. Additional consultation with specific relevant bodies was not required as part of the air quality assessment.

7.4.4 Construction Phase Methodology

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 construction 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 in order to predict the likely risk of dust impacts in the absence of mitigation measures and to determine the level of site-specific mitigation required. The use of UK guidance is recommended by Transport Infrastructure Ireland in their 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 (transport of dust and dirt from the construction site onto the public road network).

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.

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.

The construction stage traffic will not increase by 1,000 AADT or 200 HDV AADT and therefore does not meet the above scoping criteria. In addition, there are no proposed changes to the traffic speeds or road alignment. As a result a detailed air assessment of construction stage traffic emissions has been scoped out from any further assessment as there is no potential for significant impacts to air quality.

7.4.5 Operational Phase Methodology

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 7.4.4 were used to determine if any road links are affected by the proposed development and require inclusion in a detailed air dispersion modelling assessment. The proposed development will result in the operational phase traffic increasing by more than 1,000 AADT on a number of road links. Therefore, 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 a proportionate number of representative receptors which are located in areas which will experience the highest concentrations or greatest improvements as a result of the proposed development are to be included in the modelling. The TII criteria state that receptors within 200m of impacted road links should be assessed; roads which are greater than 200m from receptors 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 5 no. high sensitivity residential receptors (R1, R2, R3, R5, R6) and 1 no. school (R4) were included in the modelling assessment (see Figure 7.1)

Figure 7.1 Location of Sensitive Receptors used in Operational Phase Air Quality Assessment

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.

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 7.3 below. These criteria have been adopted for the proposed development to predict the impact of NO_2 and PM_{10} emissions as a result of the proposed development.

Table 7.3 Air Quality Significance Criteria

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

Source: TII (2022a) Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106

7.4.5.1 Traffic Data Used in Modelling Assessment

Traffic flow information was obtained from Atkins Consulting Engineers for the purposes of this assessment. Data was provided for the worst-case assessment year of 2040 (see Traffic and Transport Assessment for further details). A total of 3 no. scenarios were assessed, these include:

- The Do Minimum scenario – this is the "Do Nothing" scenario and assumes the proposed development is not in place in future years.

- The Proposed Development scenario – this scenario includes traffic from the Do Minimum scenario and traffic associated with the full build-out of the masterplan lands in the ownership of the Applicant (Marina Quarter Ltd.).
- Cumulative scenario – this scenario includes traffic from the 2 scenarios above as well as traffic associated with cumulative developments in the wider Dunboyne area.

Further detail on the modelling scenarios can be found in the Traffic and Transport Assessment prepared by Atkins and submitted with this planning application. The traffic data is detailed in Table 7.4. Only road links that met the TII scoping criteria and that were within 200m of receptors were included in the modelling assessment. Background concentrations have been included as per Section 7.6.2 of this chapter based on available EPA background monitoring data (EPA, 2022a).

Table 7.4 Traffic Data used in Operational Phase Air Modelling Assessment

Road Link	Location	Speed (kph)	Do Minimum	Do Minimum + Marina Quarter Ltd.	Do Minimum + Marina Quarter Ltd. + Cumulative Devs
			LDV AADT (HDV AADT)	LDV AADT (HDV AADT)	LDV AADT (HDV AADT)
2	M3 motorway south of J5	102	40,716 (3649)	42,444 (3653)	46,057 (3649)
3	R147, north of R147/R157 junction	69	21,231 (1035)	21,370 (1013)	22,419 (1009)
8	R157, between proposed Dunboyne Business Park Distributor Road junction with R157 and Summerhill Roundabout	64	15,529 (614)	15,900 (605)	18,074 (615)
9	L2228 Summerhill Road, between Summerhill Roundabout and Main Street signalised junction	46	2,961 (136)	3,575 (125)	4,326 (138)
10	L2228 Station Road, east of Main Street signalised junction	47	5,946 (362)	6,232 (361)	7,119 (361)
14	Dunboyne Business Park Distributor Road	41	3,195 (117)	3,482 (126)	4,294 (111)

7.5 Difficulties Encountered

There were no difficulties encountered in compiling this assessment.

7.6 Baseline Environment

7.6.1 Meteorological Data

A key factor in assessing temporal and spatial variations in air quality is the prevailing meteorological conditions. Depending on wind speed and direction, individual receptors may experience very significant variations in pollutant levels under the same source strength (i.e. traffic levels) (WHO, 2006). Wind is of key importance in dispersing air pollutants and for ground level sources, such as traffic emissions, pollutant concentrations are generally inversely related to wind speed. Thus, concentrations of pollutants derived from traffic sources will generally be greatest under very calm conditions and low wind speeds when the movement of air is restricted. In relation to PM_{10}, the situation is more complex due to the range of sources of this pollutant. Smaller particles (less than $PM_{2.5}$) from traffic sources will be dispersed more rapidly at higher wind speeds. However, fugitive emissions of coarse particles ($PM_{2.5}$ - PM_{10}) will actually increase at higher wind speeds. Thus, measured levels of PM_{10} will be a non-linear function of wind speed.

The nearest representative weather station collating detailed weather records is Dublin Airport meteorological station, which is located less than 15 km east of the proposed development. Dublin Airport meteorological data has been examined to identify the prevailing wind direction and average wind speeds over a five-year period (see Figure 7.2). For data collated during five representative years (2018 – 2022), the predominant wind direction is westerly to south-westerly with a mean wind speed of 5.4 m/s over the 30-year period 1990 – 2020 (Met Eireann, 2023).

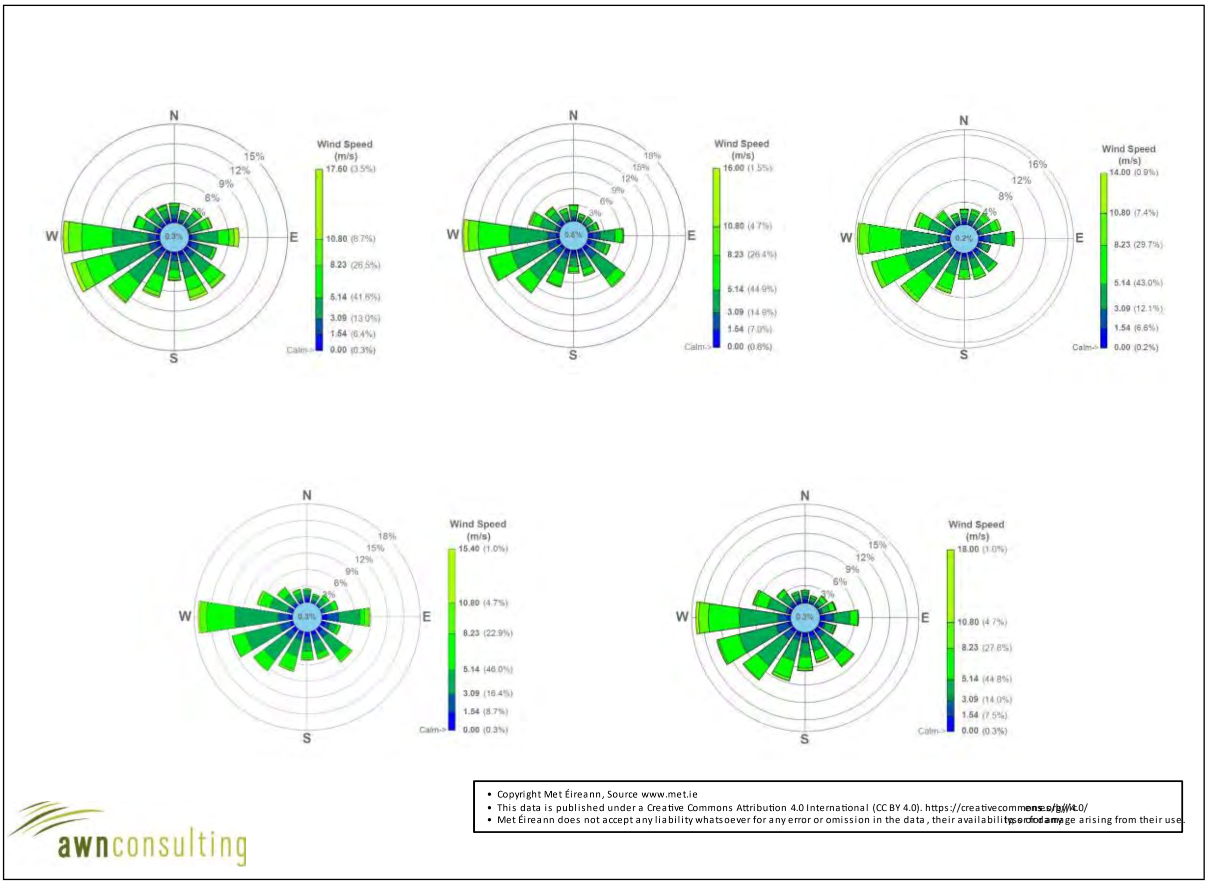

Figure 7.2 Dublin Airport Windroses, 2018 – 2022 (Source: Met Eireann, 2023)

7.6.2 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 Framework Directive on Air Quality (1996/62/EC) as amended, 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, 2022b). However, it is also in close proximity to Zone A, this has been taken into account when estimating the current background pollutant concentrations for the area of the proposed development. 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 locations, 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. The report also notes that CSO figures show that while traffic volumes are still slightly below 2019 levels, they have significantly increased since 2020 levels. 2020 concentrations are therefore predicted to be an exceptional year and not consistent with long-term trends. For this reason, 2020 data has been included in the baseline section for representative purposes only and previous long-term data has been used to determine baseline levels of pollutants in the vicinity of the proposed development.

7.6.2.1 NO_2

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/m^3. Average results range from 7 – 17 µg/m^3 over the period 2017 – 2021 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/m^3 (Table 7.5) as a background concentration. 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/m^3.

Table 7.5 Trends in Zone D Air Quality – Nitrogen Dioxide (NO_2)

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

Note 1 Annual average limit value - 40 µg/m³ and 1-hour limit value - 200 µg/m³ (EU Council Directive 2008/50/EC & S.I. No. 739 of 2022).

7.6.2.2 PM_{10}

Continuous PM_{10} monitoring was carried out at five Zone D locations from 2017 – 2021: Castlebar, Carrick-on-Shannon and Birr. Data from Dublin Airport was also reviewed due to the site's proximity to Zone A. 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). Annual average concentrations at the sites over the period 2017 – 2021 showed an upper average limit of no more than 16 µg/m³ (Table 7.6). 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.

Table 7.6 Trends in Zone D Air Quality – PM_{10}

Station	Averaging Period Note 1	Year				
		2017	2018	2019	2020	2021
Castlebar	Annual Mean PM_{10} (µg/m³)	11	11	16	14	14
	24-hr Mean > 50 µg/m³ (days)	1	0	1	2	1
Carrick-on-Shannon	Annual Mean PM_{10} (µg/m³)	-	-	-	10	9
	24-hr Mean > 50 µg/m³ (days)	-	-	-	0	0
Birr	Annual Mean PM_{10} (µg/m³)	-	-	-	10	12
	24-hr Mean > 50 µg/m³ (days)	-	-	-	0	2
Dublin Airport	Annual Mean PM_{10} (µg/m³)	-	-	-	13	11
	24-hr Mean > 50 µg/m³ (days)	-	-	-	0	0

Note1 Annual average limit value - 40 µg/m³ (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011). Daily limit value - 50 µg/m³ (EU Council Directive 2008/50/EC & S.I. No. 739 of 2022).

7.6.2.3 $PM_{2.5}$

Average $PM_{2.5}$ levels in Carrick-on-Shannon and Birr 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 10.8 µg/m^3.

The current background concentrations have been used in the operational phase air quality assessment for the Design Year of 2040 as a conservative approach in order to predict pollutant concentrations in future years. This is in line with the TII methodology (TII, 2022a).

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).

7.6.3 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, schools and hospitals.

In terms of receptor sensitivity to dust soiling, there are a small number of high sensitivity residential properties within 100 m of the site boundary (see Figure 7.3). There are between 10 and 100 properties within 100 m, between 10 and 100 properties within 50 m and no properties within 20 m of the site boundary. Therefore, the overall sensitivity of the area to dust soiling impacts is considered medium based on the IAQM criteria outlined in Table 7.7.

Table 7.7 Sensitivity of the Area to Dust Soiling Effects on People and Property

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

Source (IAQM, 2014) Guidance on the Assessment of Dust from Demolition and Construction

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 and there are between 10 and 100 high sensitivity receptors within 50 m of the Proposed Development boundary (see Figure 7.3). Based on the IAQM criteria outlined in Table 7.8, the worst-case sensitivity of the area to dust-related human health impacts is considered low.

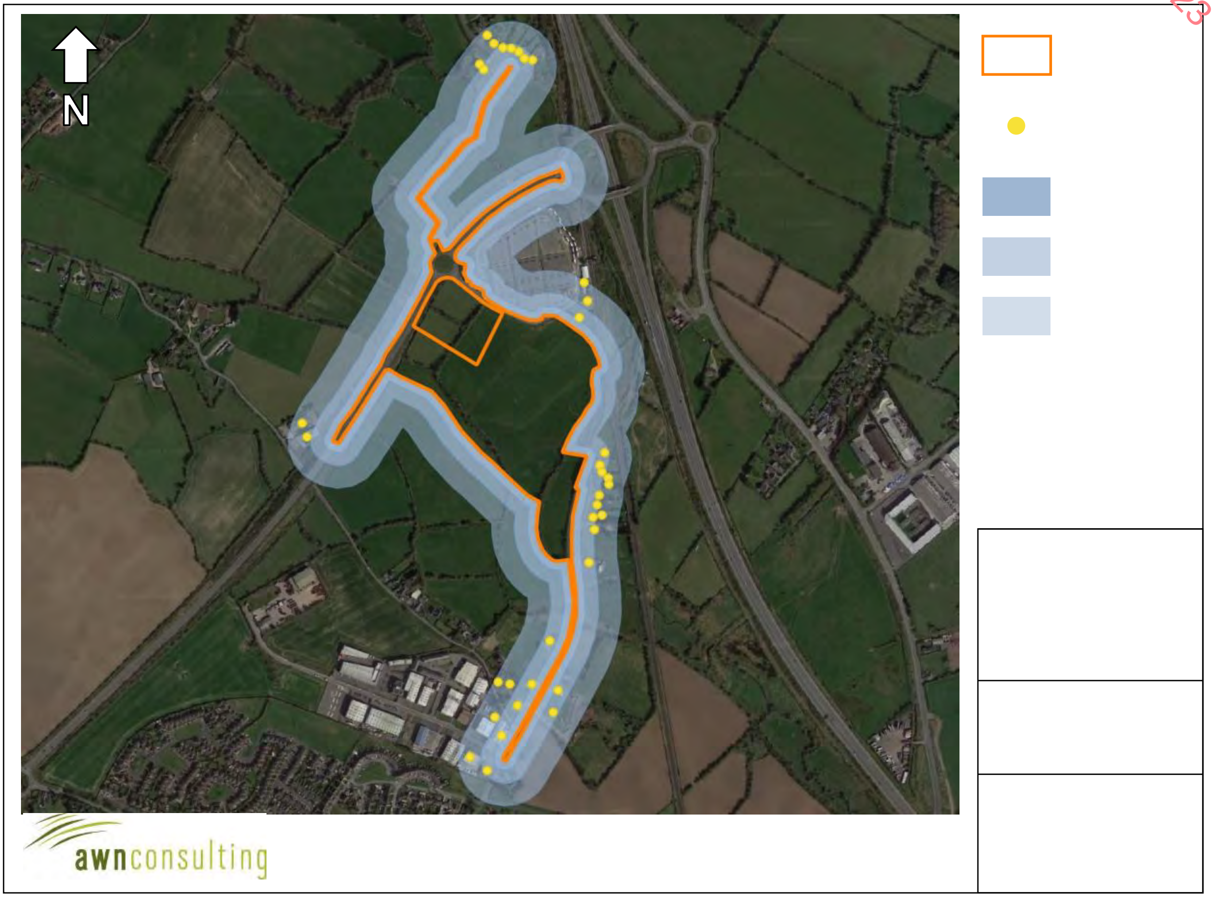

Figure 7.3 Sensitive Receptors within 20m, 50m and 100m of Site Boundary

Table 7.8 Sensitivity of the Area to Dust Related Human Health Impacts

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

Source (IAQM, 2014) Guidance on the Assessment of Dust from Demolition and Construction

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. The sensitivity of the area is determined based on the distance to the source, the designation of the site, (European, National or local designation) and the potential dust sensitivity of the ecologically important species present. High sensitivity ecological receptors are sites with European or National designation with particularly dust sensitive species present. There are no designated ecological sites within 50m of the site or 500m of site access roads, therefore there is no potential for dust impacts to sensitive ecology and no further assessment is required.

7.7 The 'Do Nothing' Scenario

Under the Do Nothing Scenario no construction works will take place and the identified impacts of fugitive dust and particulate matter emissions and emissions from equipment and machinery will not occur. Impacts from increased traffic volumes and associated air emissions from the proposed development will also not occur.

The Do Nothing scenario associated with the operational phase, including traffic associated with the additional future phases of the development and cumulative developments, is assessed within Section 7.8.2 and it was found to be imperceptible. This scenario is considered neutral in terms of air quality.

7.8 Potential Significant Effects

7.8.1 Construction Phase

7.8.1.1 Air Quality

The greatest potential impact on air quality during the construction phase of the Proposed Development is from construction dust emissions and the potential for nuisance dust. While construction dust tends to be deposited within 350m of a construction site, the majority of the deposition occurs within the first 50 m. The extent of any dust generation depends on the nature of the dust (soils, peat, sands, gravels, silts etc.) and the nature of the construction activity. In addition, the potential for dust dispersion and deposition depends on local meteorological factors such as rainfall, wind speed and wind direction. A review of Dublin Airport meteorological data indicates that the prevailing wind direction is westerly to south-westerly and wind speeds are generally moderate in nature (see Section 7.6.17.6.1). In addition, dust generation is considered negligible on days where rainfall is greater than 0.2 mm. A review of historical 30 year average data for Dublin Airport meteorological station indicates that on average 200 days per year have rainfall over 0.2 mm (Met Eireann, 2023) and therefore it can be determined that 55% of the time dust generation will be reduced.

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 7.6.3). As per Section 7.4.4, the major dust generating activities are divided into four types within the IAQM guidance to reflect their different potential impacts. These are:

- Demolition;
- Earthworks;
- Construction; and
- Trackout (transport of dust and dirt from the construction site onto the public road network).

7.8.1.1.1 Demolition

There are no demolition activities associated with the Proposed Development. Therefore, there is no demolition impact predicted as a result of the works.

7.8.1.1.2 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 > 10,000m^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 > 8m in height, total material moved >100,000 tonnes;
- **Medium:** Total site area 2,500m^2 – 10,000m^2, moderately dusty soil type (e.g. silt), 5 - 10 heavy earth moving vehicles active at any one time, formation of bunds 4m – 8m in height, total material moved 20,000 – 100,000 tonnes;
- **Small:** Total site area < 2,500m^2, soil type with large grain size (e.g. sand), < 5 heavy earth moving vehicles active at any one time, formation of bunds < 4m in height, total material moved < 20,000 tonnes, earthworks during wetter months.

The dust emission magnitude for the proposed earthwork activities can be classified as large as worst-case as the total site area is greater than 10,000 m^2.

The sensitivity of the area, as determined in Section 7.6.3, is combined with the dust emission magnitude for each dust generating activity to define the risk of dust impacts in the absence of mitigation. Using the criteria in Table 7.9, this results in an overall medium risk of dust soiling impacts and a low risk of dust related human health impacts as a result of the proposed earthworks activities.

Table 7.9 Risk of Dust Impacts – Earthworks

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

7.8.1.1.3 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 25,000m^3 – 100,000 m^3, potentially dusty construction material (e.g. concrete), on-site concrete batching;
- **Small:** Total building volume < 25,000m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

The dust emission magnitude for the proposed construction activities can be classified as medium as a worst-case as the total building volume will be between 25,000 and 100,000 m^3. Using the criteria in Table 7.10, this results in an overall medium risk of dust soiling impacts and a low risk of human health impacts as a result of the proposed construction activities.

Table 7.10 Risk of Dust Impacts – Construction

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

7.8.1.1.4 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 dusty surface 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 dusty surface material (e.g. high clay content), unpaved road length 50 - 100 m;
- **Small:** < 10 HGV (> 3.5 t) outward movements in any one day, surface material with low potential for dust release, unpaved road length < 50 m.

The dust emission magnitude for the proposed trackout can be classified as medium, as at worst-case peak periods there will between 10 – 50 outward HGV movements per day. As outlined in Table 7.11, this results in an overall medium risk of dust soiling impacts and a low risk of human health impacts as a result of the proposed trackout activities.

Table 7.11 Risk of Dust Impacts – Trackout

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

7.8.1.1.5 Summary of Dust Emission Risks

The risk of dust impacts as a result of the Proposed Development are summarised in Table 7.12 for each activity. The magnitude of risk determined is used to prescribe the level of site specific mitigation required for each activity in order to prevent significant impacts occurring.

There is at most a medium risk of dust soiling impacts and a low risk of dust-related human health impacts associated with the proposed works. Best practice dust mitigation measures associated with medium risk works will be implemented to ensure there are no significant impacts at nearby sensitive receptors. In the absence of mitigation, dust impacts are predicted to be short-term, negative and slight.

Table 7.12 Summary of Dust Impact Risk used to Define Site-Specific Mitigation

Potential Impact	Dust Emission Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Emission Magnitude	N/A	Large	Medium	Medium
Dust Soiling Risk	N/A	Medium Risk	Medium Risk	Medium Risk
Human Health Risk	N/A	Low Risk	Low Risk	Low Risk

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 scoping assessment criteria in Section 7.4.4. It can therefore be determined that the construction stage traffic will have an imperceptible, direct, neutral and short-term impact on air quality.

7.8.1.2 Human Health

Dust emissions from the construction phase of the proposed development have the potential to impact human health through the release of PM_{10} and $PM_{2.5}$ emissions. As per Table 7.8, the surrounding area is of low sensitivity to dust-related human health impacts. In addition, there is at most a low risk of dust-related human health impacts as a result of the proposed construction works. In the absence of mitigation there is the potential for short-term, negative and imperceptible impacts to human health as a result of construction dust emissions.

7.8.2 Operational Phase

7.8.2.1 Air Quality

The potential impact of the proposed development has been assessed by modelling emissions from the traffic generated as a result of the development. Traffic data for the worst-case assessment year of 2040 has been provided by Atkins in order to inform the air quality assessment. To provide for a worst case assessment traffic associated with the full masterplan development has been included in the air modelling assessment, as this will allow for the impact from the full build out of the site to be determined. The impact of NO_2, PM_{10} and $PM_{2.5}$ emissions for the Design Year 2040 was predicted at the nearest sensitive receptors to the development.

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, in order to determine the degree of impact.

The results of the assessment of the impact of the proposed development on NO_2 are shown in Table 7.13. The annual average concentration is in compliance with the limit value at all worst-case receptors in the worst-case year 2040. Concentrations of NO_2 are at most 37% of the annual limit value. In addition, the hourly limit value for NO_2 is 200 $\mu g/m^3$ and is expressed as a 99.8th percentile (i.e. it must not be exceeded more than 18 times per year). The maximum 1-hour NO_2 concentration is not predicted to be exceeded as a result of the proposed development (Table 7.13).

The impact of the proposed development on annual mean NO_2 concentrations can be assessed relative to "Do Nothing (DN)" levels. Relative to baseline levels, there are predicted to be some imperceptible increases in NO_2 concentrations at the receptors assessed. Concentrations will increase by at most 0.08 $\mu g/m^3$ at worst-case receptor R3, this is an increase of 0.2% relative to the annual air quality limit value for NO_2. Where the predicted annual mean concentrations are less than 75% of the air quality standard (see Table 7.1) and there is a less than 5% change in concentrations compared with the ambient air quality limit value, then the impact is considered neutral as per the TII significance criteria (see Table 7.3). Therefore, the impact of the proposed development on NO_2 concentrations is neutral.

In relation to changes in PM_{10} concentrations due to the proposed development, the results of the assessment can be seen in Table 7.14 for the Design Year 2040. The annual average concentration is in compliance with the limit value at the worst-case receptors. Concentrations of PM_{10} are at most 43% of the annual limit value. In addition, the proposed development will not result in any exceedances of the daily PM_{10} limit value of 50 $\mu g/m^3$. 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 0.10 $\mu g/m^3$ at receptor R3, this is a 0.25% change relative to the annual mean air quality limit value for PM_{10}. As with NO_2, where the predicted annual mean concentrations are less than 75% of the air quality limit value (see Table 7.1) and there is a less than 5% change in concentrations relative to the ambient air quality limit value, then the impact is considered neutral as per the TII significance criteria (see Table 7.3). Therefore, the impact of the proposed development on PM_{10} concentrations is neutral.

The results of the assessment of changes in $PM_{2.5}$ concentrations due to the proposed development, can be seen in Table 7.15 for the Design Year 2040. The annual average concentration is in compliance with the limit value at the worst-case receptors. Concentrations of $PM_{2.5}$ are at most 46% of the annual limit value. 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 0.06 µg/m^3 at receptor R3, this is a 0.24% change relative to the annual mean ambient air quality limit for $PM_{2.5}$. As with NO_2 and PM_{10}, where the predicted annual mean concentrations are less than 75% of the air quality standard (see Table 7.1) and there is a less than 5% change in concentrations relative to the ambient air quality limit value, then the impact is considered neutral as per the TII significance criteria (see Table 7.3). Therefore, the impact of the proposed development on $PM_{2.5}$ concentrations is neutral.

Overall, the impact of the proposed development on ambient air quality in the operational stage is considered long-term, localised, neutral, imperceptible and non-significant.

Table 7.13 Annual Mean NO_2 Concentrations (µg/m^3) – Proposed Development

Receptor	Impact Design Year 2040				
	DN	DS	DS-DN	% Change of AQAL	Description
R1	14.7	14.7	0.00	0.00%	Neutral
R2	14.1	14.2	0.01	0.02%	Neutral
R3	14.4	14.5	0.08	0.20%	Neutral
R4	14.8	14.8	0.04	0.10%	Neutral
R5	14.0	14.1	0.01	0.03%	Neutral
R6	14.1	14.1	0.00	0.00%	Neutral

Table 7.14 Annual Mean PM_{10} Concentrations (µg/m^3) – Proposed Development

Receptor	Impact Design Year 2040				
	DN	DS	DS-DN	% Change of AQAL	Description
R1	17.1	17.1	-0.01	-0.03%	Neutral
R2	16.2	16.2	0.00	0.00%	Neutral
R3	16.6	16.7	0.10	0.25%	Neutral
R4	17.1	17.2	0.04	0.10%	Neutral
R5	16.1	16.1	0.00	0.00%	Neutral
R6	16.1	16.1	0.00	0.00%	Neutral

Table 7.15 Annual Mean $PM_{2.5}$ Concentrations (µg/m^3) – Proposed Development

Receptor	Impact Design Year 2040				
	DN	DS	DS-DN	% Change of AQAL	Description
R1	11.4	11.4	0.00	0.00%	Neutral
R2	10.9	10.9	0.00	0.00%	Neutral
R3	11.1	11.2	0.06	0.24%	Neutral
R4	11.5	11.5	0.02	0.08%	Neutral
R5	10.8	10.8	0.01	0.04%	Neutral
R6	10.9	10.9	0.00	0.00%	Neutral

7.8.2.2 Human Health

Traffic related air emissions have the potential to impact air quality which can affect human health. However, air dispersion modelling of traffic emissions has shown that levels of all pollutants are below the ambient air quality standards set for the protection of human health. It can be determined that the impact to human health during the operational stage is long-term, direct, neutral and imperceptible.

7.8.3 Cumulative Effects

7.8.3.1 Construction Phase

According to the IAQM guidance (2014) should the construction phase of the proposed development coincide with the construction phase of any other development within 350m then there is the potential for cumulative construction dust impacts. A review of relevant planning applications within 350m of the site was conducted in order to identify sites with the potential for cumulative impacts. There were 3 no. sites identified which may have coinciding construction phases with that of the proposed development, these include: Dunboyne Link Road (Planning Ref. P822022), an office development (Planning Ref. 23/424) and a commercial development (Planning Ref. 23/60065).

The proposed development has been assessed as having a medium risk of dust soiling impacts during the construction phase. A number of mitigation measures have been proposed in order to ensure significant dust impacts do not occur. Provided these measures are in place for the duration of the construction phase significant cumulative construction dust impacts are not predicted. Cumulative impacts to air quality will be short-term, localised, negative and imperceptible.

7.8.3.2 Operational Phase

There is the potential for cumulative traffic associated with other planned and permitted developments in the area to result in cumulative impacts to air quality as a result of vehicle exhaust emissions. A detailed air dispersion modelling assessment of cumulative air quality impacts from traffic has been conducted. Concentrations of NO_2, PM_{10} and $PM_{2.5}$ have been predicted at a number of worst-case sensitive receptors (see Figure 7.1). The results are outlined in Table 7.16, Table 7.17 and Table 7.18. Results have been compared against the Do Nothing scenario in order to determine the degree of impact as per the TII guidance (2022a).

Pollutant concentrations have been predicted for the worst-case design year of 2040. Chapter 11 – Material Assets Traffic & Transport and the Traffic and Transport Assessment prepared by Atkins include further detail on the specific cumulative developments included in the assessment. The assessment criteria used for the operational phase assessment in Section 7.8.2.1 have also been applied to the cumulative assessment.

In relation to NO_2, predicted concentrations in the Design Year 2040 will be at most 37% of the annual mean limit value for NO_2. Concentrations will increase by a maximum of 0.18 $\mu g/m^3$ at receptor R3, this is a 0.45% change relative to the annual mean ambient air quality limit for NO_2.

In relation to PM_{10}, predicted concentrations in the Design Year 2040 will be at most 43% of the annual mean limit value for PM_{10}. Concentrations will increase by a maximum of 0.23 µg/m^3 at receptor R3, this is a 0.58% change relative to the annual mean ambient air quality limit for PM_{10}.

In relation to $PM_{2.5}$, predicted concentrations in the Design Year 2040 will be at most 46% of the annual mean limit value for $PM_{2.5}$. Concentrations will increase by a maximum of 0.14 µg/m^3 at receptor R3, this is a 0.56% change relative to the annual mean ambient air quality limit for $PM_{2.5}$.

Using the TII assessment criteria in Table 7.3 (TII, 2022a), where the predicted annual mean pollutant concentrations are less than 75% of the air quality standard (see Table 7.1) and there is a less than 5% change in concentrations relative to the ambient air quality limit value, then the impact is considered neutral. Therefore, the cumulative impact of the proposed development in the operational phase is long-term, direct, neutral and imperceptible.

Table 7.16 Annual Mean NO_2 Concentrations (µg/m^3) – Cumulative Assessment

Receptor	Impact Design Year 2040				
	DN	DS	DS-DN	% Change of AQAL	Description
R1	14.7	14.7	0.01	0.03%	Neutral
R2	14.1	14.2	0.01	0.02%	Neutral
R3	14.4	14.6	0.18	0.45%	Neutral
R4	14.8	14.9	0.14	0.35%	Neutral
R5	14.0	14.1	0.01	0.03%	Neutral
R6	14.1	14.1	0.00	0.00%	Neutral

Table 7.17 Annual Mean PM_{10} Concentrations (µg/m^3) – Cumulative Assessment

Receptor	Impact Design Year 2040				
	DN	DS	DS-DN	% Change of AQAL	Description
R1	17.1	17.1	0.01	0.02%	Neutral
R2	16.2	16.2	0.01	0.03%	Neutral
R3	16.6	16.8	0.23	0.58%	Neutral
R4	17.1	17.3	0.17	0.42%	Neutral
R5	16.1	16.1	0.01	0.03%	Neutral
R6	16.1	16.1	0.00	0.00%	Neutral

Table 7.18 Annual Mean $PM_{2.5}$ Concentrations (µg/m^3) – Cumulative Assessment

Receptor	Impact Design Year 2040				
	DN	DS	DS-DN	% Change of AQAL	Description
R1	11.4	11.5	0.01	0.04%	Neutral
R2	10.9	10.9	0.00	0.00%	Neutral
R3	11.1	11.3	0.14	0.56%	Neutral
R4	11.5	11.6	0.10	0.40%	Neutral

Receptor	Impact Design Year 2040				
	DN	DS	DS-DN	% Change of AQAL	Description
R5	10.8	10.8	0.01	0.04%	Neutral
R6	10.9	10.9	0.00	0.00%	Neutral

7.9 Mitigation

7.9.1 Construction Phase Mitigation

The proposed development has been assessed as having a medium risk of dust soiling impacts and a low risk of dust related human health impacts during the construction phase as a result of earthworks, construction and trackout activities (see Section 7.8.1.1). Therefore, the following dust mitigation measures shall be implemented during the construction phase of the proposed development. These measures are appropriate for sites with a medium risk of dust impacts and aim to ensure that no significant nuisance occurs at nearby sensitive receptors. The mitigation measures draw on best practice guidance from Ireland (DCC, 2018), the UK (IAQM (2014), BRE (2003), The Scottish Office (1996), UK ODPM (2002)) and the USA (USEPA, 1997). These measures will be incorporated into the overall Construction Environmental Management Plan (CEMP) prepared for the site. The measures are divided into different categories for different activities.

Communications

- Develop and implement a stakeholder communications plan that includes community engagement before works commence on site. Community engagement includes explaining the nature and duration of the works to local residents and businesses.
- The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board should also include head/regional office contact details.

Site Management

- During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions. Dry and windy conditions are favourable to dust suspension therefore mitigations must be implemented if undertaking dust generating activities during these weather conditions.
- A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out

Preparing and Maintaining the Site

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.

- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
- Cover, seed or fence stockpiles to prevent wind whipping.

Operating Vehicles / Machinery and Sustainable Travel

- Ensure all vehicles switch off engines when stationary - no idling vehicles.
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.
- Impose and signpost a maximum-speed-limit of 15 kph haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing)

Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

Waste Management

- Avoid bonfires and burning of waste materials.

Measures Specific to Earthworks

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
- Only remove the cover in small areas during work and not all at once.
- During dry and windy periods, and when there is a likelihood of dust nuisance, a bowser will operate to ensure moisture content is high enough to increase the stability of the soil and thus suppress dust.

Measures Specific to Construction

- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
- For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.

Measures Specific to Trackout

- A speed restriction of 15 kph will be applied as an effective control measure for dust for on-site vehicles.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site log book.
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
- Access gates to be located at least 10 m from receptors where possible.

Monitoring

- Undertake daily on-site and off-site inspections, where receptors (including roads) are nearby, to monitor dust, record inspection results in the site inspection log. This should include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100 m of site boundary, with cleaning to be provided if necessary.
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

7.9.2 Operational Phase Mitigation

The impact of the operational traffic associated with proposed development on air quality is predicted to be imperceptible with respect to the operational phase in the long term. Therefore, no site-specific mitigation measures are required.

7.10 Residual Impact Assessment

7.10.1 Construction Phase

7.10.1.1 Air Quality

Once the dust minimisation measures outlined in Section 7.9.1 are implemented, the impact of the proposed development in terms of dust soiling will be short-term, negative, localised and imperceptible at nearby receptors.

7.10.1.2 Human Health

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

7.10.2 Operational Phase

7.10.2.1 Air Quality

Air dispersion modelling of operational traffic emissions associated with the proposed development was carried out using the TII REM tool. The modelling assessment determined that the change in emissions of NO_2, PM_{10} and $PM_{2.5}$ at nearby sensitive receptors as a result of the proposed development will be imperceptible. Therefore, the operational phase impact to air quality is long-term, direct, neutral and imperceptible.

7.10.2.2 Human Health

As the air dispersion modelling has shown, emissions of air pollutants are significantly below the ambient air quality standards which are based on the protection of human health, impacts to human health are long-term, direct, negative and imperceptible.

7.10.3 Cumulative Impact

7.10.3.1 Construction Phase

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 7.9.1, are implemented throughout the construction phase of the proposed development significant cumulative dust impacts are not predicted. Impacts are predicted to be short-term, negative and imperceptible.

7.10.3.2 Operational Phase

Air dispersion modelling of operational traffic emissions associated with the proposed development and cumulative developments in the wider area was carried out using the TII REM tool. The modelling assessment determined that the change in emissions of NO_2, PM_{10} and $PM_{2.5}$ at nearby sensitive receptors as a result of the proposed development in combination with cumulative developments will be imperceptible. Therefore, the operational phase impact to air quality is long-term, direct, neutral and imperceptible.

7.11 Risk of Major Accidents or Disasters

There are no likely risks of major accidents and disasters in relation to air quality associated with the proposed development due to the nature and scale of the development. The proposed development is residential in nature and will not require large scale quantities of hazardous materials or fuels.

7.12 Significant Interactions

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 (Chapter 11) 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 Change Chapter (Chapter 8). 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.

No other significant interactions with air quality have been identified.

7.13 References & Sources

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Large Scale
Residential Development
at Dunboyne North, Co. Meath

Volume II

Environmental Impact Assessment Report

CHAPTER 8

Climate

August 2023

McCutcheon Halley
CHARTERED PLANNING CONSULTANTS

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8 Climate

8.1 Introduction

This chapter of the EIAR was prepared to assess the potential significant effects on climate as a result of the proposed development at Bennetstown, Dunboyne, Co. Meath.

It should be read in conjunction with Chapter 7 – Air Quality, Chapter 11 – Material Assets Traffic & Transport and the Energy and Sustainability Statement Report prepared in relation to the development.

8.2 Expertise & Qualifications

This chapter was completed by Aisling Cashell, an Environmental Consultant in the air quality section of AWN Consulting Ltd. She holds a BA and an MAI in Civil, Structural and Environmental Engineering from Trinity College Dublin. She is a member of Engineers Ireland. She has experience in mapping software, primarily in ArcGIS and she specialises in the area of air quality, climate and sustainability.

Ciara Nolan also assisted in drafting and reviewing this chapter. Ciara is a Senior Environmental Consultant in the Air Quality section of AWN Consulting. She holds a BSc in Energy Systems Engineering from University College Dublin and has also completed an MSc in Applied Environmental Science at UCD. She is a Member of the Institute of Air Quality Management (MIAQM) and the Institute of Environmental Science (MIEnvSc). She specialises in the fields of ambient air monitoring, indoor air monitoring, EIA and air dispersion modelling.

8.3 Proposed Development

The subject site is located within the townland of Bennetstown to the north of Dunboyne town. The proposed development will consist of a mix of residential units and all associated site works. The site is phase 1 of a larger masterplan area. Future phases of development will be situated to the west of the subject site. A full description of the proposed development is outlined in Chapter 2 'Site Location & Project Description' of this EIAR.

8.3.1 Aspects Relevant to this Assessment

During the construction phase engine emissions from site vehicles and machinery have the potential to impact climate through the release of CO_2 and to a lesser extent, other greenhouse gases (GHGs). Embodied carbon of materials used in the construction of the development along with site activities will impact climate. Impacts to climate are assessed against Ireland's obligations under the EU 2030 GHG targets and sectoral emissions ceilings.

Engine emissions from vehicles accessing the site have the potential to impact climate during the operational phase of the development through the release of CO_2. Operational phase impacts will be long-term in duration. In addition, the vulnerability of the proposed development in relation to future climate change must be considered during the operational phase. The proposed development has been designed to minimise the impact on climate where possible in line with the most recent development guidelines (Part L of the Building Regulations 2022) and in reference to measures within the Climate Action Plan 2023 (Government of Ireland, 2022).

8.4 Methodology

8.4.1 Relevant Legislation & Guidance

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

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning & Local Government, 2018);
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017);
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022);
- Advice Note on Preparing Environmental Impact Statements – Draft (EPA, 2015);
- Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (European Commission, 2013);
- European Union (EU) Directive 2011/92/EU (as amended by Directive 2014/52/EU) on the assessment of the effects of certain public and private projects on the environment (the EIA Directive);
- European Union (EU) Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law');
- 2030 Climate and Energy Policy Framework (European Commission 2014);
- 2030 EU Climate Target Plan (European Commission, 2021b);
- Climate Action and Low Carbon Development (Amendment) Act 2021 (the 2021 Climate Act) (No. 32 of 2021) (Government of Ireland, 2021b).
- Climate Action Plan 2023 (Government of Ireland, 2022);
- Assessing Greenhouse Gas Emissions and Evaluating their Significance (Institute of Environmental Management & Assessment (IEMA), 2022);
- PE-ENV-01104: Climate Guidance for National Roads, Light Rail and Rural Cycleways (Offline & Greenways) – Overarching Technical Document (Transport Infrastructure Ireland (TII), 2022a);
- UK Design Manual for Roads and Bridges (DMRB) Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 14 LA 114 Climate (UK Highways Agency, 2019)

8.4.2 Site Surveys/Investigation

No surveys were required as part of the climate assessment.

8.4.3 Consultation

A Section S32B meeting with Meath County Council was held on 20/07/2023; additional consultation with specific relevant bodies was not required as part of the climate assessment.

8.4.4 Criteria for Rating of Impacts

8.4.4.1 Climate Agreements and Policies

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) Bill 2021 (hereafter referred to as the 2021 Climate Bill) 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 '*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 8.1. 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 8.2 Industry and Buildings (Residential) have a 35% and 40% reduction requirement respectively and a 2030 emission ceiling of 4 Mt CO_2e[1].

Table 8.1 5-Year Carbon Budgets 2021-2025, 2026-2030 and 2031-2025

Budget Period	Carbon Budget	Reduction Required
2021-2025	295 Mt CO_2e	Reduction in emissions of 4.8% per annum for the first budget period.
2026-2030	200 Mt CO_2e	Reduction in emissions of 8.3% per annum for the second budget period.
2031-2035	151 Mt CO_2e	Reduction in emissions of 3.5% per annum for the third provisional budget.

Note 1 Table derived from Department of the Taoiseach press release 28 July 2022 from Government announces sectoral emissions ceilings, setting Ireland on a pathway to turn the tide on climate change

[d] Mt CO_2e denotes million tonnes carbon dioxide equivalent.

Table 8.2 Sectoral Emission Ceilings 2030

Sector	Baseline (MtCO$_2$e)	Carbon Budgets (MtCO$_2$e)		2030 Emissions (MtCO$_2$e)	Indicative Emissions % Reduction in Final Year of 2025- 2030 Period (Compared to 2018)
	2018	2021-2025	2026-2030		
Transport	12	54	37	6	50
Electricity	10	40	20	3	75
Built Environment - Residential	7	29	23	4	40
Built Environment - Commercial	2	7	5	1	45
Agriculture	23	106	96	17.25	25
LULUCF	5	xxx	xxx	xxx	xxx
Industry	7	30	24	4	35
Other (F-gases, waste, petroleum refining)	2	9	8	1	50
Unallocated Savings	-	7	5	-5.25	-
Total	**68**	**xxx**	**xxx**	**-**	**-**
Legally Binding Carbon Budgets and 2030 Emission Reduction Targets	**-**	**295**	**200**	**-**	**51**

Note 1 Table derived from Department of the Taoiseach press release 28 July 2022 from Government announces sectoral emissions ceilings, setting Ireland on a pathway to turn the tide on climate change

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. 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.

8.4.5 Climate Assessment Significance 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.

8.4.5.1.1 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 Industry and Buildings (Residential) sectors emitted approximately 7 Mt CO_{2eq} in 2018 and has a ceiling of 4 Mt CO_{2eq} in 2030 which is a 35% and 40% reduction respectively over this period (see Table 8.2).

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.

The criteria for determining the significance of effects are a two-stage process that involves defining the magnitude of the impacts and the sensitivity of the receptors (i.e. Ireland's National GHG targets). In relation to climate, there is no project specific assessment criteria, but the project will be assessed against the recommended IEMA significance determination. This takes account of any embedded or committed mitigation measures that form part of the design which 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*[2] *by 2050".*

Significance is determined using the criteria outlined in Table 8.3 (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.

Table 8.3 GHGA Significance Criteria

Effects	Significance Level	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.

[2] Net Zero: "*When anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period.*" Net zero is achieved where emissions are first educed in line with a 'science-based' trajectory with any residual emissions neutralised through offsets.

8.4.5.1.2 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 8.4 details the vulnerability matrix; vulnerabilities are scored on a high, medium and low scale. TII guidance (TII, 2022a) and the EU technical guidance (European Commission, 2021a) note that if all vulnerabilities are ranked as low in a justified manner, no detailed climate risk assessment may be needed. The impact from climate change on the proposed development can therefore considered to be not significant. However, 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.

Table 8.4 Vulnerability Matrix

		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

8.4.6 Construction Phase Methodology

8.4.6.1 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 8.6). 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. The construction stage activities and potential for GHG emissions have been reviewed as part of the construction stage climate assessment and a qualitative assessment conducted.

8.4.7 Operational Phase Methodology

8.4.7.1 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, 2021a); 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 8.6, 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 8.5). 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.

- **Asset 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 8.4. TII guidance (TII, 2022a) and the EU technical guidance (European Commission, 2021a) note that if all vulnerabilities are ranked as low in a justified manner, no detailed climate risk assessment may be needed. The impact from climate change on the proposed development can therefore considered to be not significant. However, 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.

8.4.7.2 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 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.

There are a 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, 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 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. The output is provided in terms of CO_2e.

Traffic data was provided by Atkins for the worst-case assessment year of 2040 (see Traffic and Transport Assessment for further details). A total of 3 no. scenarios were assessed, these include:

- The Do Minimum scenario – this is the "Do Nothing" scenario and assumes the proposed development is not in place in future years.
- The Proposed Development scenario – this scenario includes traffic from the Do Minimum scenario and traffic associated with the full build-out of the masterplan lands in the ownership of the Applicant (Marina Quarter Ltd.).
- Cumulative scenario – this scenario includes traffic from the 2 scenarios above as well as traffic associated with cumulative developments in the wider Dunboyne area.

Further detail on the modelling scenarios can be found in the Traffic and Transport Assessment prepared by Atkins and submitted with this planning application. The traffic data is detailed in Table 8.5. Only road links that met the DRMB scoping criteria were included in the modelling 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. See Chapter 7 Air Quality and Chapter 12 Material Assets – Transport for further details on the traffic data.

Table 8.5 Traffic Data used in Operational Phase Climate Assessment

Road Link	Location	Speed (kph)	Do Minimum	Do Minimum + Marina Quarter Ltd.	Do Minimum + Marina Quarter Ltd. + Cumulative Devs
			LDV AADT (HDV AADT)	LDV AADT (HDV AADT)	LDV AADT (HDV AADT)
1	M3 off ramp	100	1273 (66)	1444 (66)	1832 (66)
1	M3 on ramp	84	1381 (65)	1404 (65)	1698 (65)
2	M3 motorway south of J5	102	40716 (3649)	42444 (3653)	46057 (3649)
3	R147, north of R147/R157 junction	69	21231 (1035)	21370 (1013)	22419 (1009)
5	R157, between M3-Junction 5 and M3 Parkway junction	65	17677 (469)	19676 (471)	25447 (469)
6	R157, between M3 Parkway Junction and proposed Navan Road distributor road junction with R157	67	16625 (721)	18491 (722)	21640 (721)
7	R157, between proposed Navan Road distributor road junction with R157 and proposed Dunboyne Business Park Distributor Road junction with R157	66.5	16625 (721)	17478 (722)	20516 (722)

Road Link	Location	Speed (kph)	Do Minimum	Do Minimum + Marina Quarter Ltd.	Do Minimum + Marina Quarter Ltd. + Cumulative Devs
			LDV AADT (HDV AADT)	LDV AADT (HDV AADT)	LDV AADT (HDV AADT)
8	R157, between proposed Dunboyne Business Park Distributor Road junction with R157 and Summerhill Roundabout	63.5	15529 (614)	15900 (605)	18074 (615)
9	L2228 Summerhill Road, between Summerhill Roundabout and Main Street signalised junction	45.5	2961 (136)	3575 (125)	4326 (138)
10	L2228 Station Road, east of Main Street signalised junction	47	5946 (362)	6232 (361)	7119 (361)
12	Old Navan Road, north of Main Street signalised junction	44	3375 (141)	4108 (149)	4356 (137)
13	Proposed Eastern Distributor Road	37.5	2915 (0)	3876 (0)	4594 (0)
14	Dunboyne Business Park Distributor Road	41	3195 (117)	3482 (126)	4294 (111)
16	Proposed Old Navan Road distributor road	19	0 (0)	731 (0)	807 (0)
17	M3-Junction 5 Interchange	49	17706 (700)	18901 (677)	22327 (675)

8.5 Difficulties Encountered

There were no difficulties encountered in compiling this assessment.

8.6 Baseline Environment

PE-ENV-01104 (TII, 2022c) 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.

8.6.1 Greenhouse Gas Emissions

Data published in July 2023 (EPA, 2023) predicts that Ireland exceeded (without the use of flexibilities) its 2022 annual limit set under EU's Effort Sharing Decision (ESD) (EU 2018/842) by 3.72 Mt CO_2eq. When the available flexibilities are taken into account, the limit is exceeded by 1 MtCO_2e. The sectoral breakdown of 2022 GHG emissions is shown in Table 8.6. The sector with the highest emissions in 2022 was agriculture at 38.4% of the total, followed by transport at 19.1%. For 2022 total national emissions (excluding LULUCF) were estimated to be 60.76 Mt CO_2e as shown in Table 8.6 (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, 2022c) 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.

Table 8.6 Total National GHG Emissions in 2022

Sector	2021 Emissions (Mt CO_2e)	2022 Emissions (Mt CO_2e)	% Total 2022 (including LULUCF)	% Change from 2021 to 2022
Agriculture	23.626	23.337	34%	-2.1
Transport	10.978	11.634	17%	6.0
Energy Industries	10.262	10.076	15%	-1.8
Residential	6.992	6.105	9%	-12.7
Manufacturing Combustion	4.614	4.288	6%	-7.1
Industrial Processes	2.475	2.289	3%	-7.5
F-Gases	0.745	0.741	1%	-0.5
Commercial Services	0.765	0.767	1%	0.2
Public Services	0.672	0.659	1%	-1.9
Waste [Note 2]	0.726	0.867	1%	4.9
LULUFC	7.338	7.305	11%	-0.5
National total excluding LULUFC	**61.955**	**60.764**	**89%**	**-1.9**
National total including LULUFC	**62.293**	**68.069**	**100%**	**-1.8**

Note 1: Reproduced from Latest emissions data on the EPA website (EPA 2023)
Note 2: Waste includes emissions from solid waste disposal on land, solid waste treatment (composting and anaerobic digestion), wastewater treatment, waste incineration and open burning of waste

8.6.2 Climate Change Vulnerability

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, 2021b):

- 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, 2020c) 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 per cent 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, 2020c) 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 and that 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, 2020c). While individual storms are predicted to have more severe winds, the average wind speed has the potential to decrease (EPA, 2020c).

TII's Guidance document PE-ENV-01104 (TII, 2022c) 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 2020d). 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. Wind turbines need a specific range of wind speeds to operate within and droughts or low ground water levels may impact hydroelectric energy generating sites. 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.

8.7 The 'Do Nothing' Scenario

Under the Do Nothing Scenario construction works associated with the proposed development will not take place. Impacts from increased traffic volumes and associated emissions from the proposed development will also not occur. The climate baseline will continue to develop in line with the identified trends (see Section 8.6).

8.8 Potential Significant Effects

8.8.1 Construction Phase

8.8.1.1 Greenhouse Gas Assessment

There is the potential for greenhouse gas emissions to atmosphere during the construction of the development. 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. The baseline scenario has been determined in Section 8.6.1 by reference to Ireland's national GHG emissions for 2022. Total national GHG emissions (excluding LULUCF) were estimated to be 60.76 Mt CO_{2eq} in 2022 (EPA, 2023). GHG emissions associated with the proposed development will be a small fraction of this and are unlikely to significantly alter the baseline.

8.8.1.2 Climate Change Risk Assessment

Examples of potential climate impacts 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 to the proposed development as a result climate change 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 8.8.2.1. 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, and 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. In the absence of mitigation, impacts are predicted to be temporary to short-term and slight.

8.8.2 Operational Phase

8.8.2.1 Climate Change Risk Assessment

In order 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 8.7 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 8.4. The results of the vulnerability assessment are detailed in Table 8.7.

Table 8.7 Climate Change Vulnerability Assessment

Climate Hazard	Sensitivity	Exposure	Vulnerability
Flooding (Coastal, Pluvial, Fluvial)	1 (Low)	1 (Low)	1 (Low)
Extreme Heat	1 (Low)	2 (Medium)	2 (Low)
Extreme Cold	1 (Low)	2 (Medium)	2 (Low)
Wildfire	1 (Low)	1 (Low)	1 (Low)
Drought	1 (Low)	1 (Low)	1 (Low)
Extreme Wind	1 (Low)	1 (Low)	1 (Low)
Lightning & Hail	1 (Low)	1 (Low)	1 (Low)
Landslides	1 (Low)	1 (Low)	1 (Low)
Fog	1 (Low)	1 (Low)	1 (Low)

The OPW flood maps database (OPW, 2023) was reviewed as part of the vulnerability assessment and this indicated that there have been past fluvial flood events in the area of the proposed development site. Increased rainfall in future years as a result of climate change has the potential to result in flooding. The drainage design standards used for the proposed development allow for an additional 20% increase in rainfall as a result of climate change which is consistent with the RCP4.5 (medium-low) scenario. Therefore, once the design measures for the proposed development are implemented there is a low risk of fluvial flooding at the site. Additionally, due to the site's location coastal flooding is not a risk at the site. The proposed development is not considered at risk due to flooding (coastal, fluvial or pluvial).

In relation to wildfires, the *Think Hazard!* tool developed by the Global Facility for Disaster Reduction and Recovery (GFDRR) (2023), indicates that the wildfire hazard is classified as medium for the Meath area. This means that there is between a 10% to 50% chance of experiencing weather that could support a hazardous wildfire that may pose some risk of life and property loss in any given year. Future climate modelling indicates that there could be an increase in the weather conditions which are favourable to fire conditions, these include increases in temperature and prolonged dry periods. However, due to the project location in a suburban area the risk of wildfire is significantly lessened and it can be concluded that the proposed development is of low vulnerability to wildfires.

The Geological Society of Ireland (GSI) landslide susceptibility mapping database (GSI, 2023) was reviewed in order to determine the risk from landslides at the proposed development. There have not been any historical landslide events in the vicinity of the proposed development and the area is not susceptible to future landslides. Therefore, landslides are not a risk for the proposed development site.

At the detailed design stage chosen building materials will be high quality, durable and hard-wearing and chosen to withstand increased variations in temperature in the future as a result of climate change. Overall, the proposed development has at most low vulnerabilities to the identified climate hazards and therefore no detailed risk assessment is required.

8.8.2.2 Climate and Traffic Emissions

There is the potential for increased traffic volumes to impact climate during the operational phase. The predicted concentrations of CO_2 for the future year of 2040 are detailed in Table 8.8. These are significantly less than 2030 targets set out under EU legislation (targets beyond 2030 are not available). It is predicted that in 2040 the proposed development will increase CO_2 emissions by 0.00066% of the EU 2030 target. The cumulative impact will result in CO_2 emissions that are predicted to increase by 0.00269% of the EU 2030 target.

Table 8.8 Traffic Emissions GHG Impact Assessment

Year	Scenario	CO_2e (tonnes/annum)
2040	Do Minimum	8,423
	Do Minimum + Marina Quarter Ltd.	8,644
	Do Minimum + Marina Quarter Ltd. + Cumulative Developments	9,321
Increment due to Marina Quarter Ltd.		221
Cumulative Increment		898
Emission Ceiling (Tonnes) 2030		33,381,312
Proposed Development Impact (%)		0.00066%
Cumulative Impact (%)		0.00269%

Note 1 Target under Commission Implementing Decision (EU) 2020/2126 of 16 December 2020 on setting out the annual emission allocations of the Member States for the period from 2021 to 2030 pursuant to Regulation (EU) 2018/842 of the European Parliament and of the Council

8.8.3 Cumulative Effects

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.

The traffic data used for the operational phase assessment included cumulative traffic from existing developments in the surrounding area and the full masterplan development. Therefore, this impact assessment is cumulative.

8.9 Mitigation

8.9.1 Construction Phase Mitigation

Embodied carbon of materials and construction activities will be the primary source of climate impacts during the construction phase. During the construction phase the following best practice measures shall be implemented on site to prevent significant GHG emissions and reduce impacts to climate:

- 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.
- Waste materials will be re-used on site where possible and where re-use is not possible on-site they will be sent off-site for recycling, re-use or recovery.
- Sourcing materials locally where possible to reduce transport related CO_2 emissions.

Additionally, as per Section 8.8.1.2, the site contractor will be required to prepare risk assessments to assess the risk of potential impacts from climate change during the construction stage of the development. If necessary, the contractor will be required to develop mitigation and procedures for dealing with climate change related impacts during construction such as intense rainfall events or storms.

8.9.2 Operational Phase Mitigation

A number of measures have been incorporated into the design of the development in order 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 8.8.2.1).

A number of incorporated design mitigation measures have been incorporated into the design of the development to reduce the impact on climate wherever possible. The development will be in compliance with the requirements of the Near Zero Energy Building (NZEB) Standards and will achieve a Building Energy Rating (BER) in line with the NZEB requirements. Renewable technologies will be implemented for the energy or heating requirements of the units to meet the BER of the NZEB requirements. All lighting will be fully energy efficient lighting. Durable building material will be selected to prevent the need for frequent replacement or maintenance thereby reducing the embodied footprint of the development. Bicycle parking has been incorporated into the development to provide an alternative, more sustainable mode of transport compared to private vehicles. These identified measures will aid in reducing the impact to climate during the operational phase of the proposed development in line with the goals of the Climate Change Action Plan. Further details on some of the incorporated design measures can be found in the Energy Statement prepared by Morely Walsh in respect of this planning application.

8.9.3 Cumulative Mitigation

No specific cumulative mitigation is required.

8.10 Residual Impact Assessment

The impact to climate as a result of a proposed development must be assessed as a whole for all phases. 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 has proposed some best practice mitigation measures and is committing to reducing climate impacts where feasible. As per the assessment criteria in Table 8.3 the impact of the proposed development in relation to GHG emissions is considered long-term, minor adverse and not significant.

In relation to climate change vulnerability, it has been assessed that there are no significant risks to the proposed development as a result of climate change.

8.11 Risk of Major Accidents or Disasters

As detailed in Section 8.8.2.1, climate change has the potential to alter weather patterns and increase the frequency of rainfall in future years. However, the potential for flooding on site has been reviewed and adequate attenuation and drainage have been provided for to account for increased rainfall in future years. The proposed development has been assessed as having only low vulnerabilities to various climate change related hazards and therefore there is no significant risk to the site as a result of climate change. Therefore, the impact will be neutral and imperceptible.

8.12 Significant Interactions

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 increased rainfall in future years as a result of climate change. Therefore, interactions between climate and hydrology are not significant.

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. In addition, climate impacts will interact with the proposed developments design both with respect to embodied carbon but also through its vulnerability to future climate change impacts (e.g. wind loading, extreme temperatures). The building detailed design will be finalised with potential future climate hazards in mind. Building design will also take into account energy efficiency measures to reduce construction phase and operational carbon emissions. The impact of the interactions between design considerations (flood mitigation design, landscaping design and building design) and climate are considered to be long-term and not significant.

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.

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Large Scale
Residential Development
at Dunboyne North, Co. Meath

Volume II

Environmental Impact Assessment Report

CHAPTER 9

Noise and Vibration

August 2023

McCutcheon Halley
CHARTERED PLANNING CONSULTANTS

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9 Noise & Vibration

9.1 Introduction

This chapter of the EIAR was prepared to assess the potential significant effects of the proposed development on the subject site which is located within the townland of Bennetstown to the north of the defined development boundary of the town of Dunboyne. The site is located c.1.45km to the north of the town centre and situated directly south of the Dunboyne to Clonsilla Rail Line and M3 Parkway rail station,

This chapter assesses the potential noise & vibration impacts associated with the proposed residential development at Dunboyne, Co. Meath.

This chapter includes a description of the receiving ambient noise climate in the vicinity of the subject site and an assessment of the potential noise and vibration impacts associated with the proposed development during both the short-term construction phase and the long-term operational phase on its surrounding environment and the inward impact of existing noise on the development itself. The assessment of direct, indirect and cumulative noise and vibration impacts on the surrounding environment have been considered as part of the assessment.

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

The assessment has been undertaken with reference to the most appropriate guidance documents relating to environmental noise and vibration which are set out within the relevant sections of this chapter and included in the references section. In addition to specific noise guidance documents, the following guidelines were considered and consulted for the purposes of this chapter:

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning & Local Government, 2018);
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017); and
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022)

9.2 Expertise & Qualifications

This chapter has been prepared by Alistair Maclaurin. Alistair holds a BSc in Creative Music and Sound Technology and a Diploma in Acoustics and Noise Control. He is a member of the Institute of Acoustics (MIOA). Alistair has worked in the field of acoustics since 2012. He has been the lead noise consultant across various sites on major infrastructure projects such as Crossrail and Thames Tideway Tunnel, specialising in construction noise assessment and control. Additionally, he has undertaken various environmental noise assessments and planning reports for infrastructure, residential, commercial and other developments.

9.3 Proposed Development

The full description of the proposed development is outlined in Chapter 2 'Development Description' of this EIAR.

The subject site is located within the townland of Bennetstown to the north of the defined development boundary of the town of Dunboyne. The site is located c.1.45km to the north of the town centre and situated directly west of the Dunboyne to Clonsilla Rail Line and M3 Parkway rail station, The site is accessible via the R157 which is located at the west of the site.

The area surrounding the site is characterised by predominantly agricultural uses. The lands immediately adjoining the site to the west, east and south are all under agricultural use. The M3 Parkway rail station is situated to the north of the site. The R157 bounds the site to the west with agricultural land beyond.

The site is Phase 1 of a larger masterplan area. Future phases of development will be situated to the west of the subject site.

9.4 Methodology

The study has been undertaken using the following methodology:

- Baseline noise monitoring has been undertaken across the development site to determine the range of noise levels at varying locations across the site;
- A review of the most applicable standards and guidelines has been conducted in order to set a range of acceptable noise and vibration criteria for the construction and operational phases of the proposed development, this is summarised in the following sections;
- Predictive calculations have been performed to estimate the likely noise emissions during the construction phase of the project at the nearest sensitive locations (NSL's) to the site;
- Predictive calculations have been performed to assess the potential impacts associated with the operation of the development at the most sensitive locations surrounding the development site;
- A schedule of mitigation measures has been proposed, where relevant, to control the noise and vibration emissions associated with both the construction and operational phases of the proposed development, and;
- The inward impact of noise of the surrounding environment (e.g. aircraft and road noise) into the proposed buildings has also been assessed to determine the requirements, for additional noise mitigation to provide suitable residential amenities.

9.4.1 Relevant Legislation & Guidance

9.4.1.1 Construction Noise

There is no published statutory Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. Local authorities normally control construction activities by imposing limits on the hours of operation and consider noise limits at their discretion.

In the absence of specific noise limits, appropriate criteria relating to permissible construction noise levels for a development of this scale may be found in the British Standard BS 5228 – 1: 2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Noise.

The approach adopted here calls for the designation of a noise noise-sensitive location into a specific category (A, B or C) based on existing ambient noise levels in the absence of construction noise. This then sets a threshold noise value that, if exceeded at this location, indicates a significant noise impact is associated with the construction activities.

This document sets out guidance on permissible noise levels relative to the existing noise environment. Table 9.1 sets out the values which, when exceeded, signify a significant effect at the facades of residential receptors as recommended by BS 5228 – 1.

Table 9.1 Example of Threshold of Potential Significant Effect at Dwellings

Assessment Category & Threshold Value Period (LAeq)	Threshold Value, in Decibels (dB)		
	Category A Note A	Category B Note B	Category C Note C
Night-time (23:00 to 07:00hrs)	45	50	55
Evening & Weekends Note D	55	60	65
Daytime (0700 to 19:00hrs) & Saturdays (07:00 to 13:00hrs)	65	70	75

- Note A) Category A: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.
- Note B) Category B: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as Category A values.
- Note C) Category C: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than Category A values.
- Note D) 19:00 – 23:00hrs weekdays; 13:00 – 23:00hrs Saturdays and 07:00 – 23:00hrs Sundays

It should be noted that this assessment method is only valid for residential properties.

This assessment process determines if a potential significant construction noise impact is likely.

Proposed Significance Threshold Noise Levels

Taking into account the proposed documents outlined above and making reference to the baseline noise environment monitored around the development site (see Section 9.3), BS 5228-1:2009+A1:2014 has been used to inform the assessment approach for construction noise.

The following Construction Noise Threshold (CNT) levels are proposed for the construction stage of this development:

- For residential NSLs it is considered appropriate to adopt 65 dB(A) CNT. Given the baseline monitoring carried out, it would indicate that Category A values are appropriate using the ABC method.

Taking into account the proposed documents outlined above and making reference to the baseline noise environment monitored around the development site (see Section 12.3), BS 5228-1:2009+A1:2014 has been used to inform the assessment approach for construction noise, in line with the ABC method.

Interpretation of the CNT

In order to assist with the interpretation of CNTs, Table 9.2 includes guidance as to the likely magnitude of the impact associated with construction activities, relative to the CNT. This guidance is derived from Table 3.16 of DMRB: Noise and Vibration and adapted to include the relevant significance significant effects from the EPA EIAR Guidelines.

Table 9.2 Likely Impact due to Construction Noise

Guidelines for Noise Impact Assessment Significance (DMRB)	CNT per Period	EPA EIAR Significance Effects
Negligible	Below or equal to baseline noise level	Not Significant
Minor	Above baseline noise level and below or equal to CNT	Slight to Moderate
Moderate	Above CNT and below or equal to CNT +5 dB	Moderate to Significant
Major	Above CNT +5 to +15 dB	Significant, to Very Significant

The adapted DMRB guidance outlined will be used to assess the predicted construction noise levels at NSLs and comment on the likely impacts during the construction stages.

9.4.1.2 Construction Vibration

Peak particle velocity (PPV) is commonly used to assess the structural response of buildings to vibration. Reference to the following documents has been made for the purposes of this assessment in order to discuss appropriate PPV limit values.

- British Standard BS7385: 1993: Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration, and;
- British Standard BS5228-2: 2009 + A1: 2014: Code of practice for noise and vibration control on construction and open sites – Vibration.

BS5228-2 and BS7385 advise that, for soundly constructed residential property properties and similar structures that are generally in good repair, a threshold for minor or cosmetic (i.e. non-structural) damage should be taken as a peak component particle velocity (in frequency range of predominant pulse) of 15mm/s at 4Hz increasing to 20mm/s at 15Hz and 50mm/s at 40Hz and above. The standard also notes that below 12.5 mm/s PPV the risk of damage tends to zero.

The recommended vibration limits in order to avoid cosmetic damage to buildings, as set out in both documents referred to above, are reproduced in Table 9.3. The documents note that minor structural damage can occur at vibration magnitudes which are greater than twice those presented in Table 9.4. Major damage to a building structure is possible at vibration magnitudes greater than four times the values set out in the Table. It should be noted that these values refer to the base of the building.

Table 9.3 Transient Vibration Guide Values for Cosmetic Damage

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

Human response to vibration stimuli occurs at orders of magnitudes below those associated with any form of building damage; hence vibration levels lower than those indicated in Table 9.3 can lead to concern. BS5228-2 also provides a useful guide relating to the assessment of human response to vibration in terms of PPV. Table 9.4 summarises the range of vibration values and the associated potential effects on humans.

Table 9.4 Guidance on Effects of Human Response to PPV Magnitudes

Vibration Level, PPV	Effect
0.14 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies. At lower frequencies people are less sensitive to vibration.
0.3 mm/s	Vibration might be just perceptible in residential environments.
1 mm/s	It is likely that a vibration level of this magnitude in residential environments will cause complaint.

The standard notes that single or infrequent occurrences of these levels do not necessarily correspond to the stated effect in every case. Where these values are routinely measured or expected, then an assessment in accordance with BS 6472-1 might be more appropriate to determine whether time time-varying exposure is likely to give rise to any degree of adverse comment.

9.4.1.3 Additional Traffic on Public Roads

In order to consider the potential noise impact associated with the proposed development introducing additional traffic onto the existing road networks and given that vehicle movements on public roads are assessed using a different parameter (the ten-percentile noise level; L_{A10}), it is appropriate to consider the increase in traffic noise level that arises as a result of vehicular movements associated with the development in terms of the L_{A10} parameter.

In order to assist with the interpretation of the noise associated with vehicular traffic on public roads, Table 9.5 offers guidance as to the likely impact associated with any change in traffic noise level (Source DMRB).

Table 9.5 Likely Impact Associated with Change in Traffic Noise Level

Change in Sound Level (dB L_{A10})	Subjective Reaction	DMRB Magnitude of Impact	EPA Classification Magnitude of Impact
0	Inaudible	No Change	Neutral
0.1 – 2.9	Barely Perceptible	Negligible	Imperceptible
3 – 4.9	Perceptible	Minor	Slight
5 – 9.9	Up to a doubling of loudness	Moderate	Moderate

9.4.1.4 Building Services Plant

BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound is the industry standard method for analysing building services plant sound emissions to residential receptors. BS 4142 describes methods for rating and assessing sound of an industrial and/or commercial nature. The methods described in this British Standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

For an appropriate BS 4142 assessment it is necessary to compare the measured external background sound level (i.e. the $L_{A90,T}$ level measured in the absence of plant items) to the rating level ($L_{Ar,T}$) of the various plant items, when operational. Where sound emissions are found to be tonal, impulsive, intermittent or to have other sound characteristics that are readily distinctive against the residual acoustic environment, BS4142 advises that penalties be applied to the specific level to arrive at the rating level.

The subjective method for applying a penalty for tonal sound characteristics outlined in BS 4142 recommends the application of a 2dB penalty for a tone which is just perceptible at the receptor, 4dB where it is clearly perceptible, and 6dB where it is highly perceptible. In relation to intermittency, BS 4142 recommends that If the intermittency us readily is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

The following definitions, as discussed in BS 4142 as summarised below:

"ambient sound level, $L_{Aeq,T}$"	equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at any given time, usually from many sources near and far, at the assessment location over a given time interval, T.
"residual sound level, $L_{Aeq,T}$"	equivalent continuous A-weighted sound pressure level of the residual sound (i.e. ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound) at the assessment location over a given time interval, T.
"specific sound level, $L_{Aeq,T}$"	equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, Tr.
"rating level, $L_{Ar,T}$"	specific sound level plus any adjustment for the characteristic features of the sound.
"background sound level, $L_{A90,T}$"	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.

In order to establish an initial estimate of impact, BS 4142 states the following:

Obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level from the rating level, and consider the following.

a. Typically, the greater this difference, the greater the magnitude of the impact.

b. A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.

c. A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.

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

Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.

The assessment methodology described above (i.e. comparison of rated sound level to background sound level) is quoted in BS4142 as representing a methodology to 'obtain an initial estimate' of impact. It is important to note that BS4142 also comments that 'Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration'. BS4142 provides a list of potential pertinent factors that can influence the 'initial estimate'. The plant noise assessment conducted in the following sections has been carried out with consideration of the guidance contained in BS4142 as summarised above.

9.4.1.5 Operational Noise – Inward Noise Assessment

9.4.1.5.1 Meath County Development Plan 2021-2027

Section 12 DM POL 31 of the *Meath County Development Plan 2021-2027* sets out "to manage noise sensitive development in Noise Zone B and Noise Zone C, where aircraft noise may give rise to annoyance and sleep disturbance, and to ensure, where appropriate, noise insulation is incorporated within the development."

Noise zones are detailed in the *Fingal Development Plan 2023-2029* and are presented below. The proposed development site is located within Zone C. The noise zones are not detailed in the *Meath County Development Plan 2021-2027* and therefore the zones in Fingal Development Plan have been relied upon.

Table 9.6 Dublin Airport Noise Zones

Zone	Indication of Potential Noise Exposure during Airport Operations	Objective
D	≥ 50 dB and < 54 dB $L_{Aeq,\ 16hr}$ and ≥ 40 dB and < 48 dB L_{night}	**To identify noise sensitive developments which could potentially be affected by aircraft noise and to identify any larger residential developments in the vicinity of the flight paths serving the Airport in order to promote appropriate land use and to identify encroachment.** *All noise sensitive development within this zone is likely to be acceptable from a noise perspective. An associated application would not normally be refused on noise grounds, however where the development is residential-led and comprises non-residential noise sensitive uses, or comprises 50 residential units or more, it may be necessary for the applicant to demonstrate that a good acoustic design has been followed.* *Applicants are advised to seek expert advice.*
C	≥ 54 dB and < 63 dB $L_{Aeq,\ 16hr}$ and ≥ 48 dB and < 55 dB L_{night}	**To manage noise sensitive development in areas where aircraft noise may give rise to annoyance and sleep disturbance, and to ensure, where appropriate, noise insulation is incorporated within the development** *Noise sensitive development in this zone is less suitable from a noise perspective than in Zone D. A noise assessment must be undertaken in order to demonstrate good acoustic design has been followed.* *The noise assessment must demonstrate that relevant internal noise guidelines will be met. This may require noise insulation measures.* *An external amenity area noise assessment must be undertaken where external amenity space is intrinsic to the development's design. This*

Zone	Indication of Potential Noise Exposure during Airport Operations	Objective
		assessment should make specific consideration of the acoustic environment within those spaces as required so that they can be enjoyed as intended. Ideally, noise levels in external amenity spaces should be designed to achieve the lowest practicable noise levels. *Applicants are strongly advised to seek expert advice.*
B	≥ 54 dB and < 63 dB $L_{Aeq, 16hr}$ And ≥ 55 dB L_{night}	**To manage noise sensitive development in areas where aircraft noise may give rise to annoyance and sleep disturbance, and to ensure noise insulation is incorporated within the development.** *Noise sensitive development in this zone is less suitable from a noise perspective than in Zone C. A noise assessment must be undertaken in order to demonstrate good acoustic design has been followed.* *Appropriate well-designed noise insulation measures must be incorporated into the development in order to meet relevant internal noise guidelines.* *An external amenity area noise assessment must be undertaken where external amenity space is intrinsic to the development's design. This assessment should make specific consideration of the acoustic environment within those spaces as required so that they can be enjoyed as intended. Ideally, noise levels in external amenity spaces should be designed to achieve the lowest practicable noise levels.* *Applicants must seek expert advice.*
A	≥ 63 dB $L_{Aeq, 16hr}$ and/or ≥ 55 dB L_{night}	**To resist new provision for residential development and other noise sensitive uses.** *All noise sensitive developments within this zone may potentially be exposed to high levels of aircraft noise, which may be harmful to health or otherwise unacceptable. The provision of new noise sensitive developments will be resisted.*
Notes: • 'Good Acoustic Design' means following the principles of assessment and design as described in ProPG: Planning & Noise – New Residential Development, May 2017; • Internal and External Amenity and the design of noise insulation measures should follow the guidance provided in British Standard BS8233:2014 'Guidance on sound insulation and noise reduction for buildings'		

9.4.1.5.2 Adopted Guidance

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

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

- Stage 1 - Comprises a high-level initial noise risk assessment of the proposed site considering either measured and or predicted noise levels; and,
- Stage 2 – Involves a full detailed appraisal of the proposed development covering four "key elements" that include:
    - Element 1 - Good Acoustic Design Process.
    - Element 2 - Noise Level Guidelines.
    - Element 3 - External Amenity Area Noise Assessment; and,
    - Element 4 - Other Relevant Issues.

The initial noise risk assessment is intended to provide an early indication of any acoustic issues that may be encountered. It calls for the categorisation of the site as a negligible, low, medium or high risk based on the pre-existing noise environment. Figure 9.1 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.

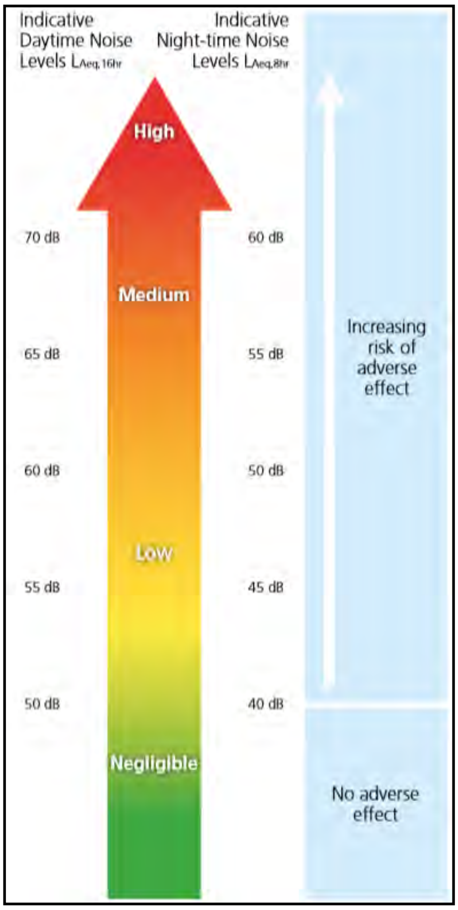

Figure 9.1 ProPG Stage 1 – Initial Noise Risk Assessment

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

Element 2 of the ProPG document sets out recommended internal noise targets derived from BS 8233 (2014). The recommended indoor ambient noise levels are set out in Table 9.7 and are based on annual average data, they omit occasional events where higher intermittent noisy events may occur.

Table 9.7 ProPG Internal Noise Levels

Activity	Location	(07:00 to 23:00hrs)	(23:00 to 07:00hrs)
Resting	Living Room	35 dB $L_{Aeq, 16hr}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq, 16hr}$	-
Sleeping	Bedroom	35 dB $L_{Aeq, 16hr}$	30 dB $L_{Aeq, 8hr}$ 45 dB L_{AFmax}

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

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.

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

"The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB $L_{Aeq,16hr}$."

9.5 Difficulties Encountered

There were no particular difficulties encountered during this assessment.

9.6 Baseline Environment

A series of baseline noise surveys have been undertaken across the development site to determine the range of noise levels at varying locations across the site and to establish the existing noise climate the nearest noise noise-sensitive locations and across the development site itself.

The surveys were conducted in general accordance with ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise. Specific details are set out below.

Figure 9.2 Approximate Study Area for Noise and Vibration Assessment (indicative outline in orange)

9.6.1 Local Receptors

Figure 9.3 identifies the receptors local to the proposed development. The outward noise and vibration assessments will focus on the impact on these locations. To the north east of the site at approximately 35m distance lies the closest receptor (R1) which is a residential property. Other receptors (R2) lie to the south east of the site on Navan Road. These residential properties are approximately 180m distance to the site. All other existing properties are located greater than 300m from the site and have been discounted from the assessment due to the considerable distance and the associated noise attenuation provided by that distance.

Figure 9.3 Identified Receptor Locations

9.6.2 Choice of Measurement Locations

Unattended noise monitoring was undertaken at location UT01 during both day and night periods. Attended daytime measurements were undertaken at locations AT01, AT02, AT03. The locations were selected to be representative of the existing noise environment at the closest noise-sensitive locations and the noise climate within the development site itself.

The locations are described below and illustrated in Figure 9.4.

Figure 9.4 Noise Monitoring Locations

9.6.3 Survey Periods

The surveys were undertaken over the following surveys periods:

- Unattended noise monitoring was undertaken at UT01 between 10:45hrs on 7th July 2022 and 10:00hrs on 11th July 2022;
- Attended noise monitoring was undertaken at AT01, AT02 and AT03 on 27th June 2022.

9.6.4 Monitoring Equipment

The surveys were undertaken with a Rion NL-52 and a Brüel & Kjaer 2250 Sound Level Meter. Calibration certificates can be forwarded on request.

9.6.5 Measurement Parameters

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

L_{Aeq} — is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period.

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

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

The "A" suffix denotes the fact that the sound levels have been "A-weighted" in order to account for the non-linear nature of human hearing.

All sound levels in this report are expressed in terms of decibels (dB) relative to $2x10^{-5}$ Pa.

9.6.6 Survey Results

The results of the noise monitoring completed at the various locations are discussed in the following sections.

9.6.6.1 Location UT01

Table 9.8 reviews the measured noise levels at Location UT01.

Table 9.8 Noise Monitoring Results Location UT01

Date	Period	dB $L_{Aeq(T)}$	L_{Amax}	dB $L_{A90(T)}$
07/07/23	Day	56	81	49
	Night	50	76	40
08/07/23	Day	56	85	48
	Night	50	76	38
09/07/23	Day	55	79	47
	Night	51	75	44
10/07/23	Day	56	80	50
	Night	55	70	46
11/07/23	Day	56	79	51
	Night	52	70	42
12/07/23	Day	56	76	52

In general, the following noise sources were noted across the site:

- Aircraft activity associated with Dublin Airport;
- M3 road traffic noise;
- M3 Parkway rail line intermittent noise;
- Local traffic movements;
- Agricultural noises
- Birdsong, and;
- A degree of wind generated noise.

Ambient noise levels averaged 56 dB $_{LAeq,16hr}$ over daytime periods and 52 dB $_{LAeq,8hr}$ during night time. Background noise levels ranged from 47 to 52 dB $_{LA90,16hr}$ and 38 to 46 dB $_{LA90,8hr}$ during daytime and night time periods, respectively.

The L_{AFmax} levels are also of an interest here, in particular in relation to night time periods. The L_{AFmax} values were measured at 15-minute intervals over the duration of the unattended monitoring survey. Figure 9.5 presents the distribution of the magnitude of L_{AFmax} events during the night period at the noise monitoring location considered for this assessment.

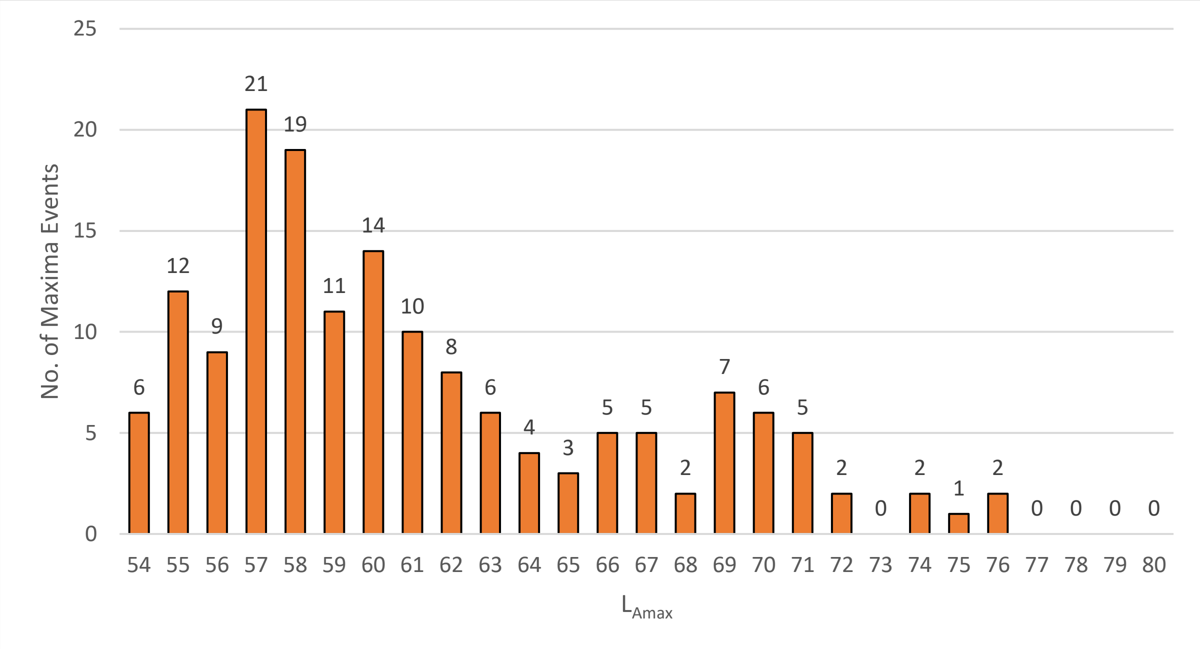

Figure 9.5 Chart Presenting Analysis of Night-time LAmax Events

These L_{Amax} levels will be discussed in detail in subsequent sections of this assessment.

No significant level of vibration was noted at this location during setup and removal of the equipment from site.

9.6.6.2 Location AT01

Table 9.9 presents the results of the noise monitoring completed at Location AT01.

Table 9.9 Noise Monitoring Results Location AT01

Location	Date	Time	Survey Time	L_{Aeq}	L_{Amax}	dB $L_{A90(T)}$
AT01	27/06/2022	14:10	00:15:00	64	74	55
	27/06/2022	15:13	00:15:00	65	76	57
	27/06/2022	16:14	00:15:00	66	79	59

During the survey period noise from local traffic on the R157 regional road, the M3 motorway, birdsong, agricultural noise, foliage rustle and aircraft noise were noted here. Noise levels were the order of 64 – 65 dB $_{LAeq,15min}$ and 55 – 59 dB $_{LA90,15min}$.

9.6.6.3 Location AT02

Table 9.10 presents the results of the noise monitoring completed at Location AT02.

Table 9.10 Noise Monitoring Results Location AT02

Location	Date	Time	Survey Time	L_{Aeq}	L_{Amax}	dB $L_{A90(T)}$
AT02	27/06/2022	14:32	00:15:00	56	72	51
	27/06/2022	15:33	00:15:00	57	75	50
	27/06/2022	16:34	00:15:00	57	71	52

During the survey period noise from the M3 motorway, noise from the local traffic on the R157 regional road, intermittent train noise from the M3 parkway rail line, birdsong, agricultural noise and aircraft noise were noted here. Noise levels were the order of 56 – 57 dB $_{LAeq,15min}$ and 50– 51 dB $_{LA90,15min}$.

9.6.6.4 Location AT03

Table 9.11 presents the results of the noise monitoring completed at Location AT03.

Table 9.11 Noise Monitoring Results Location AT03

Location	Date	Time	Survey Time	L_{Aeq}	L_{Amax}	dB $L_{A90(T)}$
AT03	27/06/2022	14:51	00:15:00	55	73	51
	27/06/2022	15:50	00:15:00	57	72	52
	27/06/2022	16:52	00:15:00	57	65	54

During the survey period noise from the M3 motorway, intermittent train noise from the M3 parkway rail line, birdsong, agricultural noise and aircraft noise were noted here. Noise levels were the order of 55 – 57 dB $_{LAeq,15min}$ and 51 – 54 dB $_{LA90,15min}$.

No significant level of vibration was noted at this location during survey period.

9.6.7 Impact Assessment

The proposed development comprises residential units; a full description of the development can be found in Chapter 2 of this EIAR.

The potential noise and vibration impact on the surroundings are considered for both the construction and operational phases of this development.

During the construction phase, the main site activities will include site clearance, foundation works, building construction, road works, and landscaping. This phase has the greatest potential noise and vibration impacts on its surrounding environment, however this phase will be of short-term impact.

During the operational phase of the development, the primary source of outward noise in the operational context relates to any changes in traffic flows along the local road network and building services noise associated with commercial and office spaces.

The potential associated with each phase is assessed in the following sections.

9.7 The 'Do nothing' Scenario

In the event of a Do Nothing Scenario the noise environment is not expected to change.

9.8 Potential Significant Effects

9.8.1 Construction Phase Noise

The largest noise and vibration impact of the proposed development will occur during the construction phase due to the operation of various plant machinery and HGV movement to, from and around the site. However, the construction phase can be classed as a short-term phase.

BS 5228-1 contains noise level data for various construction machinery. The noise levels relating to site clearance, ground excavation and loading lorries (dozers, tracked excavators and wheeled loaders) reach a maximum of 81 dB $L_{Aeq,T}$ at a distance of 10 m. For this assessment, a worst-case scenario is assumed of 3 no. such items with a sound pressure level (SPL) of 81 dB at 10 m operating simultaneously along the closest works boundary. This would result in a total noise level of 86 dB at 10m and an equivalent combined sound power level of 114 dB L_{WA}. This conservative scenario is the typical assumption made for developments of this size, on the basis that it is unlikely that more than 3 no. items of such plant/equipment would be operating simultaneously in such close proximity to each other.

Guidance on the approximate attenuation achieved by barriers surrounding the site is also provided in BS 5228-1. It states that when the top of the plant is just visible to the receiver over the noise barrier, an approximate attenuation of 5 dB can be assumed, while a 10 dB attenuation can be assumed when the noise screen completely hides the sources from the receiver.

For this scenario it is assumed that construction will be partially screened from the local receptors by way of typical 2.4m site hoarding. Table 9.12 shows the potential noise levels calculated at various distances based on the assumed sound power level, a percentage on time of 66% and attenuation provided by the barrier of 5 dB.

Table 9.12 Predicted Construction Noise Levels

Description of Noise Source	Sound Power Level (dB Lw(A))	Calculated noise levels at varying distances (dB $L_{Aeq,T}$)				
		10m	20m	35m	50m	100m
3 no. items each with SPL of 81 dB at 10 m operating simultaneously.	114	76	69	63	59	51

Given that the closest receptor is located approximately 35m from the nearest site boundary the predictions indicate that noise levels from construction works will be within the recommended BS5228 criteria at receptor locations, and hence a **negative, slight to moderate and short-term impact** will be experienced at these locations.

9.8.2 Construction Phase Vibration

Potential for vibration impacts during the construction phase programme are likely to be limited given that rock breaking is not expected. In terms of piling, this activity is not expected to occur within 35m distance to the nearest noise sensitive property. Expected vibration levels during piling assuming augured or bored piles have been determined through reference to published empirical data. The British Standard BS 5228 – Part 2: Vibration, publishes the measured magnitude of vibration of rotary bored piling using a 600mm pile diameter for bored piling into soft ground over rock, (Table D.6, Ref. No. 106):

- 0.54mm/s at a distance of 5m, for auguring;
- 0.22mm/s at a distance of 5m, for twisting in casing;
- 0.42mm/s at a distance of 5m, for spinning off, and;
- 0.43mm/s at a distance of 5m, for boring with rock auger.

Taking into account the distance to the receptors vibration emissions from this activity will be significantly reduced. Vibration levels at the closest neighbouring buildings are expected to be orders of magnitude below the limits set out in Table 9.3 to avoid any cosmetic damage to buildings. Vibration levels are also expected to be below a level that would cause disturbance to building occupants. The impacts are predicted to be **temporary, negative and slight.**

9.8.3 Operational Phase Additional Traffic on Public Roads

A traffic impact assessment relating to the proposed development has been prepared as part of this planning assessment. Information from this report has been used to determine the predicted change in noise levels in the vicinity of a number of roads in the area surrounding the proposed development, for the opening and design years.

For the purposes of assessing 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 development. Note that this assessment takes a cumulative approach where all known planned future developments are accounted for in the traffic, hence this is a worst-case assessment. The results are presented in Table 9.11.

The results indicate that the effect due to noise from a change in traffic volumes will be imperceptible and long-term.

It's noted that a new road is included in the results. The volume of traffic predicted on Ref 16 Old Navan Distributor Road is comparatively lower than other roads within the area and is not expected to cause any significant impacts.

Table 9.13 Change in Traffic Noise Levels

Ref	Name	Location	Do Min (2040)	Do Something (2040)	Change in Noise Level (dB)
1	M3 North	-	25,284	26,171	+0.1
		Off-ramp	1,339	1,898	+1.5
		On-Ramp	1,446	1,763	+0.9
2	M3 South	-	44,366	49,706	+0.5
		Off-ramp	10,305	13,190	+1.1
		On-Ramp	11,539	13,964	+0.8

Ref	Name	Location	Do Min (2040)	Do Something (2040)	Change in Noise Level (dB)
3	R147	-	22,266	23,428	+0.2
4	R147	-	8,217	8,634	+0.2
5	R157	-	18,146	25,916	+1.5
6	R157	-	17,346	22,361	+1.1
7	R157	-	17,346	21,238	+0.9
8	R157	-	16,144	18,689	+0.6
9	L2228	-	3,097	4,464	+1.6
10	L2228	-	6,309	7,480	+0.7
11	Main Street	-	4,553	4,988	+0.4
12	Old Navan Road	-	3,516	4,493	+1.1
13	Eastern Distributor Road	-	2,915	4,594	+2.0
14	Dunboyne Business Park Distributor Road	-	3,312	4,405	+1.2
15	Kennedy Road	-	2,391	2,550	+0.3
16	Old Navan Road Distributor Road	-	0	807	-
17	M3 - Junction 5 Interchange	-	18,406	23,002	+1.0

9.8.4 Building Services Plant

Once operational, there will be building services plant items required to serve the residential aspect of the development. These will typically be limited to heating and cooling plant and extract units, depending on the building design and user requirements. Given the use of these buildings, the majority of plant items are likely to be required during daytime hours only; however, there may be requirement for a night-time operational plant, depending on specific requirements.

The location or type of building services plant has not yet been established, therefore it is not possible to calculate noise levels to the surrounding environment. In this instance, is it best practice to set appropriate noise limits that will inform the detailed design during the selection and layout of building services for the development,

These items will be selected at a later stage, however, they will be designed and located so that there is no negative impact on sensitive receivers within the development itself. The cumulative operational noise level from building services plant at the nearest noise-sensitive location within the development (e.g. apartments, etc.) will be designed/attenuated to meet the relevant BS 4142 noise criteria for day and night-time periods as set out in this assessment. Based on the baseline noise data collected for this assessment it is considered an appropriate design criterion is the order of 43 dB $L_{Aeq,15min}$. This limit is set in order to achieve acceptable internal noise levels within residential spaces based on prevailing noise levels in the area.

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

In terms of noise associated with day to day activities the associated effect is stated to be **negative, not significant, long-term.**

9.8.5 Inward Noise Assessment

9.8.5.1 Noise Environment

The development lands in question are in proximity to the Maynooth rail line, the M3 Motorway which lies to the east of the site, and is also within the Dublin Airport Noise Contours. These sources of noise have the potential to impact the residential development proposed for the site itself. The Dublin Airport Noise Zones account for potential future noise levels attributed to additional flights, hence, in this case they are summed with the measured baseline noise levels. In additional the noise levels have been adjusted for future traffic flows on roads local to the area. It's noted that the electrification of the DART Maynooth line will result in a positive change in noise levels within the area. The noise levels assumed for the site are as follows:

Table 9.14 Site noise levels

Reference Location	Day $L_{Aeq,16hr}$	Night $L_{Aeq,8hr}$
Facades facing onto R157	68	60
All other facades	64	57

9.8.5.2 Stage 1 – ProPG Noise Risk Classification of the Site

Giving consideration to the measured noise levels and the Dublin Airport Noise Contours presented in the previous sections the initial site noise risk assessment has concluded that there is a medium level of noise risk across the site.

Additionally, the Stage 1 Noise Risk Assessment requires analyses of the L_{AFmax} noise levels. In the case of the AWN survey, the L_{AFmax} noise levels measured less than 80 dB. ProPG guidance considers 20 night events over 80 dB to be a high risk, therefore this site would be considered a low to medium risk in terms of maxima events.

ProPG states the following with respect to medium risk:

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.

Given the above an Acoustic Design Strategy is required to demonstrate that suitable care and attention has been applied in mitigating and minimising noise impact to such an extent that an adverse noise impact will be avoided in the final development.

9.8.5.3 Stage 2 – Acoustic Design Strategy

Discussion on Open Windows

In the first instance, it is important to note 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 9.7 and a sound reduction across an open window of 15 dB, the free-field noise levels that would be required to ensure that internal noise levels do not exceed good (i.e. at or below the internal noise levels) or reasonable internal noise levels (i.e. 5 dB above the internal noise levels) have been summarised in Table 9.14.

Table 9.15 ProPG External Noise Levels to Achieve Reasonable Internal Noise Levels with Windows Open

Activity	(07:00 to 23:00hrs)	(23:00 to 07:00hrs)
Resting	50 - 55 dB $L_{Aeq, 16hr}$	45 dB $L_{Aeq, 8hr}$
Dining	55 - 60 dB $L_{Aeq, 16hr}$	50 dB $L_{Aeq, 8hr}$

In this instance, the external noise levels are such that it will not be possible to achieve the desired good internal noise levels with windows open and therefore appropriate acoustic specifications to windows and passive vents will be provided to ensure the rooms are adequately ventilated and achieve the good internal noise levels detailed here.

External Noise Levels for External Amenity Areas

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

> *"The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB $L_{Aeq,16hr}$."*

External noise levels across the site during the daytime are expected to range up to 64 to 67 dB $L_{Aeq,16hr}$.

It's noted that the external areas are calculated to be higher than the ProPG guidance noise levels, however, it is not possible to reduce the noise level across external spaces due to overhead aircraft noise being the dominant noise source as per the daa noise contours. However, it should be noted that the noise levels presented here are worst case assumptions based on the potential for future noise from the airport. Current noise levels across the site are much lower and the average noise level measured at U1 was 56 dB $L_{Aeq,16hr}$.

9.8.6 Cumulative Effects

Given the distances between receptors and other potential construction sites it is expected that there will be no significant cumulative construction or operational impacts.

9.9 Mitigation

9.9.1 Construction Phase Mitigation

With regard to construction activities, best practice operational and control measures for noise and vibration from construction sites are found within BS 5228 (2009 +A1 2014) Code of Practice for Noise and Vibration Control on Construction and Open Sites Parts 1 and 2.

BS5228 includes guidance on several aspects of construction site practices, including, but not limited to: -

- Selection of quiet plant.
- Control of noise sources.
- Screening (boundary, and or localised plant screening).
- Hours of work.
- Liaison with the public.
- Monitoring.

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

9.9.1.1 Selection of Quiet Plant

This practice is recommended in relation to sites with static plant such as compressors and generators. It is recommended that these units be supplied with manufacturers' proprietary acoustic enclosures where possible. The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. The least noisy item should be selected wherever possible.

9.9.1.2 Noise Control at Source

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

BS5228 states that "as far as reasonably practicable sources of significant noise should be enclosed". In applying this guidance, constraints such as mobility, ventilation, access and safety must be taken into account. Items suitable for enclosure include pumps and generators.

BS5228 makes a number of recommendations in relation to "*use and siting of equipment*". These are all directly relevant and hence are reproduced below. These recommendations will be adopted on site.

> *"Plant should always be used in accordance with manufacturers' instructions. Care should be taken to site equipment away from noise-sensitive areas. Where possible, loading and unloading should also be carried out away from such areas.*
>
> *Machines such as cranes that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum. Machines should not be left running unnecessarily, as this can be noisy and waste energy.*

Plant known to emit noise strongly in one direction should, when possible, be orientated so that the noise is directed away from noise-sensitive areas. Attendant operators of the plant can also benefit from this acoustical phenomenon by sheltering, when possible, in the area with reduced noise levels.

*Acoustic covers to engines should be kept closed when the engines are in use and idling. The use of compressors that have effective acoustic enclosures and are designed to operate when their access panels are closed is recommended.**

Materials should be lowered whenever practicable and should not be dropped. The surfaces on to which the materials are being moved could be covered by resilient material."

Other forms of noise control at source relevant to the development works are set out below: -

- For mobile plant items such as cranes, dump trucks, excavators and loaders, the installation of an acoustic exhaust and or maintaining enclosure panels closed during operation can reduce noise levels by up to 10dB. Mobile plant should be switched off when not in use and not left idling.
- For percussive tools such as pneumatic concrete breakers and tools a number of noise control measures include fitting muffler or sound reducing equipment to the breaker 'tool' and ensure any leaks in the air lines are sealed. Erect localised screens around breaker or drill bit when in operation in close proximity to noise sensitive boundaries.
- For concrete mixers, control measures should be employed during cleaning to ensure no impulsive hammering is undertaken at the mixer drum.
- For all materials handling ensure that materials are not dropped from excessive heights, lining drops chutes and dump trucks with resilient materials.
- Demountable enclosures can also be used to screen operatives using hand tools/ breakers and will be moved around site as necessary.
- All items of plant should be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.

9.9.1.3 Screening

Typically screening is an effective method of reducing the noise level at a receiver location and can be used successfully as an additional measure to all other forms of noise control. The effectiveness of a noise screen will depend on the height and length of the screen and its position relative to both the source and receiver.

Screening may be a useful form of noise control when works are taking place at basement and ground level to screen noise levels at ground floor adjacent buildings.

In addition, careful planning of the site layout should also be considered. The placement of site buildings such as offices and stores and in some instances materials such as aggregate can provide a degree of noise screening if placed between the source and the receiver. The use of localised mobile (mobile hoarding screens and / or acoustic quilts) to items of plant with the potential to generate high levels of noise are an effective noise control measure. These options should be considered when percussive works are taking place in close proximity to the nearest sensitive perimeter buildings.

9.9.1.4 Liaison with the Public

A designated noise liaison should be appointed to site during construction works. All noise complaints should be logged and followed up in a prompt fashion by the liaison officer. In addition, prior to particularly noisy construction activity, e.g. demolition, breaking, piling, etc., the liaison officer should inform the nearest noise sensitive locations of the time and expected duration of the noisy works.

9.9.1.5 Hours of Work

Construction works will be undertaken within the times below, taken from the Section 6 of the Draft Construction Management Plan: -

- Monday to Friday: 07:00 to 19:00hrs
- Saturday: 07:00 to 14:00hrs
- Sunday and Public Holidays: No noisy work on site.

9.9.2 Operational Phase Mitigation

9.9.2.1 Inward Noise Impact

The British Standard BS EN 12354-3: 2000: Building acoustics – Estimation of acoustic performance of buildings from the performance of elements – Part 3: Airborne sound insulation against outdoor sound provides a calculation methodology for determining the sound insulation performance of the external envelope of a building. The method is based on an elemental analysis of the building envelope and can take into account both the direct and flanking transmission paths.

The Standard allows the acoustic performance of the building to be assessed taking into account the following:

- Construction type of each element (i.e. windows, walls, etc.);
- Area of each element;
- Shape of the façade, and;
- Characteristics of the receiving room.

The principles outlined in BS EN 12354-3 are also referred to in BS8233 and Annex G of BS8233 provides a calculation method to determine the internal noise level within a building using the composite sound insulation performance calculated using the methods outlined in BS EN 12354-3. The methodology outlined in Annex aG of BS8233 has been adopted here to determine the required performance of the building facades. This approach corrects the noise levels to account for the frequency content of the source in question. In this instance, rail and road traffic noise, depending on the buildings in question. For properties with cumulative impacts from both rail and road, the frequency content of the dominant source has been used for calculations.

As is the case in most buildings, the glazed elements of the building envelope are typically the weakest element from a sound insulation perspective. Table 9.15 and Table 9.16 provide the calculated specification for glazing and ventilation, respectively.

Table 9.16 Sound Insulation Performance Requirements for Glazing, SRI (dB)

Facade	Octave Band Centre Frequency (Hz)						R_w
	125	250	500	1k	2k	4k	
RED	28	29	33	42	45	53	39
All Other Facades	27	26	33	39	39	47	37

Table 9.17 Sound Insulation Performance Requirements for Ventilation, SRI (dB)

Facade	Octave Band Centre Frequency (Hz)						$D_{ne,w}$
	125	250	500	1k	2k	4k	
RED	46	44	38	43	43	55	42
All Other Facades	30	33	38	37	36	36	38

Figure 9.6 highlights the **RED** façades that require the higher level of noise mitigation, all other facades will require the lower level of mitigation.

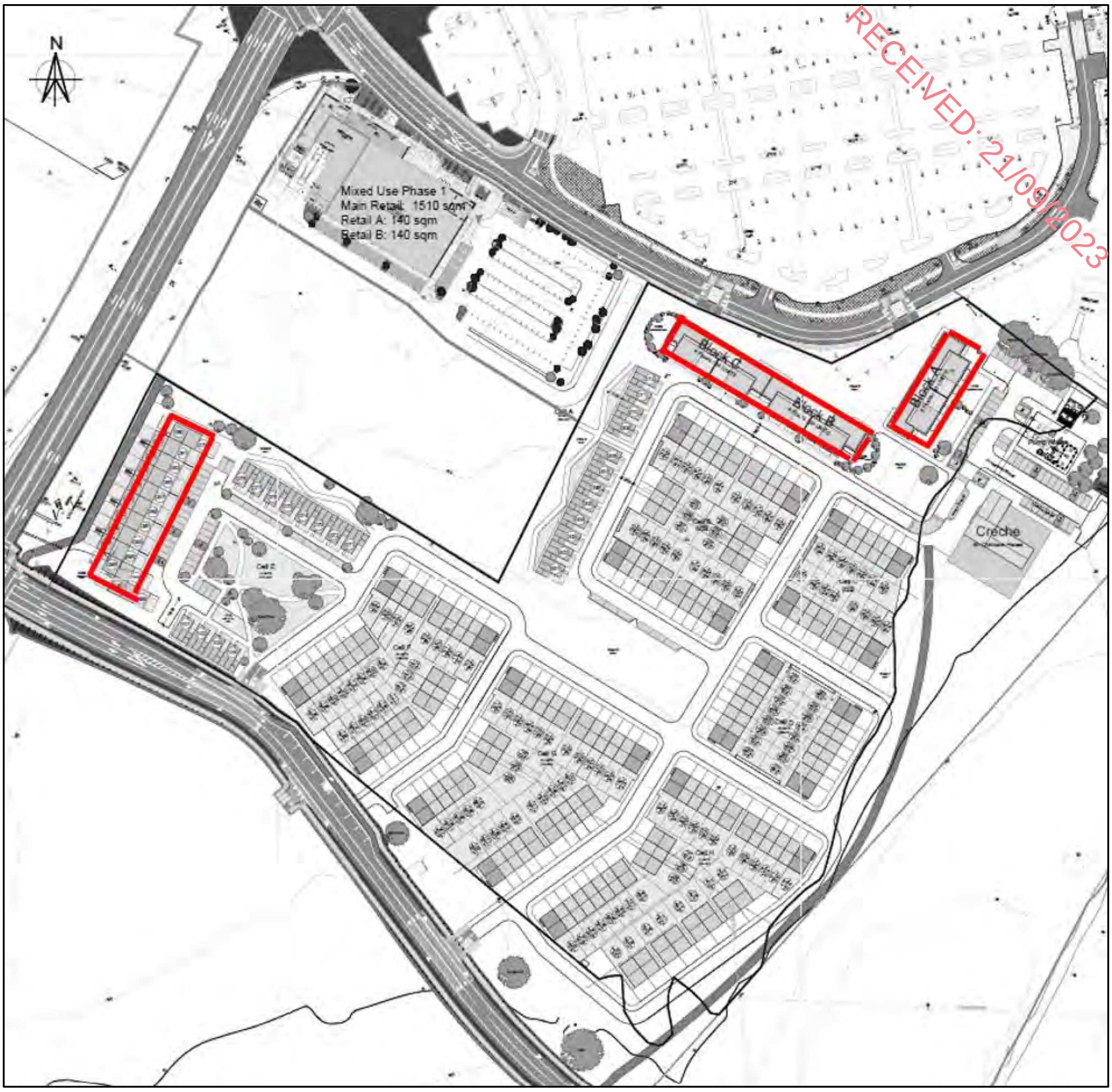

Figure 9.6 Façade Mitigation

The overall R_w and $D_{ne,w}$ outlined above are provided for information purposes only. The over-riding requirement is that the internal noise criteria is achieved, other combinations of upgraded glazing and ventilation may provide the same or better performance than those outlined within this report.

In the context of the acoustic performance specification the 'glazing system' is understood to include any and all of the component parts that form part of the glazing element of the façade, i.e. glass, frames, seals, openable elements etc.

The assessment has demonstrated that the recommended internal noise criteria can be achieved through consideration of the proposed façade elements at the design stage. The calculated glazing and ventilation specifications are preliminary and are intended to form the basis for noise mitigation at the detailed design stage. Consequently, these may be subject to change as the project progresses.

Wall Construction

In general, all wall constructions (i.e. block work or concrete) offer a high degree of sound insulation, much greater than that offered by the glazing systems. Therefore, noise intrusion via the wall construction will be minimal. The calculated internal noise levels across the building façade have assumed a minimum sound reduction index of 50 dB Rw for this construction.

Internal Noise Levels

Taking into account the external façade levels and the specified acoustic performance to the building envelope, the internal noise levels have been calculated. For all buildings within the development site, the good internal noise levels are achieved with windows closed.

9.9.3 Cumulative Mitigation

No cumulative mitigation is required.

9.10 Residual Impact Assessment

9.10.1 Construction Phase

Construction predictions indicate that noise levels from construction works will be within the recommended BS5228 criteria at receptor locations, and hence **a negative, slight to moderate and short-term impact** will be experienced at these locations.

Given the distance to local receptors the residual vibration impacts are predicted to be **negative, short-term and not significant**.

9.10.2 Operational Phase

Residual effects from noise as a result of a change in traffic volumes is predicted to **be negative, imperceptible and long-term**.

Noise levels associated with building services plant are expected to be within the adopted day and night-time noise limits at the nearest noise-sensitive properties taking into account the site layout, the nature and type of units proposed and distances to nearest residences. Assuming the operational noise levels do not exceed the adopted design goals, the resultant residual noise impact from this source will be of **negative, not significant and long-term.**

9.10.3 Cumulative Impact

Given the distances between receptors and other potential construction sites it is expected that there will be no significant cumulative construction or operational impacts.

The traffic noise assessment has taken account of known proposed developments in the area and the resultant predictions indicate an imperceptible effect.

9.11 Significant Interactions

This chapter has used information from the Traffic chapter and the architectural drawings to inform the assessment of noise and vibration impacts. With increased traffic movements, the noise levels in the surrounding area increase. The impacts of the proposed development on the noise environment are assessed by reviewing the change in traffic flows on roads close to the site. In this assessment, the impact of the interactions between traffic and noise are considered to be imperceptible due to the low-level changes in traffic flows associated with the proposed development.

9.12 References & Sources

Meath County Noise Action Plan 2019.

Meath County Development Plan 2021 – 2027.

Fingal County Development Plan 2023 – 2029.

BS 8233: 2014: Guidance on sound insulation and noise reduction for buildings.

British Standard BS 4142: 2014+A1:2019: Methods for Rating and Assessing Industrial and Commercial Sound

Design Manual for Roads & Bridges – LA111 Revision 2, 2020.

British Standard BS 5228 (2009 +A1 2014): Code of Practice for Control of Noise and Vibration on Construction and Open Sites Part 1: Noise & Part 2: Vibration.

British Standard BS 7385 (1993): Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration.

Calculation of Road Traffic Noise, Department of Transport Welsh Office, HMSO, 1988.

ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise.

ISO 9613 (1996): Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation.

EPA Advice Notes for Preparing Environmental Impact Statements, (May 2022).

Professional Guidance on Planning & Noise (ProPG), (IoA, 2017).

Large Scale
Residential Development
at Dunboyne North, Co. Meath

Volume II

Environmental Impact Assessment Report

CHAPTER 10

Landscape and Visual Impact

August 2023

McCutcheon Halley
CHARTERED PLANNING CONSULTANTS

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10 Landscape & Visual Impact

RECEIVED: 21/09/2023

10.1 Introduction

This chapter of the EIAR was prepared to assess the potential significant effects of the proposed development on landscape and visual impact. Other effects of lower significance have been included in this assessment to better inform the decision-making process.

This chapter should be read in conjunction with the architectural and landscape architectural plans and verified photomontages produced by external consultants as well as the Biodiversity and Cultural Heritage chapters of this report for references to and descriptions of relevant designations.

10.2 Expertise & Qualifications

JBA Consulting Engineers and Scientists Ltd has been commissioned to conduct a Landscape and Visual Impact Assessment (LVIA) of the site and environs. The chapter has been prepared by Christos Papachristou (Chartered Senior Landscape Architect), Conor O'Neill (Project Environmental Scientist), and Jemima Kivikoski (Assistant Environmental Scientist).

Christos is a Chartered Member of the Landscape Institute (CMLI) in the UK. Christos has carried out LVIAs and been involved in the preparation of LVIAs for EIARs as well as standalone in Ireland and the UK. Conor holds an MSc in Environmental Science and an Adv. Dip. in Planning and Environmental Law from the King's Inns and has prepared LVIA reports as part of wider EIARs for residential, industrial and linear infrastructure developments. Jemima holds a Pg. Dip. in Environmental Science and has assisted in drafting LVIA reports for a number of residential and linear infrastructure developments in Ireland.

Below is an indicative list of projects the team members have been involved with the production of the LVIA reports for:

- Brownsbarn Citywest LRD, SDCC
- Residential development in Raitneachan, Co. Wicklow
- Carpark development at the Rock of Dunamase, Co. Lois
- Industrial development in Greenogue, Unit C, SDCC
- N17 Knock to Collooney
- N72/ N73 Mallow traffic relief scheme
- N3 Virginia bypass
- Grand Canal Dock outfall

10.3 Proposed Development

The proposed Large Scale Residential Development will consist of the construction of 267 no. residential units, a creche, a new link road between the R157 and the Old Navan Road including a bridge over the River Tolka, 2 no. signalised junctions, upgrade works and road improvements to the R157 and the M3 Parkway access road, and all associated site development works including drainage, landscaping, and boundary treatments. A full description is included in the statutory notices and in Chapter 2 of the EIAR.

The subject site is located within the townland of Bennetstown to the north of the defined development boundary of the town of Dunboyne. The site is located c.1.45km to the north of the town centre and situated directly south of the Dunboyne to Clonsilla Rail Line and M3 Parkway rail station. The site is accessible via the R157 which is located at the west of the site.

The area surrounding the site is characterised by predominantly agricultural uses. The lands immediately adjoining the site to the west, east and south are all under agricultural use. The M3 Parkway rail station is situated to the north of the site. The R157 bounds the site to the west with agricultural land beyond.

10.3.1 Aspects Relevant to this Assessment

This assessment is relevant to elements of other disciplines that contribute to the amenity offered to users of the areas surrounding the site. These are sites visited for recreational purposes relating to Biodiversity, such as SAC and SPA and Cultural Heritage such as World Heritage Sites, demesnes and sites with visitor centres.

10.4 Methodology

10.4.1 Assessment Methodology

The landscape and visual amenity chapter examines the potential effects of the proposed development on views of receptors within the Zone of Theoretical Visibility including residential properties and nearby open spaces, in terms of visual intrusion and visual obstruction. It also examines the impact on landscape character areas from the permanent physical changes to the site brought about by the development.

The Landscape and Visual Impact Assessment in the EIAR takes into consideration aerial photography, emerging design drawings, relevant various publications and reports, together with visits to the site and environs of the proposed development. The Assessment is carried out in accordance with:

- Environmental Protection Agency (2022) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports;
- Guidelines for Landscape and Visual Impact Assessment (GLVIA) as published by the Landscape Institute (UK) and the Institute of Environmental Management and Assessment (3rd Edition, 2013); and
- Landscape Character Assessment (LCA) of Meath County Development Plan (Draft Report May 2021).

Verified photomontages in accordance with the GLVIA guidance are included in Appendix 10.1 to facilitate the assessment of visual impacts. The locations for the photomontages have been agreed following liaison with the local planning authority.

10.4.1.1 Landscape Impact Assessment Criteria

When assessing the potential impacts on the landscape resulting from a proposed project, the following criteria are considered:

- Landscape character sensitivity;
- Magnitude of likely impacts; and
- Significance of landscape effects.

10.4.1.2 Sensitivity of the Landscape

The sensitivity of the landscape to change is the degree to which a particular Landscape Character Area (LCA) can accommodate changes or new elements without unacceptable detrimental effects to its essential characteristics.

Landscape Sensitivity, often referred to as 'value', is classified using the following criteria which have been derived from a combination of industry guidelines from the Landscape Institute for Landscape and Visual Impact Assessment and professional judgement.

- Very high - Areas where the landscape character exhibits a very low capacity for change in the form of development. Examples of which are very high value landscapes, protected at an international level e.g., World Heritage Site, where the principal management objectives are likely to be protection of the existing character;
- High - Areas where the landscape character exhibits a low capacity for change in the form of development. Examples of which are high value landscapes, protected at a national level e.g., National Park, where the principal management objectives are likely to be protection of the existing character;
- Medium - Areas where the landscape character exhibits a medium capacity for change in the form of development. Examples of which are medium value landscapes, protected at a Local or Regional level e.g., Open space areas mentioned within a County Development Plan, where the principal management objectives are likely to be protection of the existing character;
- Low - Areas where the landscape character exhibits a high capacity for change and has very few or no designated landscapes or open space areas; and
- Negligible - Areas of landscape character that include derelict, mining, industrial land or are part of the urban fringe where there would be a reasonable capacity to embrace change or the capacity to include the development proposals. Management objectives in such areas could be focused on change, creation of landscape improvements and/or restoration to realise a higher landscape value.

10.4.1.3 Magnitude of Likely Landscape Impacts

The magnitude of a predicted landscape impact is a product of the scale, extent or degree of change that is likely to be experienced as a result of the proposed project. The magnitude takes into account whether there is a direct physical impact resulting from the loss of landscape components and/or a change that extends beyond the boundary of the proposed project that may have an effect on the landscape character of the area.

- Very high - Change that would be large in extent and scale with the loss of critically important landscape elements and features, that may also involve the introduction of new uncharacteristic elements or features that contribute to an overall change of the landscape in terms of character, value and quality.
- High - Change that would be more limited in extent and scale with the loss of important landscape elements and features, that may also involve the introduction of new uncharacteristic elements or features that contribute to an overall change of the landscape in terms of character, value and quality.
- Medium - Changes that are modest in extent and scale involving the loss of landscape characteristics or elements that may also involve the introduction of new uncharacteristic elements or features that would lead to changes in landscape character, and quality.
- Low - Changes affecting small areas of landscape character and quality, together with the loss of some less characteristic landscape elements or the addition of new features or elements.
- Negligible - Changes affecting small or very restricted areas of landscape character. This may include the limited loss of some elements or the addition of some new features or elements that are characteristic of the existing landscape or are hardly perceivable.
- Neutral - Changes that do not involve the loss of any landscape characteristics or elements and will not result in noticeable changes to the prevailing landscape character; and
- Positive - Changes that restore a degraded landscape or reinforce characteristic landscape elements.

10.4.1.4 Significance of Landscaped Effects

The significance of the landscape impact will be the combination of the sensitivity of the landscape against the magnitude of the change. It is summarised in Table 10.1 below.

Table 10.1: Significance of Landscape and Visual effects based on Magnitude and Sensitivity

	SENSITIVITY				
MAGNITUDE	**Very high**	**High**	**Medium**	**Low**	**Negligible**
Very high	Profound	Very significant	Significant	Moderate	Slight
High	Very significant	Significant	Moderate	Slight	Slight
Medium	Significant	Moderate	Slight	Slight	Imperceptible
Low	Moderate	Slight	Slight	Imperceptible	Imperceptible
Negligible	Slight	Slight	Imperceptible	Imperceptible	Imperceptible
Neutral	Imperceptible	Imperceptible	Imperceptible	Imperceptible	Imperceptible
Positive	Positive	Positive	Positive	Positive	Imperceptible

10.4.1.5 Sensitivity of Visual Receptors

Unlike landscape sensitivity, the sensitivity of visual receptors has an anthropocentric (or human-centric) basis. It considers factors such as the perceived quality and values associated with the view, the landscape context of the viewer, the likely activity they are engaged in and whether this heightens their awareness of the surrounding landscape.

Visual receptors most susceptible to changes in views and visual amenity are:

- Very high - Residents in properties within protected landscapes and travellers on a Scenic route where awareness of views is likely to be heightened.
- High – Residents in properties with predominantly open views from windows, garden or curtilage. People, whether residents or visitors, who are engaged in outdoor recreation including use of public rights of way, whose attention or interest is likely to be focused on the landscape and on particular views, and those on a scenic route where the view is not specifically in the direction of the proposed development.
- Medium - Visitors to heritage assets, or to other attractions, where views of the surroundings are an important contributor to the experience, and communities where views contribute to the landscape setting enjoyed by residents in the area.
- Low - People engaged in outdoor sport or active recreation on a local scale, which does not involve or depend upon appreciation of views of the landscape; and people at their place of work whose attention may be focused on their work or activity, not their surroundings and where the setting is not important to the quality of working life, and people travelling in vehicles where their view is limited to a few minutes at any viewpoint; and
- Negligible - Changes affecting restricted viewpoints.

10.4.1.6 Magnitude of Visual Impact

The magnitude of a visual effect is determined on the basis of several factors: the relative numbers of viewers, the distance from the viewpoint, the visual dominance of the proposed development within a view and its effect on visual amenity, as follows:

- Very high - The proposal intrudes into a large proportion or critical part of the available vista and is without question the most noticeable element. A high degree of visual clutter or disharmony is also generated, strongly reducing the visual amenity of the scene.
- High - The proposal intrudes into a significant proportion or important part of the available vista and is one of the most noticeable elements. A considerable degree of visual clutter or disharmony is also likely to be generated, appreciably reducing the visual amenity of the scene.
- Medium - The proposal represents a moderate intrusion into the available vista, is a readily noticeable element and/or it may generate a degree of visual clutter or disharmony, thereby reducing the visual amenity of the scene. Alternatively, it may represent a balance of higher and lower order estimates in relation to visual presence and visual amenity.
- Low - The proposal intrudes to a minor extent into the available vista and may not be noticed by a casual observer and/or the proposal would not have a marked effect on the visual amenity of the scene; and
- Negligible - The proposal would be barely discernible within the available vista and/or it would not detract from, and may even enhance, the visual amenity of the scene.
- Magnitude can also be described as:

- Neutral - Changes that are not discernible within the available vista and have no bearing the visual amenity of the scene; and
- Positive - Changes that enhance the available vista by reducing visual clutter or restoring degraded features.

10.4.1.7 Visual Impact Significance

As stated above, the significance of visual impacts is a function of visual receptor sensitivity and visual impact magnitude. This relationship is expressed in the same significance matrix as used earlier in respect of landscape effects, see Table 10.2.

10.4.1.8 Impact Classification Terminology

Table 10.2 overleaf presents the Impact Classification Terminology as published in the EPA guidance document (EPA, 2022). Standard definitions are provided in this glossary, which permit the evaluation and classification of the quality, significance, duration and type of impacts associated with a proposed development on the receiving environment.

Each impact is described in terms of its quality, significance, extent, duration & frequency and type, where possible.

Table 10.2 Impact Classification Terminology taken from EPA (2022) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports

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

IMPACT CHARACTERISTICS	TERM	DESCRIPTION
Types of Effects	**Indirect/ Secondary)**	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	The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.
	'Do-Nothing'	The environment as it would be in the future should the subject project not be carried out.
	`Worst case'	The effects arising from a project in the case where mitigation measures substantially fail.
	Indeterminable	When the full consequences of a change in the environment cannot be described.
	Irreversible	When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
	Residual	The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
	Synergistic	Where the resultant effect is of greater significance than the sum of its constituents.

10.4.1.9 Cumulative Impact Assessment

The cumulative effect of a set of developments is the combined effect of all the developments taken together.

Cumulative effects on visual amenity consist of combined visibility and sequential effects.

Combined visibility occurs where the observer is able to see two or more developments from one viewpoint.

- Combined visibility may either be in combination (where several developments are within the observer's arc of vision at the same time) or in succession (where the observer has to turn to see the developments).
- Sequential effects occur when the observer has to move to another viewpoint to see different developments. For example, this could be when travelling along roads or paths. The occurrence of sequential effects may range from frequently sequential (the features appear regularly and with short time lapses between, depending on speed of travel and distance between the viewpoints) to occasionally sequential (long time lapses between appearances, because the observer is moving very slowly and / or there are large distances between the viewpoints).

Cumulative landscape effects affect the physical fabric or character of the landscape, or any special values attached to the landscape.

- Cumulative effects on the physical fabric of the landscape arise when two or more developments affect landscape components such as woodland, dykes or hedgerows. Although this may not significantly affect the landscape character, the cumulative effect on these components may be significant – for example, where the last remnants of former shelterbelts are completely removed by two or more developments.
- Cumulative effects on landscape character arise from two or more developments. Housing developments introduce new features into the landscape. In this way, they can so change the landscape character that they can create a different landscape character type. That change

need not be negative; some derelict or industrialised landscapes may be enhanced as a result of such a change in landscape character. The cumulative effects on landscape character may include other changes, for example trends or pressures for change over long time periods, which should form part of any consideration of a particular project.

The area in which the proposals site is located contains other housing developments and therefore there is potential for cumulative effects on landscape and visual amenity.

10.4.2 Relevant Legislation & Guidance

The landscape assessment undertaken is made with regard to the sensitivity of the landscape and its ability to undergo change. The methodology is based on national and local policy guidelines and best practice methodology as outlined in the references below:

- Guidelines on Landscape and Visual Assessment (2002); Irish Landscape Institute (ILI)
- Guidelines for Landscape and Visual Impact Assessment (GLVIA), third edition (2013), Landscape Institute (UK)
- Guidelines on Information to be Contained in Environmental Impact Assessment Reports (2022); Environmental Protection Agency (EPA)
- Environmental Impact Assessment of Projects: Guidelines on the Preparation of the Environmental Impact Assessment Report (EIAR) (2017); European Commission (EC)
- Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (2013); EC
- Guidelines on Landscape and Landscape Assessment (2000); Department of the Environment, Community and Local Government (DOE)
- National Landscape Strategy 2015-2025; DOE
- National Biodiversity Action Plan (2017-2021)
- Meath County Development Plan 2021-2027; Meath County Council
- Dunboyne, Clonee, and Pace Local Area Plan 2009 – 2015; Meath County Council
- Eastern and Midland Regional Assembly Regional Spatial and Economic Strategy 2019 - 2031
- LCA and LVIA of Specified Infrastructure Projects – Overarching Technical Document (Dec 2020); Transport Infrastructure Ireland (TII)
- Visual Representation of Development Proposals, Landscape Institute (UK, 2019); Technical guidance notes for photomontages
- Amenity Trees and Woodland: A Guide to their Management in Ireland (2010); Tree Council of Ireland

In addition to the above documents, Ordnance Survey and National Monuments Service historical maps were used to help identify past land uses, landscape components and historic landscape evolution. In a modern context, aerial images from 1995 to the present also informed landscape changes.

10.4.3 Site Surveys/Investigation

A site visit was carried out in June 2023. The site visit involved the verification of nearby views from the initial desk-based study and observations of the site and wider landscape for the purposes of the impact assessment. Field notes were recorded in relation to topography, land use, significant landscape features and overall landscape character.

10.4.4 Consultation

Consultation with Meath CoCo was carried out to agree on the locations of verified photomontages. Originally five locations were proposed. These had been selected to cover the views of mainly sensitive receptors within the close visual envelope of the proposed development where there was a higher probability of impacts of higher significance. Meath CoCo suggested additional locations to further ensure that visually negative impacts do not arise. Meath CoCo wanted to ensure that the proposed development was visible from a distance. This was in the interest of creating a landmark that would be recognisable from afar. Finally thirteen verified photomontages were produced and shown in Appendix 10.1.

10.5 Difficulties Encountered

The site visit took place during daytime, and as a result no night-time views were observed. This is not expected to reduce the accuracy of this assessment as no significant light nuisance is expected outside the site boundary. Time restrictions allowed for surveys to only take place in summer, when full foliage on trees provides additional screening. The level of screening seen on site will therefore be lower during winter. The assessment has accounted for winter views. Finally, private properties were not accessed during the site visit. Views from private properties were instead approximated to the best possible publicly accessible viewpoint.

Photography for they verified photomontages has been carried out from locations where the dominant views are best represented with a focus on the average to worst case scenario. This is to conclude with more certainty on the level of significance of the visual impacts deriving from the proposed development. Where this was not possible due to visual obstructions and/ or unsafe site conditions, the next preferred location has been selected to adequately demonstrate the potential visual impacts. This was the case with VPXX where the existing hedge lining the eastern verge of the road would not allow for any photographs depicting both the surrounding landscape, potential range of views.

10.6 Description of Existing Environment

10.6.1 Receiving Environment – Site Context

Dunboyne is situated approximately 2.7km from the Dublin county border in the southeastern corner of County Meath. Clonee village lies to the southeast and the Pace townland lies to the north. It is the largest settlement of the Dunboyne-Clonee-Pace road and rail corridor within the Dublin Metropolitan. The settlements form radial nodes along the M3 and M3 Parkway rail line. Dunboyne is a key town linking Dublin to Navan further north and Kinnegad to the west. Due to these transport links the corridor has been identified in the Metropolitan Strategic Area Plans of the National Planning

Framework and Regional Spatial and Economic Strategy as an important location for population growth and economic development.

Several business parks and industrial areas surround the development site. Dunboyne Business Park sits between the site and Dunboyne town. Bracetown Business Park lies to the east across the M3 and Kilsaran Concrete HQ is located to the north. The area is attractive for large industrial investment as it has the land to accommodate construction and transport connections to facilitate the movement of a skilled workforce.

The landscape character area (LCA) the site lies in is "LCA 10. The Ward Lowlands". This Landscape Character Area has low value, high sensitivity, low capacity for multi-house developments, and regional importance. Terrain is relatively flat across the surrounding landscape, rising gently towards the northwest and falling gently to the southeast towards Dublin. The outskirts of Dunboyne have been a focal point for large, modern housing developments which contrast with the surrounding rural environment. Meath County Council have identified a number of objectives to improve the landscape condition and consolidate urban and industrial developments with the goal of softening the urban fringes of Dunboyne against the pastoral landscape. The River Tolka headwaters are located approximately 11km northwest of the development site.

Dunboyne has a rich history as a former manorial settlement. During the 1798 Rebellion it was destroyed and later rebuilt during the early 19th Century. There is a significant number of NIAH sites located within Dunboyne town centre. A limestone railway bridge (NIAH ref. 14405001) located 115m to the east of the site is the only proximal NIAH site to the development. Norman's Grove House and surrounding estate are situated approximately 1km east. The house is a protected structure (RPS – 91523).

There are no protected views, prospects, scenic routes or national trails in the surrounding environment.

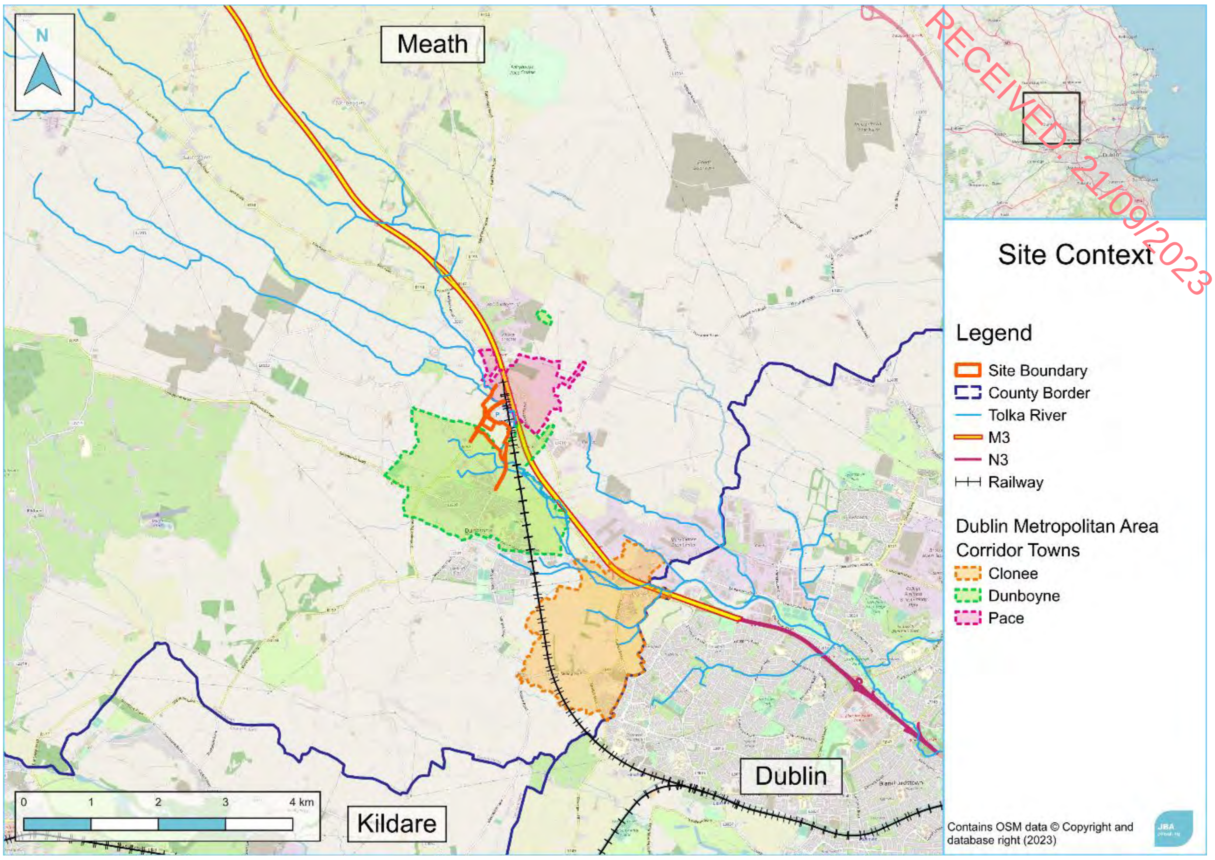

Figure 10.1 Site Context

10.6.2 Receiving Environment – Site

The site is an irregular shaped agricultural land with very gently undulating terrain north of Dunboyne town on the northern border of the Dunboyne townland. The site is enclosed by transport infrastructure and fields. R157 is located to the west, Bennetstown roundabout is northwest, railway tracks and the M3 are to the east. There are no roads within the site, and no direct access points from either R157, the railway or the M3. Well-developed vegetation is present along R157 and between the railway and M3.

The development site is zoned for new residential development. A small parcel of land at the northwest corner is zoned for residential and business mixed use. The Tolka River is culverted under the railway and flows adjacent to the site along its southeastern side bounded by riparian hedgerow and trees. There are overgrown hedgerows internal to the site that separate it from the land zoned for mix use to the northwest and pastures to the southeast and southwest.

10.6.3 Zone of Theoretical Visibility

A Zone of Theoretical Visibility (ZTV) was produced for the assessment. The ZTV gives an indication of the surrounding landscape with potential visibility of the proposed development site. For this site, the ZTV maps the area with potential visibility within a 3 km radius from the centre of the site. The ZTV was based on a viewer eye height of 1.6 m and building heights of 10 and 20 m. The ZTV is based on a digital terrain model (DTM) and represents a bare ground scenario i.e., with no trees, hedgerow or built features present that would provide screening.

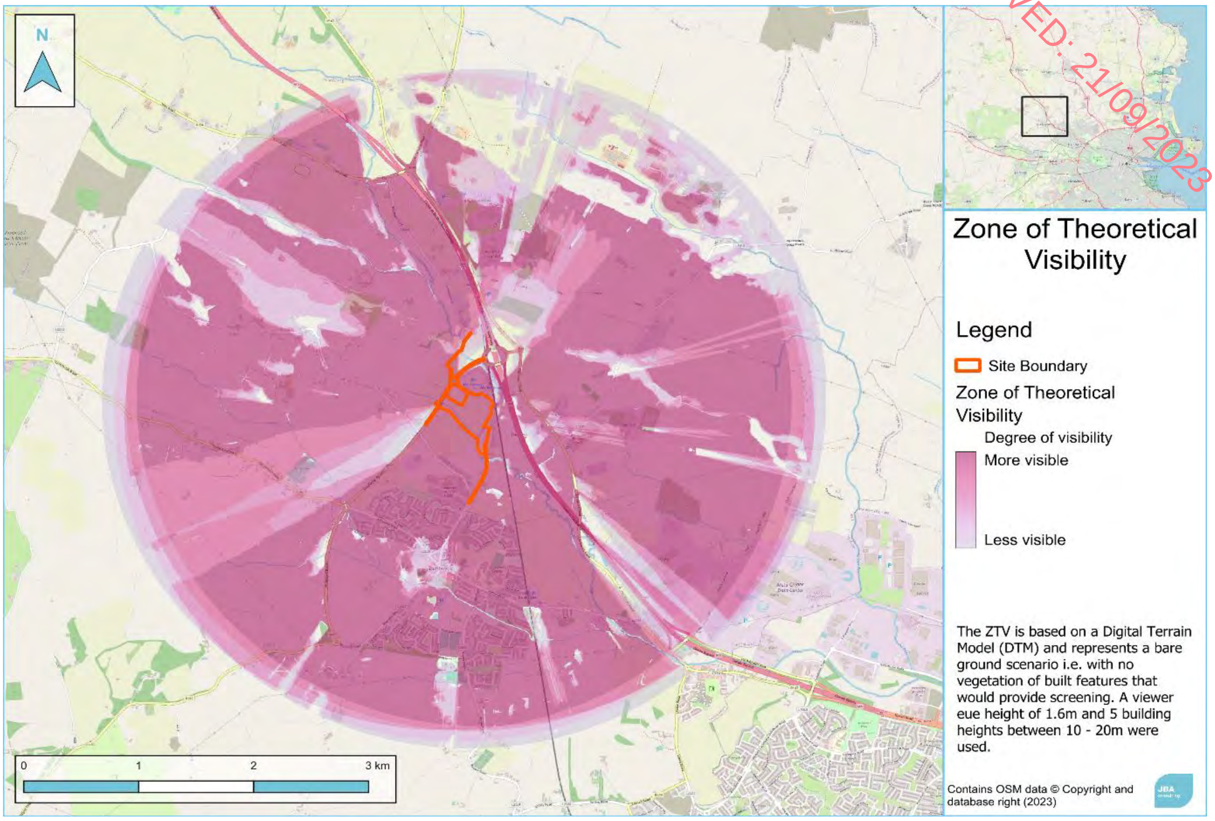

Figure 10.2 Zone of Theoretical Visibility

10.7 Characteristics of the Project

10.7.1 Proposed Development

The full description of the proposed development is outlined in paragraph 10.3 and Chapter 2 'Development Description' of this EIAR.

To facilitate the enabling works and construction, the Internal hedgerows will be removed. The trees along the boundaries will be largely retained with a focus on the protection of the vegetation between the proposed development and the residence directly to the north of the site.

The tallest elements of the site are the blocks of flats centrally to the northern part of the site, close to the car park to the north. The proposed block aim to create a visual reference point in the area. The remaining proposals comprise single to two storey residencies with front and back gardens, open spaces and a creche.

The proposed planting includes various sizes of native trees and hedgerows along the boundaries and not native planting along with native species throughout the site. The native boundary planting is reducing the number of views to the inside of the site. It also partly replicates the vegetation that was removed to enable the construction of the proposed scheme.

10.8 Predicted Impacts

10.8.1 Predicted Impact Assessment

As described in the methodology, the impacts to the landscape and visual amenity will be assessed based on the sensitivity of the receptor and magnitude of change. This assessment as part of an EIA will be focusing on potential significant and profoundly significant impacts and secondarily on impacts of lower significance.

Receptor groups were identified during the initial desktop investigation using aerial imagery and verified on site during the site visit. Receptors were grouped in terms of function, i.e., residential buildings, community buildings, etc., and location. See Figure 10.3 for the 'Visual Receptor Plan' which shows the identified receptor groups. These receptor groups are discussed below with an assessment of the effects on their visual amenity.

Thirteen photomontages have been produced showing the expected visual impact of the proposed development from selected points around the site. In photomontages where the proposed development is not clearly discernible, an additional image is included where a white line represents the outline of the extent of proposed buildings. This provides a sense of the degree of screening. The compendium of photomontages is presented at the end of this chapter as a series of images under the title *Verified Photomontages and CGI's*.

With regards *Impact Duration*, impact was considered permanent if a receptor had a distinct alteration to the horizon line or if views of a structure would continue to remain visible. During assessment, the landscape was also considered in the context of permanency. For example, retained mature trees were considered permanent, with management and evolution. New woodland tree planting at the eastern, southern and northern boundary of the site would in itself become a permanent screening feature due to size and density. Street tree planting was considered to have filtering contribution, but as a single tree layer was not a permanent screening element. In this appraisal, *Type of Impact* was considered positive only if the proposals contribute to the character of the locality and would not be detrimental to the rural association. A negative *Type of Impact* might occur if for example, the proposals diluted the character or perception of Dunboyne town or had a detrimental impact on large volumes of quality existing trees.

10.8.2 Receptor Descriptions

10.8.2.1 Landscape

The Landscape Character Assessment for the Meath County Development Plan 2021 – 2027 describes the Ward Lowlands as "large area of pasture and arable farmland" with the main urban centres being the towns of Ratoath and Ashbourne. It is under significant development pressure due to the proximity of the Dublin metropolitan area. Lack of coherence appears to be evident due to the rapid development leading to a degraded quality of landscape due to the lack of management, loss of hedgerows and larger fields adjacent to the continually expanding urban fringe.

Key characteristics include the geology that favours free draining soils, the mixed, residential, commercial and agricultural use of land. There is a lack of ecological designations, the hedgerows are overgrown and scrappy. The settlements lack vernacular buildings and most development occurs in the urban fringe.

This LCA has low potential to accommodate multi-house residential developments unless limited to the existing urban areas which have been designated to accommodate such growth. It has also medium potential capacity to accommodate new road development because busy transport corridors are part of the existing character.

The location of the proposed development, south of the M3 Parkway railway station and north of the urban cluster of Dunboyne is expected to consolidate the urban fringe. It sits appropriately next to a public transport corridor that is expected to promote sustainable travel and greater use of the area for amenity purposes. The proposed removal of the internal hedgerows is expected to reduce a distinct element of the existing landscape. This is currently mitigated by the proposed tree and hedge planting along the proposed roads and enhancement and improved management of the existing and proposed boundary planting.

According to the methodology and taking into account the proposed design, the overall impact to the landscape is expected to be *slight, temporary, negative* during construction and *long-term positive* during the operational stage.

10.8.2.2 Visual

Receptor groups were identified during the initial desktop investigation using aerial imagery and verified on site during the site visit. Receptors were grouped in terms of function, i.e., residential buildings, community buildings, etc., and location. See Figure 10.3 for the 'Visual Receptor Plan' which shows the identified receptor groups. These receptor groups are discussed below with an assessment of the effects on their visual amenity.

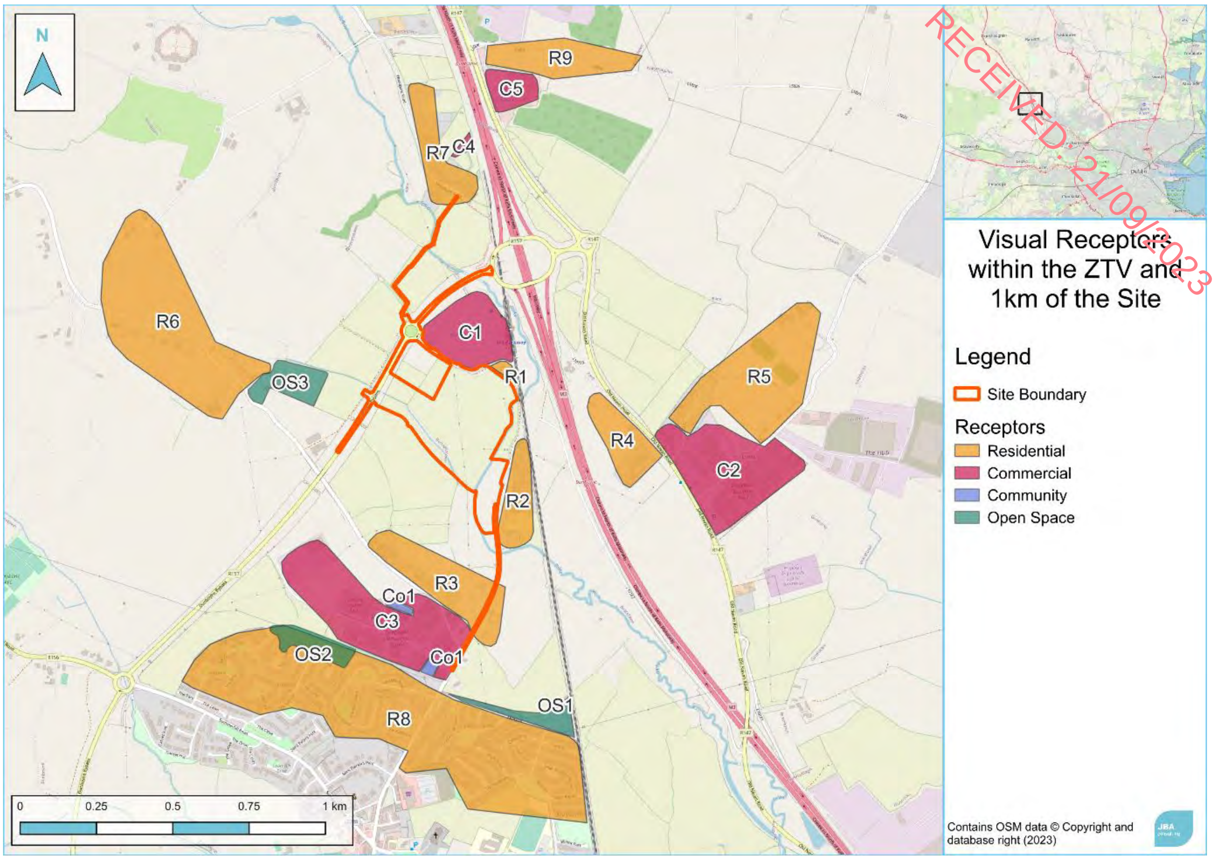

Figure 10.3 Visual Receptor Groups

Table 10.3 Visual Impact Summary

Receptor No.	Title of receptor	Distance from site	Sensitivity	Magnitude of change	Predicted impact and duration	
					Construction	Operation
R1	Single dwelling at the northeastern boundary of the site.	0m	High	Medium	*Temporary, moderate, negative*	*Permanent, moderate, negative*
R2	8 no. houses along the western side of the railway tracks, to the southeast of the development	160-330m	High	Low	*Temporary, slight, negative*	*Permanent, slight, negative*
R3	14 no. houses located along Kennedy Road and the Navan Road south of the site	350 – 620m	High	Low	*Temporary, slight, negative*	*Permanent, slight, negative*
R4	6 no. houses on the east side of the M3	270 – 500m	High	Low	*Temporary, slight, negative*	*Permanent, slight, negative*
R5	10 no. houses in the Tetrarch Grove cul-de-sac and 5 no. houses along L1010 including Norman's Grove House (RPS – 91523)	520 – 1000m	High	Low	*Temporary, slight, negative*	*Permanent, slight, negative*

Receptor No.	Title of receptor	Distance from site	Sensitivity	Magnitude of change	Predicted impact and duration	
					Construction	Operation
R6	16 no. rural houses along Kennedy Road and an unnamed rural road	420 – 1000m	High	Low	*Temporary, slight, negative*	*Permanent, slight, negative*
R7	17 no. houses along Woodpark Road (Pace)	550 – 930m	High	Negligible – Neutral	*Temporary, slight, negative*	*Permanent, slight-imperceptible, negative*
R8	Housing estates comprising 150+ houses	700 – 1100m	High	Negligible – Neutral	*Temporary, slight, negative*	*Permanent, slight-imperceptible, negative*
R9	13 no. houses along Pace Road (L5026)	1100m	High	Negligible – Neutral	*Temporary, slight, negative*	*Permanent, slight-imperceptible, negative*
C1	M3 Parkway Rail station and carpark	0m	Low	Medium	*Temporary, slight, negative*	*Permanent, slight, negative*
C2	Bracetown Business Park	510 – 990m	Low	Negligible	*Temporary, imperceptible, negative*	*Permanent, imperceptible, negative*
C3	Dunboyne Business Park	480 – 720m	Low	Low	*Temporary, imperceptible, negative*	*Permanent, imperceptible, negative*
C4	Tolka Plant Hire Limited	700m	Low	Low	*Temporary, imperceptible, negative*	*Permanent, imperceptible, negative*
C5	Avoca Dunboyne	850m	Low	Negligible	*Temporary, imperceptible, negative*	*Permanent, imperceptible, negative*
Co1	Dunboyne College of Further Education and Dunboyne Boxing Club within Dunboyne Business Park	500 and 700m	Low	Low	*Temporary, imperceptible, negative*	*Permanent, imperceptible, negative*
OS1	Triangular green space north of R8	900m	Low	Low	*Temporary, imperceptible, negative*	*Permanent, imperceptible, negative*
OS2	Green space within western part of R8	700m	Low	Low	*Temporary, imperceptible, negative*	*Permanent, imperceptible, negative*
OS3	Public playing field	180m	Low	Low	*Temporary, imperceptible, negative*	*Permanent, imperceptible, negative*

R1 (Single dwelling at the northeastern boundary of the site) – Distance from nearest site boundary = 0m.

This is a single residence situated on a triangular piece of land. The M3 Parkway station and adjoining carpark border it to the northwest, the railway line forms the eastern boundary and the proposed development site forms the southwestern boundary. It is accessed by a slip road off the Navan Road to the south.

Sensitivity Receptors would be residents at home. Sensitivity is *High*.

Magnitude The house has southwestern facing views directly onto the development site from front windows. To the rear, views are limited by the railway, the M3 Parkway station, the M3 and the riparian vegetation along the banks of the River Tolka. Trees are located at the front of the property and within the development site. All these trees are to be retained and protected during construction. The current layout with the proposed tree planting along this boundary is expected to provide partial screening. The magnitude of change is *Medium*.

Effect In accordance with Table 10.1 and Table 10.2, the significance of the visual effect will be *Temporary, Moderate, Negative* during construction and *Permanent, Moderate, Negative* during operation.

Previous iterations to the layout were proposing the blocks of flats to be further to the east and closer to the main views of this receptor. Also, proposals that could not guarantee the long-term survival of the boundary vegetation have been rejected by the design team and the developer. The previous iterations of the design would have potentially resulted in high magnitude of change and therefore significant negative visual effects to this receptor.

R2 (8 no. houses along the railway tracks to the west situated south of the development site) – Distance from nearest site boundary = 160m.

This receptor group comprises 8 rural style detached houses, all of which are bungalows, with front and rear gardens. The houses are accessed from the Navan road. The River Tolka flows in a southern direction approximately 100m to the west.

Sensitivity Receptors would be residents at home. Sensitivity is *High*.

Magnitude The properties are oriented in an east-west direction. The three northernmost houses located closest to the development will have direct views from front windows while the five houses further south will have angled views from front windows. Most front gardens feature manicured hedges and trees and further west trees along the Navan Road and riparian vegetation along the River Tolka screen views of the development site. This vegetation is deciduous so the degree of screening will vary with season. Rear facing views for all properties overlook the railway, M3, and surrounding hedgerow segregated pastures.

The development will introduce a built feature into a rural landscape that is scattered with residential, industrial, and transport infrastructure. Proposed tree planting around the site boundary will soften the stark change in landscape. The development will create a sense of connection between the surrounding area and Dunboyne town located to the south, shifting landscape character from predominantly rural with disconnected infrastructure to an increasingly suburban character typical of commuter towns. The magnitude of change will be *Low*.

Effect In accordance with and Table 10.1 and Table 10.2, the significance of the visual effect will be *Temporary, Slight, Negative* during construction and *Permanent, Slight, Negative* during operation.

R3 (14 no. houses located along Kennedy Road and the Navan Road south of the development site) – Distance from nearest site boundary = 350 – 620m.

This receptor group comprises a mix of single and two-storey houses with front and rear gardens. Four houses are positioned along the Navan Road, three are oriented in a northwest-southeast direction. The remainder of houses are oriented in a northeastern-southwestern direction.

Sensitivity Receptors would be residents at home. Sensitivity is *High*.

Magnitude Dunboyne Business Park (C4) is adjacent to this receptor group to the south. These houses lie in a transitioning landscape between industrial infrastructure to the south and a rural environment to the north. Houses along Kennedy road and the single house off the Navan Road will have partially screened views of the development through rear garden vegetation and hedgerow partitioned pastures between the houses and the development site. The three houses along Navan Road will have no direct views, although the development may be visible through angled views from side windows.

The development will alter the fabric of the surrounding landscape shifting it towards a suburban environment rather than a predominantly rural one. The proposed tree planting along the southern boundary of the site will soften the built elements visible. During the operational phase following tree maturation, the tallest elements of the development will likely still be partially visible. The magnitude of change will be *Low*.

Effect In accordance with Table 10.1 and Table 10.2, significance of the visual effect will be *Temporary, Slight, Negative* during construction and *Permanent, Slight, Negative* during operation.

R4 (6 no. houses east of the M3 to the east of the development site) – Distance from nearest site boundary = 270 – 500m.

This receptor group includes 6 houses located along the R147. Five of the houses are grouped together along a small road leading off R147 while a single house is situated north of this group directly off the R147. The group of houses are all positioned in a northwest-southeast direction along the northwestern side of the slip road. The single house faces in the opposite direction in a northeast-southwest orientation. Three houses are two-storey while the single house and two other houses are bungalows. All houses feature front and rear gardens with varying degrees of vegetation.

Sensitivity Receptors would be residents at home. Sensitivity is *High*.

Magnitude Views of the development site from either front or rear windows for the entire group would be indirect and heavily screened by vegetation present on the land and along the M3. The M3 features wooden fences along either side which are constructed upon raised banks. This will partially screen views of the development. Once operational, the tallest levels of the apartment blocks will be visible, however, the visibility will be minimal. The magnitude of change will be *Low*.

Effect In accordance with Table 10.2 and Table 10.2, the significance of the visual effect will be *Temporary, Slight, Negative* during construction and *Permanent, Slight, Negative* during operation.

R5 (10 no. houses in the Tetrarch Grove cul-de-sac and 5 no. houses along L1010 including Norman's Grove House (RPS – 91523)) – Distance from nearest site boundary = 520 – 1000m.

Tetrarch Groves leads off R147 in a northeastern direction and the 10 houses are oriented in northwestern-southeastern directions. Houses are predominantly bungalows with the exception of the two houses at the end of the cul-de-sac which feature a second storey. Houses along L1010 and Norman's Grove House are oriented in similar directions. All houses have front and rear gardens.

Sensitivity Receptors would be residents at home. Sensitivity is *High*.

Magnitude Hedgerows in close proximity to rear gardens along the northwestern side of Tetrarch Grove are dense. Due to the orientation of the houses, visibility of the development site is limited. In addition, views are screened by vegetation along R147, the M3, and the River Tolka. Small forested patches are present in pastures that form part of Norman's Grove House estate which effectively screen all views from the house. The magnitude of change will be *Low*.

Effect In accordance with Table 10.1 and Table 10.2, the significance of the visual effect will be *Temporary, Slight, Negative* during construction and *Permanent, Slight, Negative* during operation.

R6 (16 no. rural houses along Kennedy Road and a rural road, west and northwest of the site) – Distance from nearest site boundary = 420 – 1000m.

This receptor group features a mix of bungalows and two-storey dwellings, with large front and rear gardens which have varying levels of boundary vegetation. There are adjoining barns or farmyards to a couple of properties.

Sensitivity Receptors would be residents at home. Sensitivity is *High*.

Magnitude Houses along Kennedy road are oriented in a northeast-southwest direction while properties located along the rural road further north are oriented northwest-southeast which faces towards the development site. Properties along Kennedy Road are segregated by modest hedges and hedgerows are also present along the main road. Views from front or rear windows would be indirect and partially screened by the vegetation. The degree of screening may be reduced in the winter as much of the natural and domestic vegetation present in the area is deciduous. Terrain from the northwestern houses gently slopes down to the development site which may facilitate clearer views of the tallest elements of the development, however, thick hedgerows are also present at the front and back of these properties helping to filter views. The magnitude of change will be *Low*.

Effect In accordance with Table 10.1 and Table 10.2, the significance of the visual effect will be *Temporary, Slight, Negative* during construction and *Permanent, Slight, Negative* during operation.

R7 (17 no. houses along Woodpark Road (Pace) north of the development site) – Distance from nearest site boundary = 550 – 930m.

Properties in this group are a mix of bungalows and two-storey houses with modest front gardens and large rear gardens. They are oriented along Woodpark Road in a northeast-southwest direction and an east-west direction as the road bends into a north-south stretch.

Sensitivity Receptors would be residents at home. Sensitivity is *High*.

Magnitude Houses with a northeast-southwest orientation are likely to have the clearer views, while houses facing east-west are located further from the site, have no direct views, and any angled views will be screened by houses further south and partitioning vegetation between properties. The visibility of the development site for these houses will be very limited.

For houses further south, vegetation along Woodpark Road is well-developed and each house features private hedges to the front which form an effective barrier of views to or from the houses. Filtered views of the tallest elements may be visible through gaps in vegetation during the winter, however, visibility will remain limited.

The development is situated behind the M3 Parkway carpark and urban elements. The magnitude of change will be *Negligible to Neutral*.

Effect In accordance with Table 10.1 and Table 10.2, the significance of the visual effect will be *Temporary, Slight, Negative* during construction and *Permanent, Slight to Imperceptible, Negative* during operation.

R8 (Housing estates comprising 150+ houses south of the development site) – Distance from nearest site boundary = 700 – 1100m.

This receptor group covers the northern areas of the housing estates situated between Dunboyne town centre to the south and Dunboyne Business Park and the rural landscape to the north. This group forms the northern periphery of Dunboyne suburbs. Houses are detached single or two-storey dwellings with front and rear gardens. Houses are oriented in all directions along residential streets. Small communal green spaces are present throughout the estates. The Navan Road splits the group into eastern and western parts.

Sensitivity Receptors would be residents at home. Sensitivity is *High*.

Magnitude Empty pastures segregated by hedgerows dominate northern landscape views for houses located east of the Navan Road, while for houses west of the Navan Road, Dunboyne Business Park (C3) occupies majority of views facing towards the development site. There is a gap between the business park and Thorntons Civic Centre which would allow for clearer views particularly for houses oriented in a northeastern-southwestern direction. For houses facing opposite directions, visibility will be limited, angled and partially or fully screened. The magnitude of change will be *Negligible to Neutral*.

Effect In accordance with Table 10.1 and Table 10.2, the significance of the visual effect will be *Temporary, Slight, Negative* during construction and *Permanent, Slight to Imperceptible, Negative* during operation.

R9 (13 no. houses along Pace Road (L5026), northeast of the site) – Distance from nearest site boundary = 1100m.

This group of houses is located off R147 along L5026 adjacent to Avoca Dunboyne (C5). Houses are bungalows with front and rear gardens. The orientation of properties is northeast-southwest.

Sensitivity Receptors would be residents at home. Sensitivity is *High*.

Magnitude These houses are nestled within a mixed landscape. The M3 and R147 are positioned to the west and Avoca Dunboyne (C5) is adjacent to the southwest. Private clearfell sites encompass the houses from the north and south forming a barrier between properties and Kilsaran Concrete HQ which is located to the north and has been scoped out of this assessment. The east is dominated by hedgerow partitioned pastures. Terrain gently slopes down towards the development from this receptor group.

The sites of forest clearfell effectively screen all visibility of the development site from these houses. Once trees have been harvested views may be clearer, although Avoca Dunboyne obstructs views for houses located closer to R147 and the M3 and M3 Parkway and station occupy views for houses located further east along L5026. Each property also features well-developed rear hedges that grant increased privacy. The landscape is mixed and the development would be a subtle contribution to the shift towards a more suburban environment. The magnitude of change will be *Negligible to Neutral*.

Effect In accordance with Table 10.1 and Table 10.2, the significance of the visual effect will be *Temporary, Slight, Negative* during construction and *Permanent, Slight to Imperceptible, Negative* during operation.

C1 (M3 Parkway train station and adjoining carpark, north of the development site) – Distance from nearest site boundary = 0m

The train station is the final stop for commuter rail services through the Dunboyne-Clonee-Pace corridor. The carpark and station are accessed from a roundabout on R157 to the west. There is also a bike locker and ESB electric vehicle charging station in addition to the carpark.

Sensitivity Receptors would be commuters and other public transport users. Sensitivity is *Low*.

Magnitude There is little in the way of screening vegetation along the southern boundary of the carpark so views into the development site are quite clear and direct. Proposed tree planting along the northern boundary of the site will soften the views such that they have natural and built elements. The magnitude of change will be *Medium*.

Effect In accordance with Table 10.1 and Table 10.2, the significance of the visual effect will be *Temporary, Slight, Negative* during construction and *Permanent, Slight, Negative* once operational.

C2 (Bracetown Business Park, east of the development site) – Distance from nearest site boundary = 510 – 990m

The business park comprises seven large warehouses, a plaza, and several office buildings with L1010 cutting through the park from R147. R5 borders the business park to the northeast and R4 is located across R147 to the northwest.

Sensitivity Receptors would be staff and clients of businesses. Sensitivity is *Low*.

Magnitude The business park is situated along R147 with empty pastures surrounding to the south and rural residences of R4 and R5 to the north. Views of the development site from the front of the business park would be screening by trees and shrubs present along R147 and within the park. Vegetation associated with receptor groups R4 and R2 lie between the business park and the site. Although much of the vegetation is deciduous, the distance from the site and degree of screening, even in winter, will obscure visibility of the site such that views are insignificant. The Magnitude of change will be *Negligible*.

Effect In accordance with Table 10.1 and Table 10.2, the significance of the visual effect will be *Temporary, Imperceptible, Negative* during construction and *Permanent, Imperceptible, Negative* once operational.

C3 (Dunboyne Business Park southwest of the development site) – Distance from nearest site boundary =

Buildings are largely warehouses which are segregated by roads and small carparks.

Sensitivity Receptors are staff and clients. Sensitivity is *Low*.

Magnitude There is minimal vegetation within the park, however, hedges are present around the perimeter. The clearest views of the development will be from the westernmost parts of the business park located closest to R157. Thorntons Civic Amenity Centre which is a recycling facility is located here. Further east into the park views towards the development site are screened by receptors in R3. The magnitude of change will be *Low*.

Effect In accordance with and Table 10.1 and Table 10.2, the significance of the visual effect will be *Temporary, Imperceptible, Negative* during construction and *Permanent, Imperceptible, Negative* once operational.

C4 (Tolka Plant Hire Limited, north of the development site) – Distance from nearest site boundary = 700m

This is a construction company located down a small slip road off Woodpark Road, in the Pace townland.

Sensitivity Receptors are staff and clients. Sensitivity is *Low*.

Magnitude The business is located off the Pace Road along which R7 dwellings are also positioned. Views towards the development site from the business are heavily screened by vegetation, particularly tall trees and high shrubs, that is present in the rear gardens of R7 houses. Visibility beyond the immediate site surrounds is very limited. The magnitude of change will be *Low*.

Effect In accordance with Table 10.1 and Table 10.2, the significance of the visual effect will be *Temporary, Imperceptible, Negative* during construction and *Permanent, Imperceptible, Negative* once operational.

C5 (Avoca Dunboyne, north of the development site) – Distance from nearest site boundary = 850m

Avoca Dunboyne is a retail space with a garden centre, food market and restaurant. R147 and the M3 border to the west and the site is accessed from L5026 just off R147.

Sensitivity Receptors are staff and customers. Sensitivity is *Low*.

Magnitude The business is nestled between R147 to the west, a small Private Clearfell forest to the southeast and the houses of R9 to the north. The premises is a two-storey building with a large R147 facing carpark. Trees and small shrubs are present within the carpark. Trees are also present along the border with R147, all of which appear to be deciduous. The building is oriented in an east-west direction where views of the site from within the building are not likely. From the carpark, the tallest elements of the development may be visible through gaps in the vegetation which may be more apparent in the winter. The magnitude of change will be *Negligible*.

Effect In accordance with Table 10.1 and Table 10.2, the significance of the visual effect will be *Temporary, Imperceptible, Negative* during construction and *Permanent, Imperceptible, Negative* once operational.

Co1 (Dunboyne College of Further Education and Dunboyne Boxing Club located within Dunboyne Business park to the south of the development site) – Distance from nearest site boundary = 500 and 700m

Dunboyne College of Further Education is located at the north of the business park, closer to the development site while Dunboyne Boxing Club is located at the southeast corner of the business park overlooking R8.

Sensitivity Receptors are staff and students of the school, and staff and members of the club. Sensitivity is *Low*.

Magnitude Visibility of the development site from the college is partially screened by houses and associated vegetation in R3. Most trees are deciduous so visibility through gaps will be clearer in the winter. The boxing club is surrounded by large warehouses that block views to the development site. The magnitude of change will be *Negligible*.

Effect In accordance with Table 10.1 and Table 10.2, the significance of the visual effect will be *Temporary, Imperceptible, Negative* during construction and *Permanent, Imperceptible, Negative* once operational.

OS1 (Triangular green space north of R8, south of the development site) – Distance from nearest site boundary = 900m

This small green area is positioned between eastern houses of R8 and pastures to the north.

Sensitivity Receptors would be users of the green space. Sensitivity is *Low*.

Magnitude A raised bank with trees is evident along the northern perimeter of the green space that provides some screening of northern views of the development site. No playground or other features have been identified in the space, however, the space is likely an important amenity for residents. During construction machinery will be partially visible through screened views and during operation the tallest elements of the development will likely be visible. Due to the distance of the receptor from the site the change in landscape will be a minimal effect on the horizon. The magnitude of change will be *Low*.

Effect In accordance with Table 10.1 and Table 10.2, the significance of the visual effect will be *Temporary, Imperceptible, Negative* during construction and *Permanent, Imperceptible, Negative* during operation.

OS2 (Greenspace which is part of the western estates of R8, southwest of the development site) – Distance from nearest site boundary = 700m

This green space features a central walking path, some internal trees, two soccer goal posts and a line of trees along the northern boundary.

Sensitivity Receptors would be users of the open space. Sensitivity is *Low.*

Magnitude The space is positioned between R8 to the southwest and C4 to the northeast. Tall industrial buildings located in Dunboyne Business Park comprise the views from this space. Views of the development site are screened by this infrastructure, although visibility may be present through gaps. Views are further screened by vegetation present through the pastures further north. The magnitude of change will be *Low*.

Effect In accordance with Table 10.1 and Table 10.2, , the significance of the visual effect will be *Temporary, Imperceptible, Negative* during construction and *Permanent, Imperceptible, Negative* during operation.

OS3 (Playing field along Kennedy Road west of the development site) – Distance from nearest site boundary = 180m.

This is a public sports pitch.

Sensitivity Receptors will be community members and players attending training and matches. Sensitivity is *Low*.

Magnitude The playing field is separated from the development site by R157 and a single pasture. Vegetation is low around the pasture, resulting in a low level of screening towards the development site. Hedges along the sloped banks of R157 are present and provide some partial screening, however, the development will introduce a permanent change in the overall landscape composition for this receptor. The magnitude of change is *Low*.

Effect In accordance with Table 10.1 and Table 10.2the significance of visual effect will be *Temporary, Imperceptible, Negative* during construction and *Permanent, Imperceptible, Negative* once operational.

10.9 The 'Do Nothing' Scenario

The site, which is currently under agricultural use as pastureland, would likely remain under agriculture and resemble its' current condition under the *Do Nothing Scenario*. There are no hazardous trees on site that require removal. Most other elements would evolve naturally (growth, death, regeneration). Due to grazing, natural regeneration is minimal. Without intervention, there is little evidence that new planting would arise, so it can be anticipated that the site would devolve in terms of biodiversity.

The *Do Nothing* option may also result in an increased pressure on the Greater Dublin Area for available housing and stem progress of objectives outlined in the Meath CDP. As the land has been zoned for new residential development the Do Nothing option is not considered further in this report.

10.10 Potential Significant Effects

10.10.1 Construction Phase

No significant negative effects are expected during the construction phase. The highest negative effects will be *Moderate*. As witnessed on housing sites across the country, construction of the development is expected to add temporary machinery to the landscape and cause high levels of soil disturbance. With vegetation removed internally, the construction scene will be visible and likely include views of temporary security fencing or hoarding. This is a *Negative* visual and landscape character impact, but it is a *Temporary* one. Implementation of short-term mitigation measures include tree protection measures and the phasing of vegetation removal and replanting. This will help mitigate negative impact on the local community.

10.10.2 Operational Phase

The highest operational impacts will be experienced by visual receptors closest to the site, particularly those in R1 and R2 which have views over the site. These impacts will be *Slight* to *Moderate Negative,* as described above. Other receptors will generally experience *Slight* to *Imperceptible Negative* visual impacts, due to increased screening and distance from the site.

10.10.3 Cumulative Effects

Cumulative Impact is the incremental impact created by the proposed development in the context of surrounding land uses, recent changes and considered future development. In this chapter, cumulative impact assesses the visual alterations in the landscape and the potential modification to the rural and suburban setting as a result of all recent and proposed development, regardless of who carried or will carry out the actions. In assessing future works, only reasonable, foreseeable actions are considered.

The site is phase 1 of a larger masterplan area. Future phases of development will be situated to the west of the subject site, that is west of the M3. No details have been published at this stage on the future proposals. The cumulative effect will depend largely on how sympathetic the other stages will be to the existing vegetation with a focus on the boundary hedgerows. It will also depend on the scale and positioning of taller buildings.

North of the proposed development site, two planning applications, one for a single storey commercial building (23/60065) and one for three office buildings (23/424) were at the FI stage at the time of writing. The cumulative effect will depend on retention of existing vegetation, proposed planting, and the positioning of buildings. South of the proposed development the Dunboyne Link Road – Dunboyne Business Park and the R157 a Part 8 Development has been proposed (P822022).

It can only be assumed at this stage that any future stages are expected to increase the urbanising character of the area. Based on the LCA characteristics, this can be interpreted as a slight to imperceptible negative to locally positive interventions to the landscape if the principles mentioned above are followed.

With regards to the visual amenity, the further restriction of views could result in a further negative impact. Provided that the existing retained boundary hedgerows are enhanced as per the proposed development's layout, this impact is not expected to be significant. The development policies of Meath CoCo should be followed to ensure this.

There are no likely significant negative cumulative impacts of the proposed works in conjunction with committed developments based on a review of planning grants.

10.11 Mitigation

10.11.1 Construction Phase Mitigation

No significant landscape nor visual impacts are expected during construction. Despite that, less visually intrusive hoarding is proposed to reduce visibility of moving plant from outside the site.

10.11.2 Operational Phase Mitigation

No significant landscape nor visual impacts are expected during the operational phase. Nonetheless, the proposed development design includes tree retention of perimeter hedgerow that will help to mitigate against some of the less significant landscape and visual impacts on receptors most affected, namely R1 and R2. This is complementary to the proposed soft landscaping and planting schedules incorporate native tree and shrub species to encourage and support biodiversity which will improve the visual amenity and further mitigate against negative landscape and visual impacts.

10.12 Residual Impact Assessment

No residual impacts are expected.

10.13 Risk of Major Accidents or Disasters

The interventions are sympathetic to the purposes of the site and enhances the existing landscape character. These are not expected to pose any risk of cause any major accidents or disasters related to the landscape and visual amenity.

10.14 Significant Interactions

The landscape and visual amenity closely relate to the site's biodiversity and cultural heritage elements. The current proposals are not expected to significantly interact with any other disciplines.

10.15 References & Sources

Guidelines for Landscape and Visual Impact Assessment (GLVIA) as published by the Landscape Institute (UK) and the Institute of Environmental Management and Assessment (3rd Edition, 2013)

Environmental Protection Agency (2022) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports;

Meath County Development Plan 2021-2027.

Landscape Character Assessment (LCA) of Meath County Development Plan (Draft Report May 2021).

Large Scale
Residential Development
at Dunboyne North, Co. Meath

Volume II

Environmental Impact Assessment Report

CHAPTER 11

Material Assets: Traffic and Transport

August 2023

McCutcheon Halley
CHARTERED PLANNING CONSULTANTS

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11 Material Assets: Traffic & Transport

11.1. Introduction

This Chapter of EIAR has been prepared by Nicholas van den Berg of Atkins.

Nicholas is a Chartered Engineer with Engineers Ireland. Nicholas has carried out numerous traffic assessments and has been involved in the preparation of EIARs for the following projects:

- Harbour Point Development, Bray - Ballymore
- Lanesboro to Mullingar Uprate – Eirgrid
- Binbane to Cathleen Falls – Eirgrid

This chapter of the EIAR reviews the current receiving environment in terms of existing road traffic characteristics and quantifies the associated baseline scenario whilst undertaking an assessment of the proposed development to identify its likely effects on the traffic environment.

The Site is associated with the development of strategic land to the north of Dunboyne adjacent the M3 Junction 5 (Pace Interchange) and the M3 Parkway train station. In principle, the zoned lands have the potential to be well connected to the national transport network with direct connections to the motorway network, regional roads, rail and bus services, together with local connectivity to existing land uses in Dunboyne.

The overall Dunboyne North Development presents as a development wherein residents will be facilitated with a lifestyle that is based predominantly on active travel and travel by public transport whilst minimising dependency on car travel. This opportunity is based on multi-faceted characteristics of the site location and opportunities created for travel choice and preclusion of the need to travel by car in terms of direct and adjacent proximity to existing and future services.

The Site is proposed to be developed in alignment with several future public transport initiatives/projects. The major projects include:

- DART+ expansion programme; and
- BusConnects – Core Bus Corridor: N3 Navan Corridor

The DART + expansion programme, as set out in the Greater Dublin Area Transport Strategy 2016 - 2035 (NTA, 2016), it is planned to deliver additional carriages, followed in the longer term by electrification, upgrade and more frequent rail services which will see a train depart every 12 minutes in the peak hour. Customer capacity and train service frequency on these lines will be significantly increased as a result of the programme, delivering a more efficient transport system that allows more people to make sustainable travel choices to meet the goals set out in the State's Climate Action Plan.

The NTA are currently developing the BusConnects Scheme, N3 Navan Corridor is seen as a 'spine' route which will operate between Blanchardstown and Dublin City Centre with continuous bus priority. Once implemented, Dunboyne will be served by routes 70 and 270 (renamed 364 and 264 respectively) which shall be extended from Dunboyne Town Centre to M3 Parkway to create a multi-modal interchange. These routes will become high frequency feeder routes to a major bus interchange at the Blanchardstown Centre.

In January 2021, the National Remote Work Strategy was published by the Department of Enterprise Trade and Employment which lays out the long-term strategy to promote home and remote working for public sector and private sector employees. The strategy mandates that 20% of the public sector workforce move to home and remote working in 2021. Furthermore, the strategy notes that more than 25% of the private sector workers in Ireland have the ability to work remotely.

Therefore, in addition to the significant opportunities to travel to work by active travel and public transport modes, residents of the Dunboyne North development will avail of the home and remote working opportunities, including flexible working opportunities, as promoted by the National Remote Work Strategy. This change in work practice will minimise overall work trips and optimise flexible working opportunities that will enable residents to avoid travel to work and to also facilitate residents to commute to their place of employment outside of the peak traffic and travel periods.

In overall terms, the Dunboyne north Development will be fully consistent with the National Planning Framework objective of compact growth in a location that will optimise the residents' opportunities to travel by active travel and public transport modes and fully consistent with the overall objectives of the NTA Greater Dublin Area Transport Strategy.

11.2. Methodology

The assessment methodology for the traffic and transport impact is consistent with the Transport Infrastructure Ireland's (TII) Traffic and Transport Assessments Guidelines. The methodology is summarised as follows:

- **Baseline Transportation Review**: Undertake a review of current planning policies and objectives, existing public transport services, walking and cycling network and existing and roads infrastructure;
- **Baseline Traffic Flow Review**: Undertake site visits to review current traffic conditions and to make observations on same. Identify key junctions where traffic count survey information is required;
- **Future Transport Infrastructure Review:** Undertake a review of current transport policies, plans and strategy to identify future short, medium and long term transport proposals which may have a material impact on the travel behaviour associated with the proposed development;
- **Development Proposals Review**: Review the proposed development in terms of provision for access by walking, cycling, public transport and car;
- **Transport Characteristics Review**: Undertake an assessment of the likely modal share, trip generation, assignment and distribution having regard to existing and potential future traffic patterns on the local road network;

- **Identification of Local Road Network Proposals:** Identify proposed junction works on the local road network in terms of new junctions, improvements for pedestrians, cyclists and traffic at existing junctions;
  - **Assessment of Road Impact – Operational Phase**: Undertake an assessment of the key junctions during the operational base year, opening year, opening year plus five and opening year plus fifteen assessment years for both 'without development' and 'with development' scenarios in order to determine future operation and any necessary mitigation measures required; and,
  - **Assessment of Road Impact – Construction Phase**: Undertake an assessment of the potential traffic generation during the construction phase and assess the percentage traffic impact likely to occur and to identify any appropriate mitigation.

As requested at pre-planning stage, a Scoping Document was issued to Meath County Council. The content of this Scoping Document is based on feedback from Meath County Council through pre-application meetings and communications. A number of meetings were held to discuss and agree the methodology as well as what additional developments and infrastructure were to be included in future years. Meetings were held on 15th June 2021, 24th August 2021 and 1st March 2022. An S247 meeting was held on 15th May 2023 pre-planning meeting and a 32B LRD meeting was held on 20th July 2023 where the agreed scope and methodology was presented.

11.3. Receiving Environment

11.3.1. Development Location

The development lands owned by Marina Quarter Ltd are located near the M3 Parkway Railway station in the Dunboyne North region. In the Dunboyne North Masterplan (MP22) prepared by Meath County Council in October 2022, the residential development lands are divided into Phase 1A, Phase 1B and Phase 1C as outlined below. The location of lands for all three phases are summarised in the figure below which is extracted from the overall MP22 Masterplan for the area.

The initial area to be developed forms part of Phase 1A of the masterplan located east of the R157 between the proposed new road which links to the Old Navan Road and M3 Parkway access road as shown in the figure below. Two accesses are proposed for the Phase 1A lands from the proposed new link road as shown in the figure below. Both access roads junctions will be priority junctions.

The remainder of Phase 1A on the western side of the R157 along with Phase 1B and Phase 1C will be developed over time in tandem with upgrades to infrastructure in the area. These will be served by an access from the new proposed western access road and directly from the R157 at a new signalised junction.

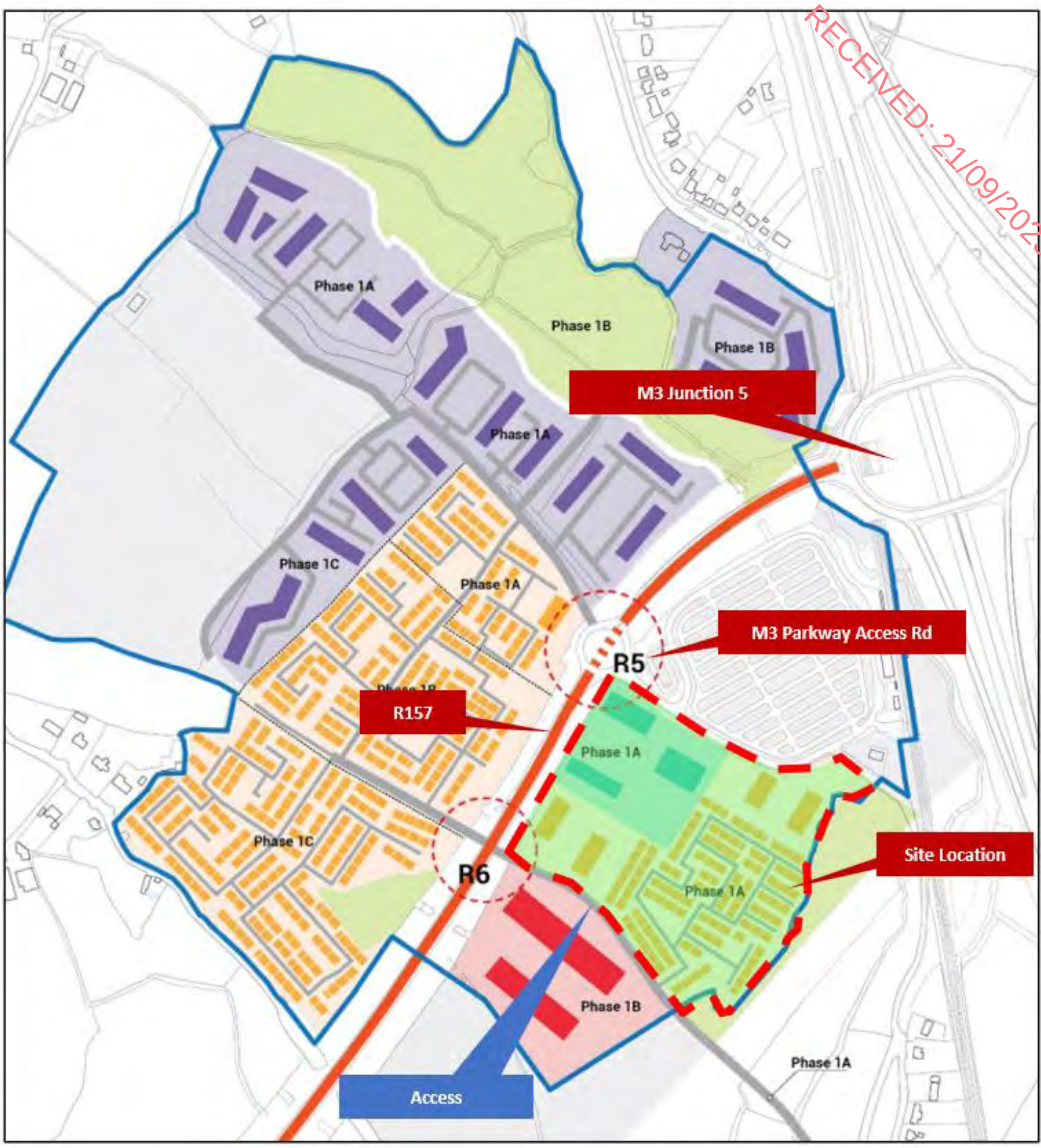

Figure 11.1 Site Location – within MP22 Masterplan

11.3.2. Pedestrian and cycling facilities

11.3.2.1. Existing

There is no existing walking and cycling infrastructure connecting this development site with Dunboyne Town as this a Greenfield area. R157 Regional Road is two way carriageway with approximately 9m wide and with 1.5/2m wide hard shoulder from both sides as shown in Figure 11.2 overleaf.

Figure 11.2 R157 connecting development site with Dunboyne Town

11.3.2.2. Future

The provision of safe and attractive pedestrian and cycle facilities throughout the proposed development and the wider Dunboyne area is critical to ensure that sustainable transport modes are adequately catered for and encouraged.

The proposed development includes signalised junctions on the R157 with dedicated cycle lanes and pedestrian crossings provided to facilitate movement across this busy regional road which currently serves as a barrier to these modes. The new western access road and southern link road to the Old Navan Road provide dedicated segregated cycle tracks along with footpaths throughout.

The internal road layout within the development also caters for pedestrians and cyclists with shared surfaces and reduced vehicle speeds throughout in accordance with DMURS. These link directly into the M3 Parkway where additional cycle/pedestrian facilities are proposed including zebra crossings to ensure that easy access is provided to allow sustainable trips to the rail station. In addition, dedicated shared pedestrian and cyclist facilities are proposed both adjacent to the R157 and to the extreme east of the site which will provide safe and convenient access for sustainable travel modes to access the development and the M3 Parkway.

The Dunboyne Masterplan document includes high walking and cycling permeability offering direct routes to local destinations and public transport stops. As per the document, connections will be facilitated through the introduction of north/south links between Dunboyne Town Centre and the Dunboyne North lands through the revitalisation of the Old Navan Road, provision of new pedestrian and cycle routes and in the form of a Linear Park along the Tolka River creating a new amenity for the area. These facilities will create an attractive, sustainable and vibrant destination that supports a move away from car dependency towards more sustainable modes of transport. The proposed pedestrian and cycle facilities along the Old Navan Road will link the proposed development with the town centre and will also provide safe routes for active travel modes between the town and the M3 Parkway. Facilities along this road are planned to be provided by Meath County Council.

The following figure summarises the proposed active travel intervention as per the Dunboyne North Masterplan document.

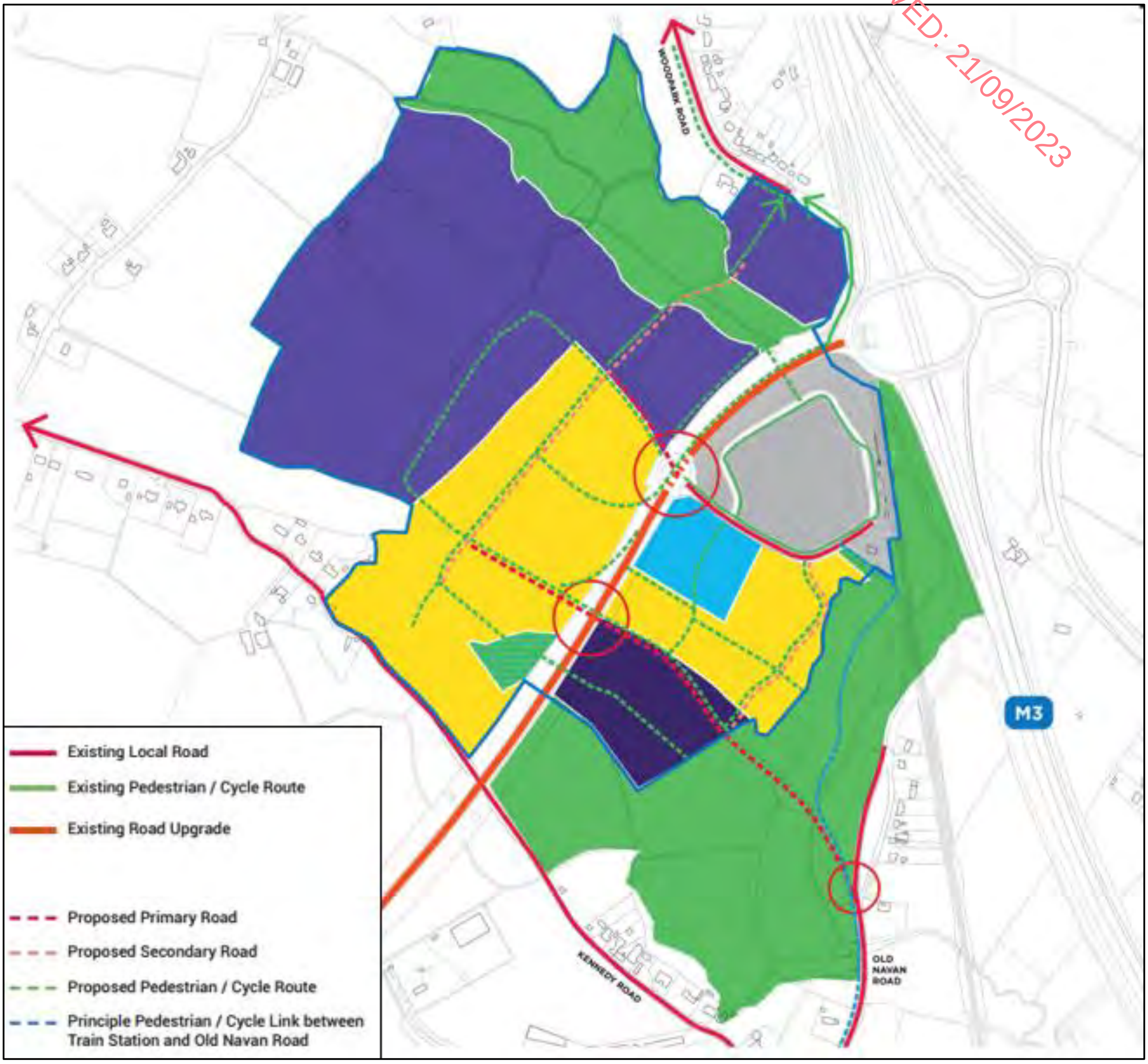

Figure 11.3 Proposed Active Travel Intervention: Dunboyne North Masterplan MP22

11.3.3. Public Transport

The east of Dunboyne is well served by public transport options, including trains and buses with train stations located within Dunboyne itself as well as a large park & ride at the M3 Parkway station to the north of the town centre.

11.3.3.1. Existing

11.3.3.1.1 Rail service

The M3 parkway, located directly adjacent to the proposed development, is a park and ride facility with 1200 parking spaces. It serves the Docklands to M3 Parkway rail route.

The rail service to/from M3 parkway rail station varies throughout the day.

Monday to Friday rail services:

- During the peak hours, trains run between Docklands and M3 parkway station, while during the off-peak hours the route is curtailed to between Clonsilla and M3 Parkway station.
- For the route from M3 parkway station to Docklands, in the morning peak, trains run between 6.50am and 9.08am. During the evening peak, 5 trains run between 4.35 pm to 6.40 pm. In addition, two trains run as far as Broombridge at 7.15 pm and 7.42 pm.
- For the route from Docklands to M3 parkway, in the morning peak, 4 trains run between 7.51 am and 9.35 am. During the evening peak, 8 trains run between 3.55 pm and 7.30 pm
- During the off-peak hours, as stated the service runs between M3 parkway and Clonsilla only at a frequency of one hour.
- Saturday, Sunday and Public holidays services:
- On Saturdays, the train services run between M3 parkway and Clonsilla only with frequency of one hour. The train services between M3 parkway and Clonsilla run between 7.30 am to 23.57 pm. For the reverse direction, the trains run between 7.50 am to 23.10 pm.
- On Saturdays, the train services also run between M3 parkway and Clonsilla only and with frequency of one hour. The train services between M3 parkway and Clonsilla run between 9.30 am to 23.57 pm. For the reverse direction, the trains run between 9.40 am to 23.10 pm.

The Docklands-M3 parkway train route is shown in the figure below.

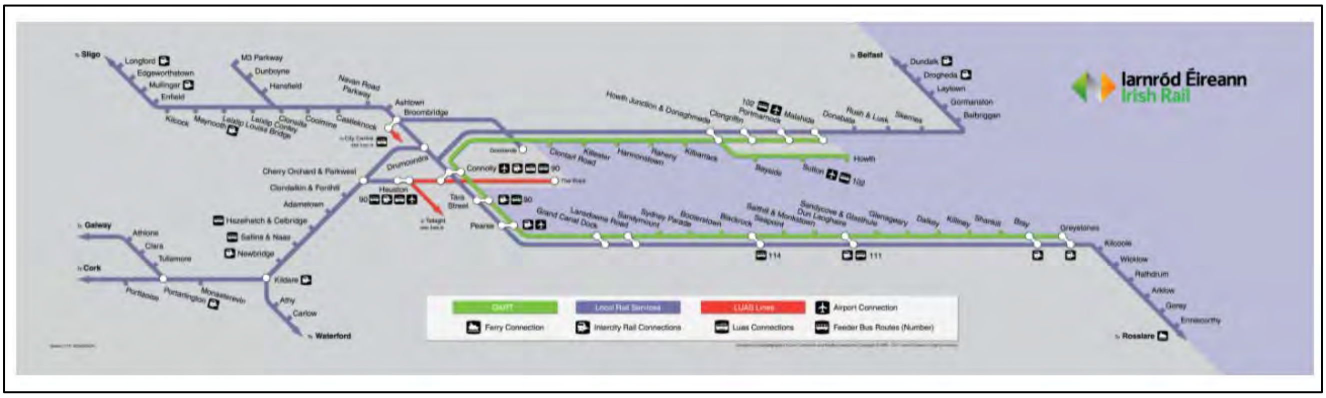

Figure 11.4 M3 Parkway-Dockland train route

11.3.3.1.2 Bus Service

Dublin Bus and Go Ahead both have routes which serve Dunboyne Town Centre (70 and 270), linking to Dublin City Centre and Blanchardstown respectively. Route 70 runs at varying frequencies, approximately every 30 minutes in the AM Peak and up to every 10 minutes in the PM Peak. Route 270 runs approximately every hour.

However, these do not serve the lands to the north of Dunboyne or the M3 Parkway directly.

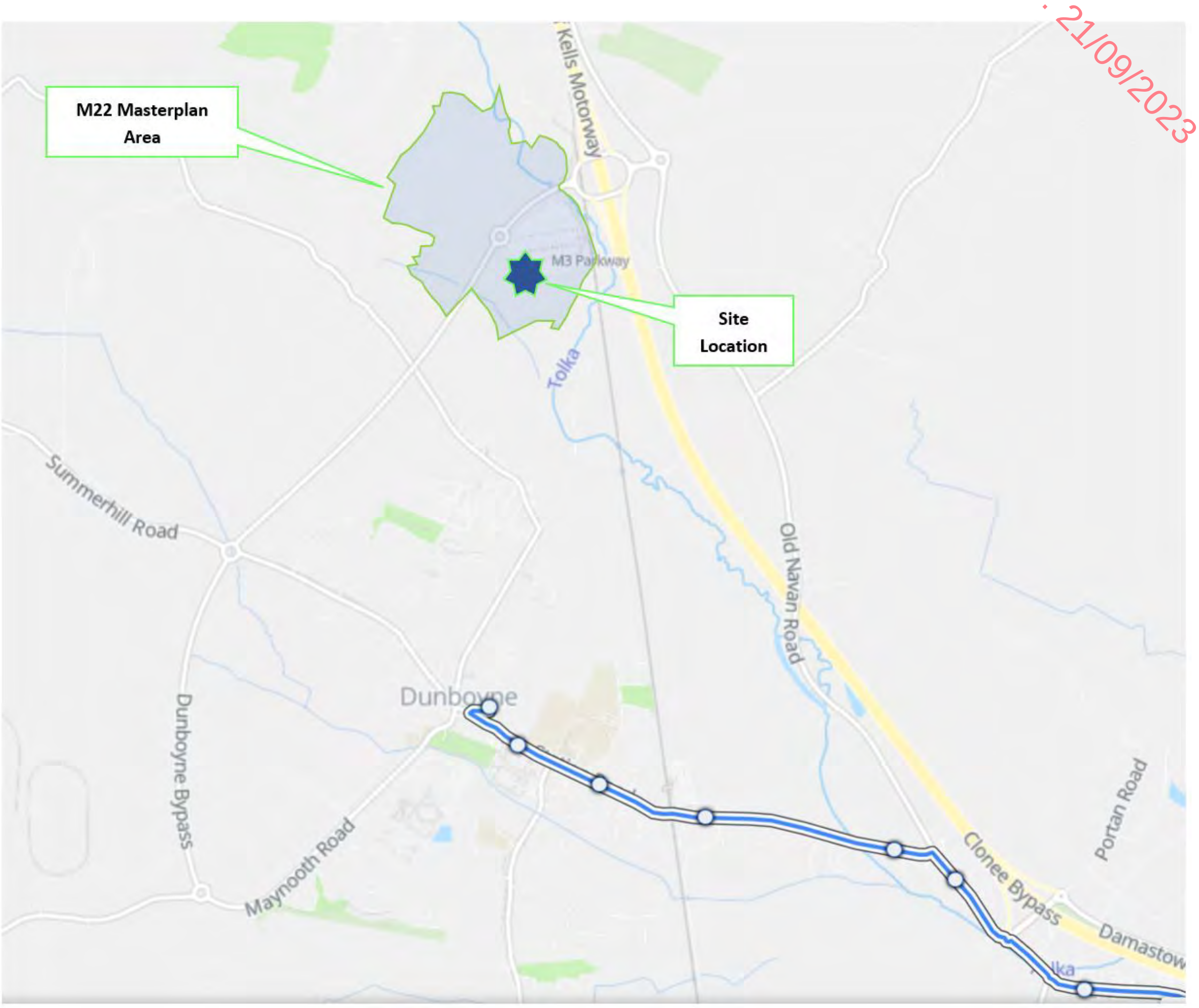

Figure 11.5 Dublin Bus Route 70 and Go Ahead Route 270

11.3.3.2 Future

11.3.3.2.1 Rail service

Significant improvements are planned for this rail line with the extension of dart services as part of Dart+ West as indicated in the figure below. The proposal will double capacity and frequency on the existing line and will offer a reliable, high speed link to Dublin City Centre and other more local employment an education centres. The proposed development is located directly adjacent to the M3 Parkway railway station and new pedestrian and cycle links are proposed to facilitate active travel links to the station. This will encourage sustainable transport modes and reduce car dependency in the area.

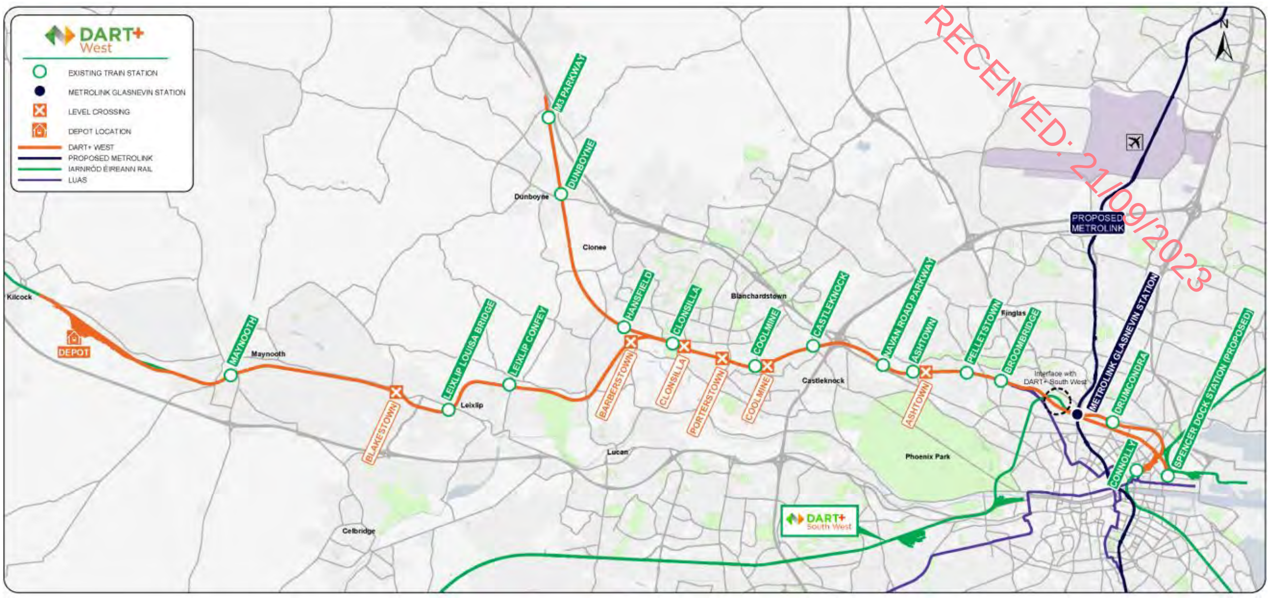

Figure 11.6 Dart+ West Route

11.3.3.2.2 Bus Service

BusConnects proposes to replace the existing services in the area with two new routes, a local route L64 which links to Blanchardstown and a peak time route P64 to the city centre as shown in the figure below. Similarly to the existing services, these do not directly serve the M3 Parkway or the proposed development. Active travel links proposed by the developer along the new southern link road and by Meath County Council along the Old Navan Road will allow people to access these services in a sustainable manner.

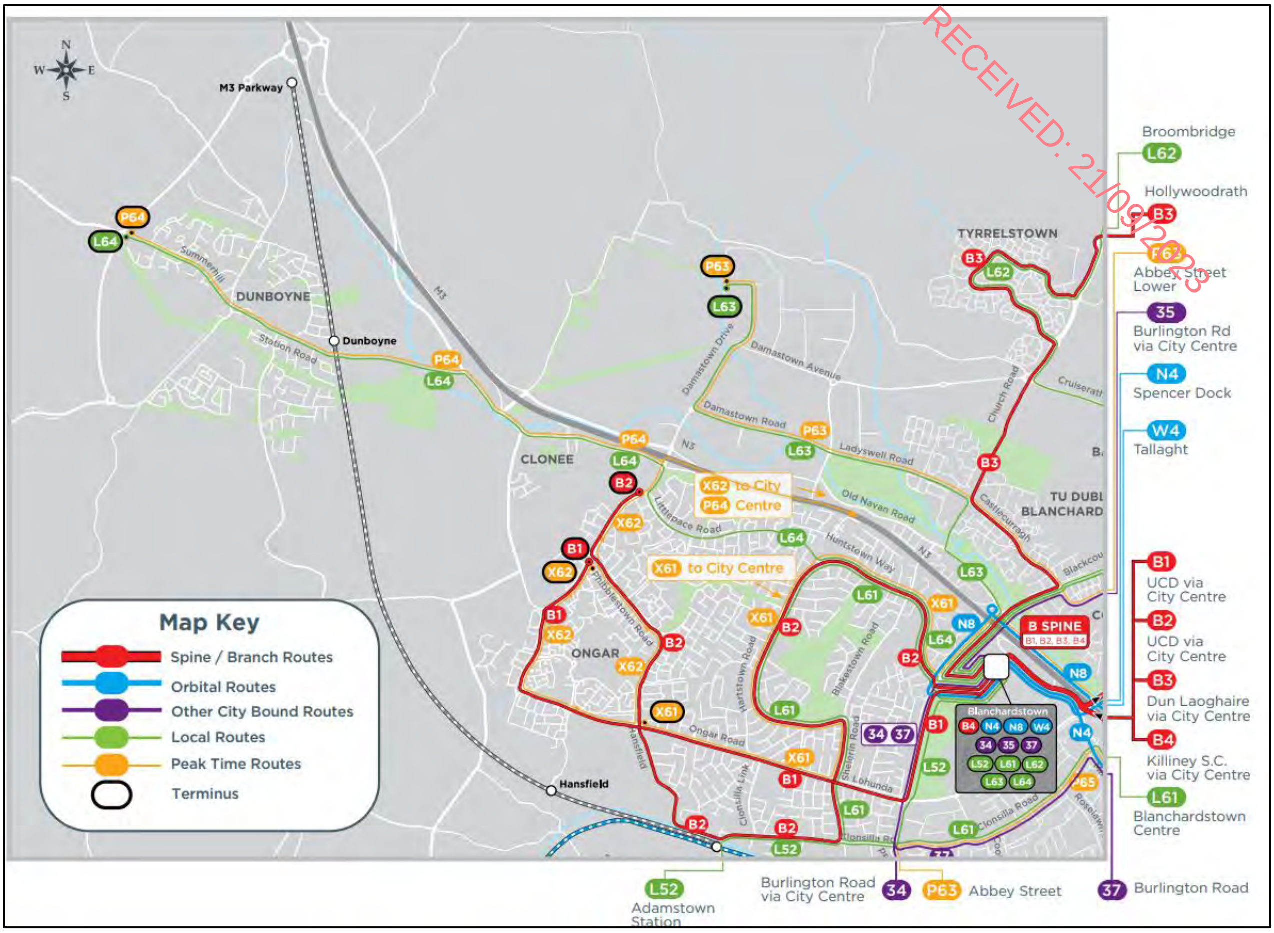

Figure 11.7 Proposed BusConnects Network

However, the Transport Study at Dunboyne & Environs report suggests extending bus services to M3 Parkway to increase the catchment area for public transportation in Dunboyne which will facilitate the Dunboyne North Development lands and further reduce car dependency. The proposed extension is shown in the figure below extracted from TSDE.

Figure 11.8 Proposed TSDE Bus Service Extension

11.3.4. Road Network

11.3.4.1. Existing Local Road Network

The proposed development site is located adjacent to a comprehensive road network consisting of national roads, regional roads and local roads. The connections from the development to the existing road network and connectivity to the wider area are outlined below and shown in

- **The M3 Motorway** – The M3 motorway forms part of the N3/M3 road corridor which connects the M50 to the midlands and north west region of Ireland. This stretch of motorway, designated M3, begins near the end of the dual carriageway outside Clonee and terminates south west of Kells just before the N52. Near the M3 Junction 5 interchange, the M3 motorway is a 2+2 lane dual carriageway facility with a speed limit of 120 km/hr. The M3 toll is located just to the north of the M3 Junction 5 interchange.

- **R147** – The R147 is a regional road. Near the M3-Junction 5 interchange, the R147 is a 1+1 single carriageway road with speed limit of 80 km/hr. North of the R147/R157 roundabout junction, the R147 has bus lanes on both sides
- **R157** – The R157 is a Regional road between Dunboyne and Maynooth in Ireland. It connects to the M3 motorway. In the vicinity of Dunboyne, the R157 link is a 1+1 single lane carriageway with speed limit of 50 km/hr.
- **L2228 (Summerhill Road)** – L2228 is a local road which runs through Dunboyne Town Centre and connects Summerhill Roundabout (R156/R157 Roundabout) to the R147 at Clonee interchange (M3 Junction 4). It is a 1+1 single carriageway with a speed limit of 50 km/hr.
- **Old Navan Road** – This is a 1+1 single carriageway which starts at the L2228 signalised junction (located in the Dunboyne Town Centre) in the south and extends north where it terminates near the Tolka river. The speed limit on the road is 50km/hr.

A full description of the local road network is contained within the TTA.

The main junctions which are likely to be impacted by the proposed development were identified as follows, with *reference numbers.*

Table 11.1 Location of key junctions

Junction Reference	Location
Junction 1	R147/R157 Roundabout, located east of M3-Junction 5 interchange
Junction 2	M3-Junction 5 Interchange (Pace Interchange)
Junction 3	R157/M3 Parkway Access Junction
Junction 4	R156/R157/L2228 (Summerhill Road) Roundabout
Junction 5	L2228 (Summerhill Road)/Main Street/Old Navan Road
Junction 6	Dunboyne Industrial Estate Road/Old Navan Road

The locations of key links and junctions are summarised in below:

Figure 11.9 Key Local Roads and Junctions

11.3.4.2. Future Local Road Improvements

Based on the Transport Study at Dunboyne and Environs report and consultation with Meath County Council, the following infrastructure upgrades were proposed in the future and shown in Figure 11.9..

More detailed description of the future local road infrastructure Development is contained within the Traffic and Transport Assessment.

- **R147 Cordon**

Based on the provision of the Traffic Study at Dunboyne and Environs, to cater for future development and rebalance flow on the R147 and M3, the R147/R157 roundabout should be upgraded to a signalised junction. The report suggests that the junction should be upgraded in the short term in tandem with the development at Dunboyne North.

- **Signalisation along R147**

The Dunboyne environment transport study states that traffic on all roads leading to the R147 except M3 through traffic could reasonably be considered to be able to use the M3 as a viable alternative. This traffic uses the R147 to avoid the toll located north of M3 Junction 5. Hence, it is assumed that congestion developed along the R147 due to signalisation of the junctions along this corridor will encourage people to use the M3 instead of the R147 corridor.

- **Signalisation of R157 and Access Junctions**

The Traffic Study at Dunboyne & Environs has mentioned that in order to maintain effective operation of the R157 after the construction of the Dunboyne North development, it is important upgrade the R157 corridor between Summerhill Road (L2228) and the Pace Interchange (M3 Junction 5). The study states that the upgrade should include the signalisation of both Dunboyne North access points and provision of extra lane in each direction to facilitate right turning traffic.

The signalisation of these junctions must cater for pedestrian and cyclist movements across the R157 to provide sustainable transport links to the surrounding developments, the M3 Parkway train station and onwards to Dunboyne Town Centre.

- **Distributor Roads**

In the Transport Study for Dunboyne and Environs report, three new road links are proposed to provide an alternative to the built up town centre roads to access Dunboyne including:

  - Dunboyne Business Park link to the R157;
  - Eastern Distributor Road (EDR) between Station Road and Dunboyne Business Park; and
  - Link between the R157 and the Old Navan Road.

- **Dunboyne Business Park Link**

The existing link along the Dunboyne Business Park is a cul-de-sac at Thorntons Recycling Centre at the western edge close to the R157. It is proposed that this link is extended on its western sided where it would join the R157 at a new junction. The design and type of this junction is not currently available as it is subject to a study currently underway.

- **Eastern Distributor Road (EDR)**

A new distributor road is proposed to the east of Old Navan Road. It extends from Dunboyne Business Park junction with Old Navan Road in the west to near Dunboyne Train Station in the east bypassing the Dunboyne Town Centre. The Dunboyne Environs Study suggested that EDR should be delivered prior to the occupation of the residential zones to the east of the town centre but there is no requirement for it to be delivered prior to occupation of units within Dunboyne North.

- **Proposed Junction of EDR with Business link**

The EDR is proposed to join the Old Navan Road at some point close to the existing Business Park priority junction. Following consultation with MCC, this has been assumed to be a new signalised crossroad junction with the Business Park access road.

- **Link between the R157 and the Old Navan Road**

The Dunboyne Environs Transport Study has a provision of another link road to connect the R157 to the Old Navan Road in addition to Business Link Road. This road is to be delivered as part of the proposed residential and commercial development with the accesses to both provided directly from this road. This road will connect from the new southern signalised junction on the R157 to the Old Navan Road. The Transport Study has stated that the link should be developed immediately prior to occupancy of the developments at Dunboyne North.

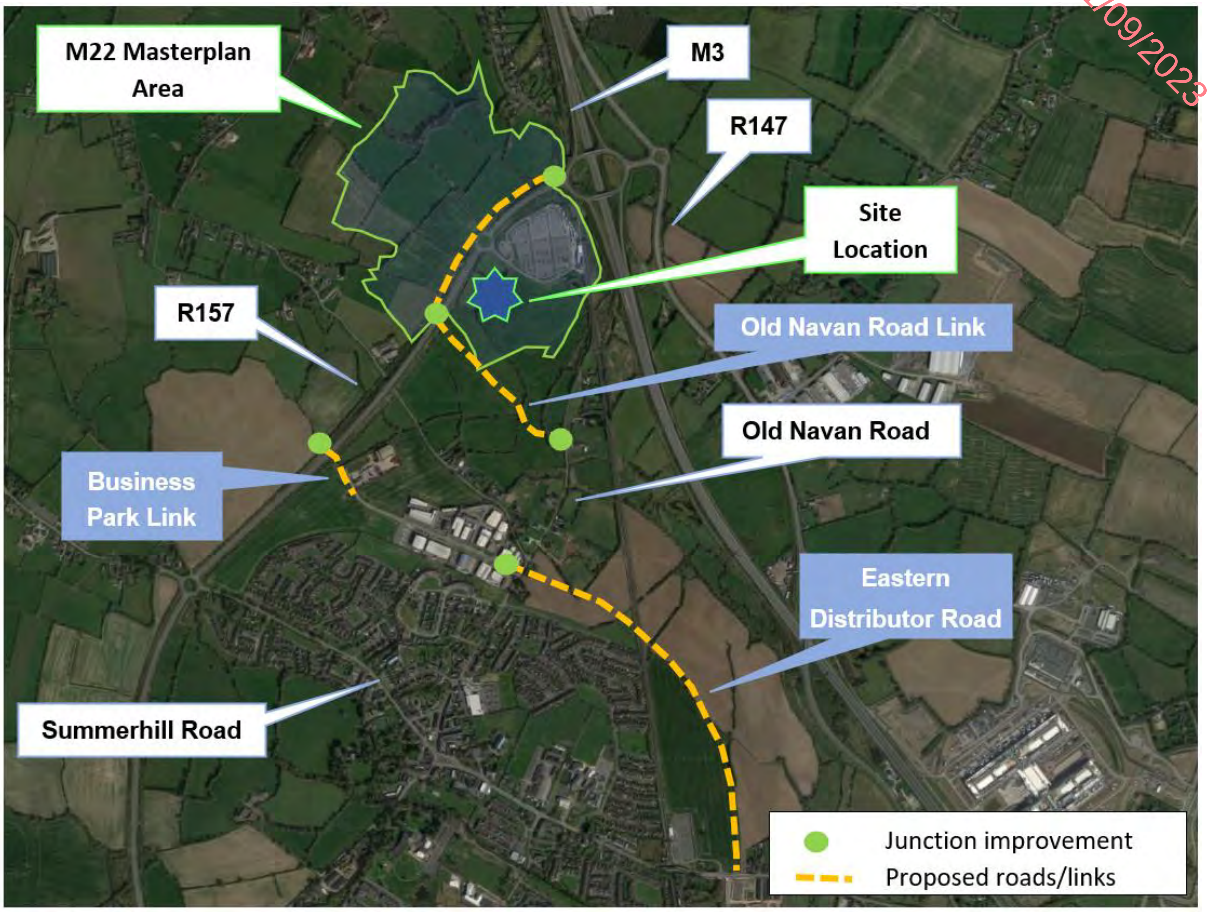

Figure 11.9 Future Local Road Improvements

11.4. Proposed development

The proposed development includes part of the residential portion of lands identified in the Dunboyne North masterplan area. It sits alongside the commercial and enterprise lands which are being developed by others and represents an ideal "work-live" location with additional excellent links to the national road and rail network.

The entire development is divided into three zones: Phase 1A, Phase 1B and Phase 1C as shown Figure 11.1. The Phase 1A lands are located east of the R157, while the other two phases are located west of the R157.

11.4.1. Schedule of Accommodation

The proposed development will consist of a range of housing and apartment units. The schedule for all three phases are summarised in the following section. The current proposed development, subject to this EIAR, includes a portion of Phase 1A east of R157.

Table 11.2 Schedule of Accommodation: Marina Quarter Ltd

Bedroom Type	Phase 1A (East of R157)	Phase 1A (West of R157) + Phase 1B	Phase 1C	Total
		Apartments/Maisonettes		
1 Bed	27	64	16	112
2 Bed	49	0	0	46
Total Dwellings	**76**	**64**	**16**	**156**
		Duplex		
2 Bed	11	0	0	11
3 Bed	35	0	0	35
Total Dwellings	**46**	**0**	**0**	**46**
		Housing Units		
2 Bed	85	57	52	194
3 Bed	52	159	160	371
4 Bed	8	4	8	20
Total	**145**	**220**	**220**	**585**
Total Units	**267**	**284**	**236**	**787**

For robustness, 3 bed duplex apartments were also considered as houses for the trip generation exercise. In addition to the residential development, a creche with 65 childcare spaces is also proposed In Phase 1A development lands.

11.4.2. Car Parking

The determination of car parking provision for the residential units was based on the rates found in the "Meath County Development Plan 2021-2027".

The rationale for the application of car parking standards is to ensure that consideration is given to the accommodation of vehicles in assessing development proposals while being mindful of the need to promote a shift towards more sustainable forms of transport.

The Meath County Development Plan car parking standards are outlined in Volume 1 – Written Statement Section 11, Subsection 9 as shown in the figure below.

Land Use – Residential	Car Spaces
Dwellings	2 per conventional dwelling
Flats/ Apartments (Refer to the Design Standards for New Apartments in relation to reduced car parking requirements for development adjacent to existing and future rail stations and minimum requirements in	2 per unit In all cases, 1 visitor space per 4 apartments

Figure 11.10 MCC Residential Car Parking Requirements

These standards require the provision of 561 no. car parking spaces (534 no. residential and 27 no. creche) which, considering the location of the development and national policy, would appear to be relatively high. The Development Plan does, however, provide some flexibility with parking provision, stating the following:

- *Residential car parking can be reduced at the discretion of the Council, where development is proposed in areas with good access to services and strong transport links,*
- *Non-residential car parking standards are set down as 'maximum' standards.*

In relation to apartments, Table 11.2 of the Development Plan (extract above) refer to the Design Standards for New Apartments which promote reduced overall car parking standards in intermediate locations and substantially reduced or wholly eliminated car parking in central and accessible locations. The proposed development is considered an intermediate location and is adjacent to the

M3 Parkway rail station. As a result, a reduced car parking provision is considered appropriate for the proposed development.

M22 Dunboyne North Masterplan also provides flexibility regarding parking, stating the following:

- *Section 5.3 - Reduced parking provision and high-quality pedestrian and cycle linkage to adjoining transportation and employment lands to foster a modal shift towards more sustainable forms of transport,*
- *Section 6.2 – Further updates to modelling and analysis of the capacity of the surrounding road network and public transport network, influenced by the implementation of transit-oriented development principles within Phase 1 which will provide for reduced levels and encourage active modes of travel.*

As a result, the parking provision for the proposed development is lower than the prescribed development rates. The number of car parking spaces proposed for the development is 327 no. The full development breakdown is provided in Table 11.3 below. The key considerations for this provision are listed below:

- The creche is expected to have 10 staff and will have space for 65 no. children. The proposal provides 11 no car parking spaces for the creche (including 3 no. set down spaces).
- The 3&4 bed houses are provided with 2 no. spaces, 2 bed houses are provided with 1 no spaces,
- The apartment blocks A, B and C are provided with car parking at a rate of 0.5 car parking spaces per unit which is in accordance with the Apartment Guidelines for reduced car parking, in accessible locations (section 4.21), while the duplexes are provided with 1 no of spaces per unit.

Table 11.3 Car Parking Provided

Car Parking	Parking Type	No. Spaces
2 no spaces for 3&4 bed Houses (60 Houses)	In-Curtilage	120
1 no spaces for 2 bed houses (85 Houses)	In-Curtilage	85
0.5 no. spaces Apartments (76 Apartments)	Surface Parking	38
1 no. spaces Duplex (46 Duplex)	Surface Parking	46
Creche	Surface Parking	11
Visitors and shared	Surface Parking	27
Total		**327**

11.4.3. Bicycle Parking

Meath County Council require an appropriate number of cycle parking facilities to be provided with new development. The following are applicable:

- **DM OBJ 96**: To require the provision of cycle parking facilities in accordance with the Design Standards for New Apartments (March 2018) and Cycle Parking Standards.

- **DM OBJ 97**: Cycle parking facilities shall be conveniently located, secure, easy to use, adequately lit and well sign posted. All long-term (more than three hours) cycle racks shall be protected from the weather.
- **DM OBJ 98**: To establish and implement Cycle Parking Standards for new developments in the County. Meath County Development Plan 2021-2027 Chapter 11
- **DM OBJ 99**: In residential developments without private gardens or wholly dependent on balconies for private open space, covered secure bicycle stands should be provided in private communal areas;
- **DM OBJ 100**: All cycle facilities in multi-storey car parks shall be at ground floor level and segregated from vehicle traffic. Cyclists shall also have designated entry and exit routes at car parks.

Meath County Development Plan cycle parking standards are also outlined in Volume 1 – Written Statement Section 11, Subsection 9 as shown on the figure below.

Type of Development	Cycle Parking Standard
Apartments	1 private secure bicycle space per bed space (note – design should not require bicycle access via living area), minimum 2 spaces 1 visitor bicycle space per two housing units

Figure 11.11 Bicycle Parking Standards

The bicycle parking spaces for the mid-terrace housing units are all provided in secure bike stores in the front gardens. The end of terrace houses and semi-detached houses will have their bikes kept in the back gardens. The bike spaces for the apartments and duplexes are also provided in safe secure stores. The proposed bicycle parking provision is shown in Table 11.4 below.

Table 11.4 Bicycle Parking Provided

Bicycle Parking	No. Spaces
Houses (145 houses)	290
Apartments (76 Apartments)	125
Duplex (76 Duplex)	72
Visitor	150
Creche	12
Creche Visitor	20
Total	**669**

11.4.4. Accessible Parking

According to the Meath County Development Plan (2021 – 2027), accessible car parking is to be provided at a rate of 5% of total parking provision. This rate was then applied to the total surface parking provision of 122 no. (the In-curtilage bays were excluded from this value) which produced the ultimate disabled parking provision of 6 no. spaces. The location of these spaces is shown in the development layout.

11.4.5. EV Charging Points

The Climate Action Plan, 2019 acknowledges that the pricing structure for EV vehicles is a major factor in consumers decision making. However, the Plan also acknowledges the importance of 'ensuring the EV Charging network underpins public confidence.' The Council will encourage the provision of EV charging points in all developments for future proofing.

- **DM OBJ 94**: All car parks shall include the provision of necessary wiring and ducting to be capable of accommodating future Electric Vehicle charging points, at a rate of 20% of total space numbers.
- **DM OBJ 95**: In any car park in excess of 20 spaces where public access is available, four fully functional charging points for Electric Vehicles shall be provided in accordance with IEC 61851 Standard for Electric Vehicle Conductive Charging Systems

In order to satisfy these conditions, a total of 24 no. EV parking spaces have been provided.

11.5. Potential Traffic Impacts on the Local Road Network during Construction Phase

11.5.1. Development of a Design Process Traffic Management Plan

In order to mitigate the impacts of the construction works, a Design Process Traffic Management Plan will be completed by the Applicant prior to the commencement of the works.

The Design Process Traffic Management Plan will be developed in full consultation with Meath County Council and the emergency services.

The plan will be completed in full compliance with the Department of Transport Document 'Guidance for the Control and Management of Traffic at Road Works".

The plan will focus on:

- Minimising risk and delay to commuters and road users
- Minimising impacts on surrounding businesses
- Minimising impacts on surrounding dwellings
- Minimising risks imposed on road workers.

However, it should be noted that the volume of traffic required to construct the development areas is likely to be considerably less than the traffic generated by the completed development. As a result, it will have less impact on the road network than the proposed development. Given that the proposed infrastructure can cater for the traffic volumes generated by the ultimate build out of the Dunboyne North MP22 Masterplan and is required prior to completion of Phase 1A of the development, the construction traffic will also be well catered for on the existing network.

11.5.2. Construction Traffic Impact

The likely impact of the construction works will be temporary in nature and fluctuate throughout the construction period. The predominant construction trip generation factor for the proposed site is anticipated to be associated with site operatives and general deliveries.

In terms of arrival and departure times, on-site employees are anticipated to arrive before 08:00 and will generally depart after 16:00. These arrival and departure times are outside the general commuter AM and PM peak periods and are therefore anticipated to impact the surrounding road network. It should also be noted that, due to the location of the M3 Parkway and surrounding road network, a significant percentage of site operatives are expected to utilise public transport – further reducing the impact of the construction phase.

Although the site is expected to generate HGV movements in the form of material delivery/removal and general deliveries, they are not anticipated to be substantial. It is further recommended that all HGV trips be undertaken during network off-peak periods wherever possible. Due to the nature of construction sites it is, however, expected to be a negligible volume of HGV's during peak periods. Traffic volumes during the construction phase are expected to be substantially smaller than the traffic volumes during the operational phase and, therefore, is considered to have a slight negative impact on the surrounding road network.

11.6. Potential Traffic Impacts on the Local Road Network

11.6.1. Assessment Years, Traffic Growth & Trip Generation

11.6.1.1. Assessment Years and Traffic growth

The following assessment years are considered to identified potential traffic impact on the road local network. For the purposes of this assessment, only the following development scenarios was considered:

- Opening Year (2025) – Do Minimum + Phase 1A east of R157 Development Scenario
- Opening Year + 15 (2040) – Do Minimum + All Dunboyne North Development Scenario

The Opening Year (2025) scenario corresponds with anticipated traffic impact during the operational phase while the Opening Year + 15 (2040) scenario corresponds with the overall masterplan impact – best representing the cumulative impact on the surrounding road network.

The baseline traffic has then been grown in accordance with the growth in the number of person trips per day as determined by the NTA National Demand Forecasting Model. Shown below.

Table 11.5 Growth in number of trips per day (NTA National forecasting Model)

Year	Person Trip	Growth Rate over 10 years
2020	4,600,000	
2030	5,000,000	0.087
2040	5,400,000	0.080
2050	5,800,000	0.074
Average growth over each 10 year period		**0.080**
Average growth per year		**0.008**
Growth Factor		**1.008**

Based on the above table, the number of trips per day is expected to increase by a factor of approximately 0.8% per year. The trips per day consist of all modes of transport including cars, public transport, and active mode of travel. Thus, the actual growth per mode may differ. In reality, taking into account modal shift targets and national policy, it is likely that the vehicle trip growth rate will be less than the overall trip growth rate. However, taking a conservative approach, it was assumed that the overall growth factor applies to the baseline traffic.

In addition, the majority of proposed development in the Dunboyne area has been explicitly included within the model before any background growth factors have been applied, i.e. Dunboyne North and Dunboyne East areas have actual trips modelled based on the development sizes and distribution of traffic etc. As such, background growth factors are likely to, in effect, represent a double counting of traffic in future year scenarios in this area. However, for robustness, the 0.8% growth per year in general traffic volumes has been included as well as proposed development traffic.

11.6.1.2. Trip Rate and Trips Generation

The person trip rate for the residential developments was estimated using the TRICS (Trip Rate Information Computer System) database using the “Residential – Houses Privately Owned” and “Residential – Flats Privately Owned” subcategories respectively for Houses and Apartment Units. This gives the total number of trips generated per unit regardless of transport mode. The direct output from TRICS is included in Appendix B and summarised in the table below.

Considering the layout and type of units proposed as part of the development, including the reduced number of parking spaces associated with them, maisonettes and 1 and 2 bed duplexes have been assumed to have the same trip rates as apartments. For robustness, 3 bed duplexes have been assumed to have the same trip rates has houses.

Table 11.6 People Trip rate from TRICS

Period	TRICS Trip Rates (People)	
	Arrivals	Departures
	Apartments	
AM Peak (07:00-08:00)	0.113	0.165
AM Peak (08:00-09:00)	0.155	0.351
PM Peak (17:00-18:00)	0.454	0.175
	Houses	
AM Peak (07:00-08:00)	0.085	0.402
AM Peak (08:00-09:00)	0.228	0.804
PM Peak (17:00-18:00)	0.64	0.319

11.6.1.3. People Trips Generation

Based on the above trip rate, the total number of person trips were calculated for all phases and are summarised in the table below.

Table 11.7 People trips from development

Parcel	Houses and 3-Bed Duplex			Apartments and remaining duplexes			Total Trips		
	Units	Arr	Dep	Units	Arr	Dep	Arr	Dep	Total
				AM Peak (07:00 – 08:00)					
Phase 1A	**180**	15	72	**167**	19	28	34	100	**134**
Phase 1B	**220**	19	88	**64**	7	11	26	99	**125**
Phase 1C	**220**	19	88	**16**	2	3	21	91	**112**
				AM Peak (08:00 – 09:00)					
Phase 1A	**180**	41	145	**167**	26	59	67	204	**271**
Phase 1B	**220**	50	177	**64**	10	22	60	199	**259**
Phase 1C	**220**	50	177	**16**	2	6	52	183	**235**
				PM Peak (17:00 – 18:00)					
Phase 1A	**180**	115	57	**167**	76	29	191	86	**277**
Phase 1B	**220**	141	70	**64**	29	11	170	81	**251**
Phase 1C	**220**	141	70	**16**	7	3	148	73	**221**

11.6.1.4. Mode Split

Based on the 2016 Census data, the mode share for the Dunboyne Settlement area is shown in the figures below. The mode share is calculated for Work only and Work/School combined. For the morning peak analysis, the mode share for work/school combined is used while, for the evening peak, the mode share for work is only used for the analysis. This takes account of the fact that the morning peak is more influenced by school trips while the evening peak is typically more commuter based.

11.6.1.4.1 Opening Year and Opening Year +5 Mode Share

Based on the figures below, it suggests that the majority of the people commute using private cars as either a driver or passenger while there is a relatively good active travel mode split for school trips. For the Opening Year and Opening Year +5 scenarios, no reduction in car mode share is anticipated

Table 11.8 Vehicle trips generation (hourly basis) for Opening and Opening Year +5 scenarios

Mode	Work/School Combine	Work Only
Active Mode	23.4%	5.0%
Public Transport	14.6%	14.3%
Cars	46.1%	72.3%
Car Passenger	11.9%	2.9%
Work from Home	2.0%	3.2%
Others	2.0%	2.3%
Total	**100%**	**100%**

11.6.1.4.2 Opening Year +15 Mode Share

The Transport Strategy for the Greater Dublin Area 2022-2042, Strategy Development and Modelling Report (November 2021) published by the NTA shows that car mode share will reduce over time as shown in the figure below.

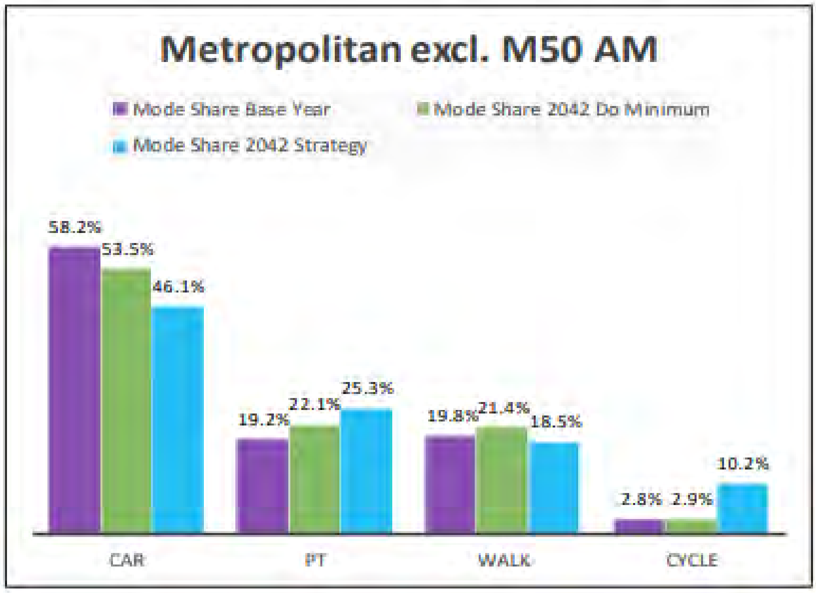

Figure 11.12 Proposed Mode Share for 2042

Noting that Dunboyne lies within the Metropolitan area, therefore, based on the above figure, it can be clearly seen that the car mode share is expected to drop by approximately 12% on implementation of the strategy. Similarly, the mode share for Public Transport and Active Travel (Walk+Cycle) is expected to increase by 6% each. In this area, this would be delivered as a result of Dart+ West, the Dublin - Navan Rail line extension and other public transport improvements such as enhanced bus service provision.

In accordance with this, for the Opening Year +15 design year, the mode share for all modes are revised and summarised in the table below.

Table 11.9 Trip rate for different modes: Opening and Opening +15 Year

Mode	Opening and Opening+5	Opening+15
AM Peak (Work/School Combine)		
Active Mode	23.4%	29.4%
Public Transport	14.6%	20.6%
Cars	46.1%	34.1%
Other modes	15.9%	15.9%
Total	**100%**	**100%**
PM Peak (Work Only)		
Active Mode	5.0%	11.0%
Public Transport	14.3%	20.3%
Cars	72.3%	60.3%
Other modes	8.4%	8.4%
Total	**100%**	**100%**

11.6.1.5. Trip Rates by Travel Mode

Based on the Mode share discussed above, the trip rate for all the different modes was calculated by multiplying the people trip rate and the percentage share of each mode. This is summarised in the table below.

Table 11.10 Trip rate for different modes: Opening Year and Opening Year +5

Mode	Mode Share	Houses		Apartments	
		Arrivals	Departures	Arrivals	Departures
7 to 8 am (Work/School combined mode share)					
Active Mode	**23.4%**	0.020	0.094	0.026	0.039
Public Transport	**14.6%**	0.012	0.059	0.016	0.024
Cars	**46.1%**	0.039	0.185	0.052	0.076
Other modes	**15.9%**	0.014	0.064	0.018	0.026
Total	**100%**	**0.085**	**0.402**	**0.113**	**0.165**
8 to 9 am (Work/School combined mode share)					
Active Mode	**23.4%**	0.053	0.188	0.036	0.082
Public Transport	**14.6%**	0.033	0.117	0.023	0.051
Cars	**46.1%**	0.105	0.371	0.072	0.162
Other modes	**15.9%**	0.036	0.128	0.025	0.056
Total	**100%**	**0.228**	**0.804**	**0.155**	**0.351**
5 to 6 pm (Work only mode share)					
Active Mode	**5.0%**	0.032	0.016	0.023	0.009
Public Transport	**14.3%**	0.091	0.045	0.065	0.025
Cars	**72.3%**	0.463	0.231	0.328	0.127
Other modes	**8.4%**	0.054	0.027	0.038	0.015
Total	**100%**	**0.64**	**0.319**	**0.454**	**0.175**

Table 11.11 Trip rate for different modes: Opening Year +15

Mode	Mode Share	Houses		Apartments	
		Arrivals	Departures	Arrivals	Departures
7 to 8 am (Work/School combined mode share)					
Active Mode	**29.4%**	0.025	0.118	0.033	0.049
Public Transport	**20.6%**	0.017	0.083	0.023	0.034
Cars	**34.1%**	0.029	0.137	0.039	0.056
Other modes	**15.9%**	0.014	0.064	0.018	0.026
Total	**100%**	**0.085**	**0.402**	**0.113**	**0.165**
8 to 9 am (Work/School combined mode share)					
Active Mode	**29.4%**	0.067	0.236	0.046	0.103
Public Transport	**20.6%**	0.047	0.165	0.032	0.072
Cars	**34.1%**	0.078	0.274	0.053	0.120
Other modes	**15.9%**	0.036	0.128	0.025	0.056
Total	**100%**	**0.228**	**0.804**	**0.155**	**0.351**
5 to 6 pm (Work only)					
Active Mode	**11.0%**	0.070	0.035	0.050	0.019
Public Transport	**20.3%**	0.130	0.065	0.092	0.035
Cars	**60.3%**	0.386	0.192	0.274	0.106
Other modes	**8.4%**	0.054	0.027	0.038	0.015
Total	**100%**	**0.64**	**0.319**	**0.454**	**0.175**

11.6.1.6. Vehicles Trip Generation

Based on the Mode share and trip rates discussed above, the car trips on an hourly basis are calculated by multiplying the car trip rates by the number of units of each type and these are summarised in the table below:

Table 11.12 Vehicle trips generation for Opening Year scenarios

Phase	Houses					Apartments					Total Trips	
	No.	Trip rate		Trips		No.	Trip rate		Trips			
		Arr	Dep	Arr	Arr		Arr	Dep	Arr		Arr	Dep
						AM Peak (07:00 - 08:00)						
Phase 1A	**180**	0.039	0.185	7	33	**87**	0.052	0.076	5	7	**12**	**40**
Phase 1B	**0**	0.039	0.185	0	0	**0**	0.052	0.076	0	0	**0**	**0**
Phase 1C	**0**	0.039	0.185	0	0	**0**	0.052	0.076	0	0	**0**	**0**
						AM Peak (08:00 - 09:00)						
Phase 1A	**180**	0.105	0.371	19	67	**87**	0.072	0.162	6	14	**25**	**81**
Phase 1B	**0**	0.105	0.371	0	0	**0**	0.072	0.162	0	0	**0**	**0**
Phase 1C	**0**	0.105	0.371	0	0	**0**	0.072	0.162	0	0	**0**	**0**
						PM Peak (17:00 - 18:00)						
Phase 1A	**180**	0.463	0.231	83	42	**87**	0.328	0.127	29	11	**112**	**53**
Phase 1B	**0**	0.463	0.231	0	0	**0**	0.328	0.127	0	0	**0**	**0**
Phase 1C	**0**	0.463	0.231	0	0	**0**	0.328	0.127	0	0	**0**	**0**

Table 11.13 Vehicle trips generation for Opening Year +5 scenarios

Phase	Houses					Apartments					Total Trips	
	No.	Trip rate		Trips		No.	Trip rate		Trips			
		Arr	Dep	Arr	Arr		Arr	Dep	Arr		Arr	Dep
						AM Peak (07:00 - 08:00)						
Phase 1A	**180**	0.039	0.185	7	33	**167**	0.052	0.076	9	13	**16**	**46**
Phase 1B	**220**	0.039	0.185	9	41	**64**	0.052	0.076	3	5	**12**	**46**
Phase 1C	**220**	0.039	0.185	9	41	**16**	0.052	0.076	1	1	**10**	**42**
						AM Peak (08:00 - 09:00)						
Phase 1A	**180**	0.105	0.371	19	67	**167**	0.072	0.162	12	27	**31**	**94**
Phase 1B	**220**	0.105	0.371	23	82	**64**	0.072	0.162	5	10	**28**	**92**
Phase 1C	**220**	0.105	0.371	23	82	**16**	0.072	0.162	1	3	**24**	**85**

Phase	Houses					Apartments					Total Trips	
	No.	Trip rate		Trips		No.	Trip rate		Trips			
		Arr	Dep	Arr	Arr		Arr	Dep	Arr		Arr	Dep
PM Peak (17:00 - 18:00)												
Phase 1A	**180**	0.463	0.231	83	42	**167**	0.328	0.127	55	21	**138**	**63**
Phase 1B	**220**	0.463	0.231	102	51	**64**	0.328	0.127	21	8	**123**	**59**
Phase 1C	**220**	0.463	0.231	102	51	**16**	0.328	0.127	5	2	**107**	**53**

Table 11.14 Table 11 Vehicle trips generation for Opening Year +15 scenarios

Phase	Houses					Apartments					Total Trips	
	No.	Trip rate		Trips		No.	Trip rate		Trips			
		Arr	Dep	Arr	Arr		Arr	Dep	Arr		Arr	Dep
AM Peak (07:00 - 08:00)												
Phase 1A	**180**	0.029	0.137	5	25	**167**	0.039	0.056	6	9	**11**	**34**
Phase 1B	**220**	0.029	0.137	6	30	**64**	0.039	0.056	2	4	**8**	**34**
Phase 1C	**220**	0.029	0.137	6	30	**16**	0.039	0.056	1	1	**7**	**31**
AM Peak (08:00 - 09:00)												
Phase 1A	**180**	0.078	0.274	14	49	**167**	0.053	0.120	9	20	**23**	**69**
Phase 1B	**220**	0.078	0.274	17	60	**64**	0.053	0.120	3	8	**20**	**68**
Phase 1C	**220**	0.078	0.274	17	60	**16**	0.053	0.120	1	2	**18**	**62**
PM Peak (17:00 - 18:00)												
Phase 1A	**180**	0.386	0.192	69	35	**167**	0.274	0.106	46	18	**115**	**53**
Phase 1B	**220**	0.386	0.192	85	42	**64**	0.274	0.106	18	7	**103**	**49**
Phase 1C	**220**	0.386	0.192	85	42	**16**	0.274	0.106	4	2	**89**	**44**

11.6.2. Operational Traffic Impact

11.6.2.1. Network Performance

Do Minimum + Phase 1A east of R157 Development Scenario

For Do Minimum+ Phase 1A east of R157 Development scenario, the average delay throughout the network was found to be in order of 20-40 seconds for both AM and PM peak. The impact for the additional trips due to the Phase 1A east of R157 lands is minimal with the network performing well within capacity for both AM and PM peak.

11.6.2.2. Junctions Performance

Do Minimum + Phase 1A east of R157 Development Scenario

For the Do Minimum+Phase 1A east of R157 Development scenarios, all junctions are operating within capacity with proposed development traffic having only very minor impacts on all existing junctions. The proposed new signalised junctions on the R157 also operate have adequate capacity to cater for the development traffic.

11.6.2.3. Conclusion

The proposed infrastructure outlined within the Transportation Study at Dunboyne & Environs report is adequate to support the proposed development within the Dunboyne area.

The volume of traffic generated by the proposed Marina Quarter Ltd residential lands for Phase 1A east of R157 has minimal impact on the proposed network with ample capacity remaining at all junctions.

11.6.3. Cumulative Traffic Impact

11.6.3.1. Network Performance

Do Minimum + All Dunboyne North Development Scenario

For Do Minimum+All Dunboyne North Development scenario, the average delay throughout the network was found to be in order of 30-100 seconds for both AM and PM peak across all the design years. There is a greater impact on the network primarily as a result of the additional traffic generated by the proposed non-residential developments within the Dunboyne North Masterplan area to the west of the R157. This results in additional congestion particularly along the R157 at the new signalised access junctions and at the entrance to M3 Junction 5. However, the delays experienced are typical of more urbanised areas and no latent demand was observed at the end of the peak hour suggesting that the network is still operating within capacity.

In all scenarios, no impact on the M3 mainline was observed.

In all scenarios, the proposed new Link Road between the R157 and Old Navan Road is used by local traffic only with through traffic utilising the new Dunboyne Business Park link road instead. This suggests that the proposed traffic management measures on this road are effective.

11.6.3.2. Junctions Performance

Do Minimum + All Dunboyne North Development Scenario

For Do Minimum+All Dunboyne North Development scenario, congestion was observed along R157 at both the new Northern and Southern Access Junctions for AM peak (8 to 9 am) and PM Peak scenarios. In the PM Peak, the congestion was also observed along Northwest Access arm at the Northern Access Junction. However, average delays were not unreasonable for an urban environment with maximum of around 100 seconds observed for Opening Year +15, 80 seconds for Opening Year +5 and 70 seconds for Opening Year scenario.

An increase in queues were observed on the R157 eastbound approach to the M3 Junction 5 as a result of the additional trips generated by the development in Dunboyne North. However, delays remain within acceptable ranges as the queue is transitory and continuously clearing.

At the Southern Access Junction, some queues and delays are experienced when travelling southbound as a result of the merging of two lanes into one immediately south of the junction. These are most notable in the PM peak, however, the delays experienced again suggest that these are transitory queues which continue to clear.

For the new Business Link Road/R157 priority junction, delay were found to be on higher side for the vehicles travelling along Business Park link road, especially during evening peak.

For all other junctions within the modelled cordon, the development traffic has only a minor impact with junctions generally operating well within capacity.

11.6.3.3. Conclusion

- The full build-out of the Dunboyne North Masterplan lands results in some congestion along the R157 at the new Northern Access Road and the approach to M3 Junction 5. However, the overall delay and queues around the network are typical of busy urbanised areas and are temporary in nature, clearing within the peak hours. The congestion is primarily as a result of traffic generated by the non-residential developments in Dunboyne North.
- There is no impact on the M3 mainline in any modelled scenario with queues on off-ramps remaining reasonably short in all cases.
- The proposed traffic management measures along the new proposed link road between the R157 and Old Navan Road deter the vast majority of through traffic from utilising this route. This traffic will utilise the new link through the Dunboyne Business Park to access the town centre.

11.7. Mitigation Measures

11.7.1. Construction Stage

The following mitigation measure shall apply during the construction stage:

- All construction activities will be managed and directed by a Construction Traffic Management Plan (CTMP). The details of the CTMP will be agreed with the roads department of the Local Authority in advance of construction activities commencing on-site.
- Below is a list of proposed traffic management measures to be adopted during the construction works by the Contractor. Note that this is not an exhaustive list, and it will be the appointed contractor's responsibility to prepare a detailed Construction Traffic Management Plan to be approved with the Planning Authority prior to commencement of construction.
- Warning signs / Advanced warning signs will be installed at appropriate locations in advance of the construction access;
- Construction and delivery vehicles will be instructed to use only the approved and agreed means of access and movement of construction vehicles will be restricted to these designated routes;
- Restriction of HGV movements during drop off and pick up times associated with the adjacent schools;
- Appropriate vehicles will be used to minimise environmental impacts from transporting construction material, for example the use of dust covers on trucks carrying dust producing material;
- Speed limits of construction vehicles to be managed by appropriate signage, to promote low vehicular speeds within the Site;
- Parking of Site vehicles will be managed, and will not be permitted on public roads, unless proposed within that designated area that is subject to traffic management measures;
- A road sweeper will be employed to clean the public roads adjacent to the Site of any residual debris that may be deposited on the public road leading away from the construction Site;
- On Site wheel washing will be undertaken for construction trucks and vehicles to remove any debris prior to leaving the Site, to avoid any potential for debris on the local roads;
- All vehicles will be suitably serviced and maintained to avoid leaks or spillage of oil, petrol or diesel. Spill kits will be available on Site. All scheduled maintenance carried out off Site will not be carried out on the public highway; and,
- Safe and secure pedestrian facilities are to be provided where construction works obscure any existing pedestrian footway. Alternative pedestrian facilities will be provided in these instances, supported by physical barriers to segregate traffic and pedestrian movements, and to be identified by appropriate signage. Pedestrian facilities will cater for vulnerable users and mobility impaired persons.

- HGV movements will be managed so as not to occur during the network traffic peak period, particularly the AM school drop off period.

The above mitigation measures will minimise any significant environmental degradation or safety concerns in the vicinity of the proposed works, due to the presence of construction traffic. Furthermore, it is in the interest of the construction programme that deliveries, particularly concrete deliveries are not unduly hampered by traffic congestion, and as a result continuous review of haulage routes, delivery timings and access arrangements will be undertaken as construction progresses to ensure smooth operation.

11.7.2. Operational Stage

The proposed development is consistent with all national, regional and local policies. In particular, those policies and objectives aligned with active and sustainable travel and transportation. Some of the mitigation measures proposed by the local and national authorities in the future include the following:

- The upgrades of road infrastructure were proposed in the future such as R147/R157 roundabout upgrade to Signalised junction, Signalisation along R147, Signalisation of R157 and Access Junctions, Dunboyne Business Park link to the R157, Eastern Distributor Road (EDR) between Station Road and Dunboyne Business Park and Link between the R157 and the Old Navan Road

- The DART + expansion programme, as set out in the Greater Dublin Area Transport Strategy 2016 -2035 (NTA, 2016), it is planned to deliver additional carriages, followed in the longer term by electrification, upgrade and more frequent rail services which will see a train depart every 12 minutes in the peak hour. Customer capacity and train service frequency on these lines will be significantly increased as a result of the programme, delivering a more efficient transport system that allows more people to make sustainable travel choices to meet the goals set out in the State's Climate Action Plan

- BusConnects Scheme, N3 Navan Corridor is seen as a 'spine' route which will operate between Blanchardstown and Dublin City Centre with continuous bus priority. Once implemented, Dunboyne will be served by routes 70 and 270 (renamed 364 and 264 respectively) which shall be extended from Dunboyne Town Centre to M3 Parkway to create a multi-modal interchange. These routes will become high frequency feeder routes to a major bus interchange at the Blanchardstown Centre,

- The development takes cognisance of the NTA's plans to redesign the bus network and provide a more efficient network with high frequency spines, new orbital routes and increased bus services

- The National Remote Work Strategy was published by the Department of Enterprise Trade and Employment which lays out the long-term strategy to promote home and remote working for public sector and private sector employees. The strategy mandates that 20% of the public sector workforce move to home and remote working in 2021. Furthermore, the strategy notes that more than 25% of the private sector workers in Ireland have the ability to work remotely,

- The development is adjacent and accessible to Routes DB1, DB2 and M14 of the N5 Greater Dublin Area Cycle Network Plan. Also, the Dunboyne North Masterplan document includes high walking and cycling permeability offering direct routes to local destinations and public transport stops. As per the document, connections will be facilitated through the introduction of north/south links between Dunboyne Town Centre and the Dunboyne North lands through the revitalisation of the Old Navan Road, provision of new pedestrian and cycle routes and in the form of a Linear Park along the Tolka River creating a new amenity for the area and
- The propensity for car ownership and car use is managed through measures that include reduced residential parking provision and increased cycle parking provision in line the 'Design Standards for New Apartments'. The provision of car club parking spaces will facilitate a lower level of car ownership.

The above mitigation measures will provide alternatives to the private car for making trips and are envisaged to promote low car ownership which will in turn ensure that the level of traffic generation and thus the traffic impact on the local road network is mitigated.

11.8. Residual Impacts

11.8.1. Construction Stage

There will be a slight negative impact due to construction traffic. However, this impact will be short term. This will be mitigated by the introduction of a Construction Traffic Management Plan (CTMP). The CTMP will manage these potential impacts, but they will remain as a short term slight negative impact on the adjacent local and strategic road network

11.8.2. Operational Stage

During the operation of the proposed development (Opening Year) there will be a long term not significant negative impact due to increased traffic flows.

Additionally, there will be a new pedestrian and cyclist movements, due to the development proximate location to the Dunboyne town centre amenities and public transport facilities, and the local authorities proposed upgrade of the active travel infrastructure from proposed development to the town centre. This will positively impact the proposed development and will assist in reducing dependency on car travel.

11.9. Monitoring Requirements

Not applicable for this Chapter.

11.10. References and Sources

- Meath County Development Plan 2021-2027
- Dunboyne North Masterplan – MP22
- Transport Study at Dunboyne & Environs
- Greater Dublin Area Transport Strategy 2016 -2035 (NTA, 2016)
- DART+ expansion programme
- BusConnects
- Irish Rail
- Dublin Bus and GoAhead Ireland

Large Scale
Residential Development
at Dunboyne North, Co. Meath

Volume II

Environmental Impact Assessment Report

CHAPTER 12

Material Assets: Service Infrastructure and Utilities

August 2023

McCutcheon Halley
CHARTERED PLANNING CONSULTANTS

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12 Material Assets Service Infrastructure & Utilities

12.1 Introduction

This section of the EIAR report has been prepared by Atkins. According to relevant EPA guidance (EPA, 2022) the following topics warrant consideration under material assets:

- Built Services;
- Roads and Traffic; and,
- Waste Management.

Roads and traffic have been assessed separately as part of this EIAR. Refer to Chapter 11 – Traffic. Therefore, this assessment examines material assets serving the proposed development specifically in relation to existing and proposed built services (i.e. foul sewerage, surface water drainage, water supply, gas, electricity, and telecommunications utilities), and waste management; both of which are assessed separately within this section.

12.2 Expertise & Qualifications

This chapter of the EIAR has been prepared by Kieran Lynch of Atkins Ireland Ltd. Kieran Lynch is a Chartered Environmental Scientist (BSc, MSc, LLB, BL, MCIWEM, C.WEM, CSci, C.ENV) with over 20 years' experience in geotechnical engineering, contaminated land and waste management, and has prepared 'Land Soils and Geology', 'Water', 'Material Assets' chapters for EIARs for major residential and infrastructure projects. Kieran has co-ordinated and reviewed EIARs for various strategic schemes including the following projects:

- Ballymore Coastal Quarter EIAR (SHD);
- Ballymore Coastal Quarter – Blocks A & B EIAR (SHD); and,
- Rathgowan, Mullingar EIAR (SHD).

Deirdre Larkin has contributed to the preparation of this chapter. Deirdre is a Chartered Geologist (IGI PGeo No. 223; EurGeol No 1064) and Hydrogeologist with over 19 years experience in the preparation of hydrogeological and hydrological assessments. She has project managed the preparation of numerous EIARs for housing, roads and infrastructure projects and has prepared the Water and Land Soils and Geology chapters of EIARs for various schemes.

12.3 Proposed Development

The proposed Large Scale Residential Development will consist of the construction of 267 no. residential units, a creche, a new link road between the R157 and the Old Navan Road including a bridge over the River Tolka, 2 no. signalised junctions, upgrade works and road improvements to the R157 and the M3 Parkway access road, and all associated site development works including drainage, landscaping, and boundary treatments. A full description is included in the statutory notices and in

Chapter 2 of the EIAR. The following summary relates to the characteristics of the proposed development specifically in relation to proposed built services / utilities.

12.4 Methodology

12.4.1 Relevant Legislation & Guidance

12.4.1.1 Built Services

The methodology used to prepare this section of the EIAR is in accordance with the EPA '*Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EIAR)*' (2022), and *'Advice Notes for Preparing Environmental Impact Statements Draft September 2015'*. The following sources have been used to collate information on built services within the general area of the Site;

- ESB Network Utility Plans;
- eir Telecommunications Plans; and
- Available utility information and maps received from Uisce Éireann and Meath County Council (MCC)

This information has been supplemented by observations recorded during various Site walkover surveys, and pre-application consultation with Uisce Éireann and MCC. Surface water runoff, foul drainage discharge and water supply requirements have also been designed with due regard to the following guidelines:

- CIRIA report C753 'The SuDS Manual – v6;
- Greater Dublin Strategic Drainage Study (GDSDS);
- Uisce Éireann Code of Practises and Technical Standards (IW-CDS-5030-01 to 04 & IW-TEC-800);
- Uisce Éireann Pre-Connection Enquiry Application (water demand and foul water loading);
- Uisce Éireann Statement of Design Acceptance; and,
- Uisce Éireann Confirmation of Feasibility (Diversion).

12.4.1.2 Waste Management

This section of the EIAR has been prepared in accordance with the EPA '*Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EIAR)*' (2022), 'Advice Notes for Preparing Environmental Impact Statements Draft September 2015', 'Best practice guidelines for the preparation of resource & waste management plans for construction & demolition projects' EPA (2021). The findings of the Construction Waste Management Plan (CWMP) prepared as part of this planning application have been incorporated into this assessment where relevant.

This assessment has been prepared with due regard to the following relevant documents:

- Waste Classification: List of Waste & Determining if Waste is Hazardous or Non-Hazardous' (EPA, 2018);
- 'Design out Waste: Preparation of Waste Reduction Factsheets for Design Teams' (EPA, 2015);
- 'Development of an Audit Methodology to Generate Construction Waste Projection Indicators for the Irish Construction Industry' (EPA, 2009); and,

- Meath County Development Plan 2021 - 2027 (MCC 2021).

This assessment has also been informed by findings of the Chapter 5 – Land, Soils and Geology section of this EIAR.

12.5 Difficulties Encountered

No difficulties were encountered during the preparation of this chapter.

12.6 Baseline Environment

12.6.1 Built Services

The Site of the proposed development is predominantly greenfield in nature. The Site is bounded to the north by a large carpark associated with Dunboyne Railway Station and to the north east by a railway line. A complete set of all utility / service plans received showing the general vicinity of the Site is presented in Appendix 12.1.

12.6.1.1 Storm Water Drainage

The site is not currently serviced by an existing stormwater drainage network. Surface water generally runs towards the Tolka River and drainage ditch to east and south west respectively.

12.6.1.2 Foul Water Drainage

The site is not currently serviced by foul water drainage.

12.6.1.3 Water Supply & Distribution

The Site is currently not serviced by a public water supply.

12.6.1.4 ESB Supply

ESB overhead lines bisect the site from north to south with an additional overhead line running from the centre of the site towards the east.

12.6.1.5 Gas Supply

The site is currently not serviced by gas services.

12.6.1.6 eir Network

The site is not currently served by EIR. EIR services are located along the Navan Road to the east of the site and Kennedy Road beyond the southern boundary of the site.

12.6.1.7 Street Lighting

There is currently no street lighting on the site.

12.6.2 Waste Management

Historic land-use at the Site was greenfield, based on a review of available historic mapping and aerial photography. Part of the northern section of the site may have been used as a construction compound associated with the development of a railway station to the north of the site and/or a motorway to the north and east of the site. The GSI bedrock geology 100k map identifies the underlying bedrock of the Site as Dark Limestone and Shale of the Lucan Formation. Based on all available evidence, including soil analytical data and findings from the geotechnical investigation (as detailed in Chapter 5– Land, Soils and Geology), and taking account of proposed mitigation measures detailed in Chapter 5– Land, Soils and Geology, soils beneath the Site are not considered to pose an unacceptable risk to human health, building and services, environmental receptors or third-party sites.

12.7 The 'Do Nothing' Scenario

The Site is currently the agricultural land. The do-nothing scenario will have a neutral and imperceptible effect on the Site with regards to Material Assets including Built Services and Waste.

12.8 Potential Significant Effects

12.8.1 Built Services

Surface Water

Surface water runoff from the development will be attenuated to greenfield runoff (Qbar), in accordance with the recommendations of the Greater Dublin Strategic Drainage Study (GDSDS). Surface water runoff from each surface water catchment, will be attenuated using a Hydrobrake on the surface water outlet.

Qbar is calculated using the Institute of Hydrology equation, as recommended (GDSDS), as follows:

- Qbar (rural) = 0.00108 x AREA0.89 x SAAR1.17 x Soil2.17
- AREA is the area of the catchment in km2. For a catchment area less than 50ha, calculate Qbar for 50 ha and pro rata it;
- SAAR = 844mm;
- SOIL = soil index 0.3.

The proposed catchment area (green in Figure 12.1) has been designed to cater for the internal part of proposed development. The proposed attenuation areas will provide the required storage volume.

The calculated Qbar from the above calculation is 2.27 l/s/ha; however, following discussions with MCC, it was agreed to limited the Q bar to 2l/s/ha.

The attenuation design has been based on the 1:100 year Return Period plus 20% Climate Change required storage volume. This has been achieved with a detention basin above ground for two of the catchments and a concrete tank for the final catchment.

The tank was chosen due to the site levels and the close proximately to the outfall. Prior to entering the tank the surface water will be cleaned with a min three stage SUDS approach.

Figure 12.1 Catchment Area (DWG No. 2023-108-010371)

Surface Water Storage

Catchment Area SW1

The proposed catchment area (in yellow in Figure 12-1) has been designed to cater for the internal part of proposed development. Surface water runoff exceeding the allowable outflow rate for the catchment will be stored in the proposed detention basin for rainfall events ups to a 1 in 100-year return period, with an allowance for climate change of 20%.

Catchment Area SW2 and SW3

The proposed catchment area (in green and purple in Figure 12-1) has been designed to cater for the internal part of proposed development. Surface water runoff exceeding the allowable outflow rate for the catchment SW2 will be stored in the above ground detention basin for rainfall events ups to a 1 in 100-year return period and for the catchment SW3 will be stored in the underground concrete tank for rainfall events ups to a 1 in 100-year return period with an allowance for climate change of 20%.

Surface water storage volumes have been calculated using the Causeway software taking account of Qbar and the impermeable area of each surface water catchment. The provision of future connections is included in calculations for future-proofing.

Long Term Storage

In addition to limiting the runoff rate through attenuation the GDSDS requires that runoff volume form the site is limited in extreme events.

In accordance with section 24.10 of CIRIA C753, as no Long-Term Storage will be provided on the site the Qbar rate will be limited to the 2-year return period with no growth factors applied.

Water Quality Management

SuDS drainage designs collect and treat surface water runoff as close to source as possible. Surface water runoff is managed using a treatment train approach. This ensures that the quantity and quality of surface water runoff are addressed through the techniques of Pollution Prevention, Source Control, Site Control and Regional Control. The treatment train approach divides the drainage elements of the development into sub catchments with different drainage characteristics and land uses, such as a dwelling with modular permeable paving.

The treatment train approach applied to the proposed development, include in curtilage SuDS comprising modular permeable paving in driveways and roof runoff discharging to the stone layer under the modular permeable paving, Stormtech storage and bypass petrol interceptors.

Interception Storage

Interception storage is required in order to ensure that no run-off passes directly to the ditch for the majority of rainfall events with depths of 5mm or less. This is aimed at trying to replicate greenfield runoff response when no runoff is likely to take place for most small events.

This type of storage is principally aimed at river water quality protection - polluted water is prevented from entering the water course for all small rainfall events.

A 5mm rainfall threshold which, if effectively applied, will reduce the number of events with runoff into a receiving water body by around 50% and reduce total runoff volumes from the site by a significantly higher proportion.

The void ratio for water storage underneath the permeable paving is 35%.

Catchment Area SW1 Summary

Impermeable area (within catchment) = 0.823 Ha (41.78% of catchment area)

Site Area (within catchment) = 1.97 Ha

Permeable paving area = 0.103 Ha

The required Interception storage for this application is 32.92m^3.

This will be provided via the 350mm stone under the permeable paving. (Permeable Paving Area)x(35% of void ratio)x(0.40m of depth) 1000x0.35x0.40 = 144.2m^3.

The permeable paving will give a volume of 144.2m^3.

Catchment Area SW2 Summary

Impermeable area (within catchment) = 1.315 Ha (37.90% of catchment area) Site Area (within catchment) = 3.47 Ha

Permeable paving area = 0.128 Ha

(Impermeable Area)x(5mm rainfall depth)x(80% paved runoff factor)

13150x0.005x0.8 = 52.60m3

The required Interception storage for this application is 52.60m³.

This will be provided via the 350mm stone under the permeable paving.

(Permeable Paving Area)x(35% of void ratio)x(0.40m of depth)

1280x0.35x0.40 = 179.2m³.

The permeable paving will give a volume of 179.2m³.

Catchment Area SW3 Summary

Impermeable area (within catchment) = 0.469 Ha (44.24% of catchment area)

Site Area (within catchment) = 1.06 Ha

Permeable paving area = 0.0683 Ha

(Impermeable Area)x(5mm rainfall depth)x(80% paved runoff factor)

4690x0.005x0.8 = 18.76m3

The required Interception storage for this application is 18.76m³.

This will be provided via the 350mm stone under the permeable paving.

(Permeable Paving Area)x(35% of void ratio)x(0.40m of depth)

683x0.35x0.40 = 179.2m³.

The permeable paving will give a volume of 95.62m³.

In addition, the proposed SUDS features applied to the surface water network (i.e., swales, bio retention areas and detention basin) will provide extra interception storage volume to the surface water runoff from roads and footpaths

Refer also to the Engineering Planning Report prepared by Paul McGrail Consulting Engineers (2023) included as part of the planning application.

A full set of all proposed surface water drainage design drawings are presented in Appendix 12.2 of this EIAR.

Foul Drainage

The foul water drainage system for the proposed development has been designed in accordance with the Uisce Éireann Code of Practice and will be separate to the surface water drainage system. The foul water from the development will discharge via soil vent pipes within the buildings by gravity flow before connecting into the proposed foul sewer pumping station located at the southern boundary which will discharge to the existing Irish Water foul sewer network and ultimately Ringsend Waste Water Treatment Plant. The foul sewerage for each house will have a separate connection to the proposed 225mm and 150mm diameter foul sewer along the road.

All foul drainage related works will be carried out in consultation with Uisce Éireann and in accordance with all relevant Uisce Éireann guidelines and any site specific additional requirements

Refer also to the Engineering Planning Report prepared by Paul McGrail Consulting Engineers (2023) included as part of the planning application.

A full set of all proposed foul drainage design drawings are presented in Appendix 12.2 of this EIAR.

Water Supply and Distribution

The proposed network has been designed to comply with Uisce Éireann specification. Individual houses will have their own connections to the distribution main via service connections and boundary boxes. Individual service boundary boxes will be of the type to suit Uisce Éireann and to facilitate possible future domestic meter installation.

The water main layout and details are in accordance with Uisce Éireann Connection and Developer Services, 'Code of Practice for Water Infrastructure' and 'Water Infrastructure Standard Details'.

Refer also to the Engineering Planning Report prepared by Paul McGrail Consulting Engineers (2023) included as part of the planning application.

A full set of all proposed water supply design drawings are presented in Appendix 12.3 of this EIAR.

ESB

Power supply, and the requirement for any alterations to the existing power supply network for the development of the subject Site, will be agreed with ESB Networks in advance of construction. All power supply related works will be carried out in accordance with ESB Networks relevant guidelines.

eir Network

Connection to the existing eir network in the vicinity of the proposed development will be agreed in advance of construction with eir. All telecommunication supply related works will be carried out in accordance with relevant eir guidelines.

Street Lighting

An Outdoor Lighting Report was prepared by Morley Walsh Consulting Engineers (2023) in accordance with relevant guidelines which will be implemented as part of the proposed development, as presented in full in Appendix 12.4.

12.8.1.1 Construction Phase

- Based on a review of existing and proposed utilities, the following potential effect during the Construction phase has been identified:
- Damage to existing overground power supply which runs through the Site;

This potential effect is considered to be unlikely and should it occur, would be temporary and moderate adverse.

12.8.1.2 Operational Phase

Uisce Éireann has confirmed that the foul network will have enough capacity for the proposed development, and that the water supply network has sufficient capacity to meet the foul and water supply requirements of the proposed residential development, once operational. All foul water, storm water and water main services will be installed and commissioned within the proposed development in accordance with all Uisce Éireann requirements and standard best practice guidelines. As previously stated, all power, telecommunications networks and street lighting will be installed and commissioned within the proposed development in accordance with the relevant service providers guidelines and requirements and standard best practice guidelines. Therefore, no significant adverse, long-term effects are predicted to occur during the operational phase.

12.8.2 Waste Management

A detailed description of the proposed development is presented in Chapter 2 - Project Description. The following summary relates to the characteristics of the proposed development specifically in relation to waste management. The proposed residential development will be designed, planned, constructed and operated to minimise waste generation at every stage.

The management of waste generated during the construction of the proposed development will be in accordance with the CWMP submitted as part of this planning application. The following waste streams will be generated during the construction phase: native non-contaminated soils, mixed C&D waste, wood / timber, metal, paper, plastics and packaging, canteen / office waste, and other waste (comprising soiled paper, cardboard, plastics, cloth, insulation and plasterboard).

During the operational phase, the proposed residential development has been designed to provide adequate domestic refuse storage areas for individual dwellings, within a paved collection area at the entrance to each home zone, and within communal waste collection areas for the apartment units. The following primary waste streams will be generated during the operational phase: residual waste, dry recyclables and organic waste. In addition, the following waste streams will occasionally be generated by the residents of the proposed development: WEEE, batteries, fluorescent tubes, furniture, chemicals and textiles.

12.8.2.1 Construction Phase

During the construction phase, it has been estimated that the various waste streams will be generated and managed as follows.

12.8.2.1.1 Native Non-Contaminated Soils

The estimated volume of soil generated during the construction phase (ca.: 40,000m3) will be minimised by reducing / eliminating the need for excavation and importing of capping layers. The balance of soil materials excavated from the Site will be reused where possible for landscaping purposes, and infill where appropriate, ensuring that any residual soil waste is kept to a minimum. Any surplus soil will be characterised and removed offsite in accordance with all relevant waste management legislation.

The environmental testing carried out as part of the ground investigation indicates that there is a moderate human health risk from contamination particularly barium from soils onsite if the soils are used in areas where home grown vegetables may be planted and subsequently consumed. All topsoil and excavated soils on site shall only be used in areas where there will be no potential for home grown vegetables. Topsoil for use in private gardens / crèche open space where there may be potential for home grown vegetables, will be imported to the site and be subject to pre-screening to ensure it is suitable for such landuse. Further environmental testing may be carried out across the site to identify areas of topsoil that may be suitable for use in areas such as gardens where there may be potential for home grown vegetables.

As a precautionary measure, no soils excavated from the localised former compound area in the northern portion of the site (Refer to Table 5.1. in Chapter 5 – Land Soils and Geology) will be reused onsite. All soil excavated from this particular area will be tested and removed offsite for disposal to a suitably permitted / licenced waste recovery / disposal facility in accordance with relevant waste management legislation (including but not limited to the Waste Management Act of 1996, 2001 and 2003 and all subsequent waste management regulations as amended).

12.8.2.1.2 Concrete , Brick, Tiles, Gypsum

The majority of concrete blocks, bricks, tiles generated as part of the construction and works are expected to be clean, inert material and should be recycled, where possible. If this waste at any time does need to be removed from site it will be stockpiled in a segregated area until it can be collected for recycling by a licensed haulier. Wood, Glass & Plastics Timber waste will be kept to a minimum through the re-use of shutters, etc. throughout the project.

12.8.2.1.3 Wood , Glass & Plastic

Material waste noted above will be kept to a minimum as the majority of the housing will be timber frame and fabricated off site thus reducing waste. Any timber that cannot be re-used because of poor quality, etc. will be segregated and stored for recycling in a skip. Where possible pallets will be stored for return to the supplier. In the case of hard plastic, it is a highly recyclable material, much of the plastic generated will be primarily from material off-cuts. All recyclable plastic will be segregated and recycled, where possible. Wooden pallets will be returned to relevant suppliers where possible.

12.8.2.1.4 Metals

Metal waste will be generated during the project, particularly arising from the use of rebar. All waste metal will be segregated offsite at the waste disposal / recovery facility for reuse and recycling. Given the significant scrap value associated with metal waste, this waste will be stored in a dedicated container within a secure part of the Site, and regular collections from Site to the waste recycling facility will limit the potential for unauthorised entry and theft.

12.8.2.1.5 Canteen / Office Waste

Onsite staff canteens will generate food and packaging waste. Dedicated containers will be provided at each canteen to permit easy segregation of these wastes; brown bins will be provided for compostable food waste, green bins will be provided for dry recyclables (packaging, hard plastic, paper, cardboard, tetrapak etc.) and black bins will be provided for any residual waste.

12.8.2.1.6 Other wastes

In addition to the above waste streams, other waste materials will be generated during the construction phase. These residual wastes will typically comprise non- recycling waste such as soiled paper / cardboard / plastics / cloth, fibreglass, polystyrene insulations bituminous mixtures and plasterboard. These materials will be stored separately to all other waste streams in order to prevent any cross contamination.

All waste materials will be segregated onsite into the various waste streams, via. dedicated skips and storage areas. All waste will be removed from Site by one or more waste haulage contractor(s) who hold a current valid waste collection permit issued by the National Waste Collection Permit Office (NWCPO). All waste materials generated during the construction phase will be removed offsite to an appropriately permitted or licenced waste disposal / recovery facility. All waste removed offsite will be appropriately characterised (under the correct LoW / EWC code), transported and disposed of in accordance with relevant waste management legislation (including but not limited to the Waste Management Act of 1996, 2001 and 2003 and all subsequent waste management regulations as amended). All waste management and disposal / recovery records will be maintained onsite throughout the project and will be made available for viewing by the Client, Employer's Representative and statutory consultees (MCC, EPA) as required.

The waste management strategy during the construction phase of the proposed development has been developed in accordance with the relevant Regional Waste Management Plans for Meath County Council and the 'Eastern-Midlands Region Waste Management Plan 2015-2021'. The overarching objectives of the Eastern-Midlands Region Waste Management Plan 2015-2021 have been incorporated into the latest development plans pertinent to this Site i.e. Meath County Development Plan 2021-2027 (MCC). The Regional Waste Management Plan has the following objectives:

- Prevent or minimise the production of waste in the first instance;
- Reduce, re-use and recycle to the maximum extent possible;
- Endeavour to recover energy from waste where possible; and
- Ensure the efficient and safe disposal of any residual waste.

The Meath County Development Plan 2021-2027 (MCC 2021) sets out the following policies and objectives with regards to waste and construction and demolition waste management:

> *'INF POL 70 To encourage the recycling of construction and demolition waste and the reuse of aggregate and other materials in future construction projects.'*
>
> *INF OBJ 54 To facilitate the transition from a waste management economy to a green circular economy to enhance employment opportunities and increase the value recovery and recirculation of resources.*
>
> *INF OBJ 67 To require developers to prepare construction and demolition waste management plans for new construction projects over certain thresholds which shall meet the relevant recycling/recovery targets for such waste in accordance with the national legislation and national and regional waste management policy*

Therefore, while waste will be generated during the construction of the proposed development, all waste streams will be managed in accordance with statutory waste management and environmental requirements, regional waste related policy, best practice waste management guidance, and a project specific Outline CEMP. As with any construction project, there is potential for nuisance issues to arise during the construction phase, associated with mud or waste materials impacting roads and footpaths adjacent to the proposed development. The potential effects of waste generated during the construction phase (via. transport and disposal / recovery to appropriately permitted / licenced facilities; and potential nuisance issues) will be temporary and slight adverse. Mitigation measures will be implemented as required to further manage these potential effects.

12.8.2.2 Operational Phase

During the operational phase, communal waste collection areas for apartments units will be clearly identified, secure, have adequate lighting and drainage, and will be easily accessible for bin collection crews.

Bin storage capacity at these communal waste collection areas will be as follows;

- 1100L wheeled bins for residual waste;
- 1100L wheeled bins for dry recyclable waste; and,
- 240L wheeled bins for organic waste.

It is expected that individual houses with external access to the rear of the property will store the wheeled bins to the rear of the houses. Houses with no external rear access will store the wheeled bins to the front of the house in a covered area. Each house will have storage capacity for 2no. 240L wheeled bins for residual waste and dry recyclable waste and 1no. 140L wheeled bin for organic waste.

During the operational phase waste shall be collected on a regular basis by a commercial waste contractor who holds a current valid waste collection permit issued by the National Waste Collection Permit Office (NWCPO). All waste materials will be removed offsite to an appropriately permitted or licenced waste disposal / recovery facility. All such waste will be transported and disposed of in accordance with relevant waste management legislation (including but not limited to the Waste Management Act of 1996, 2001 and 2003 and all subsequent waste management regulations as amended).

Therefore, while waste will be generated during the operational phase of the proposed development, all such waste will be managed in accordance with statutory waste management and environmental requirements, regional waste related policy, and best practice waste management guidance. As with all residential developments, there will be potential for litter pollution within the proposed housing estate and surrounding areas. The potential effects of waste generated during the operational phase (via. transport and disposal / recovery to appropriately permitted / licenced facilities; and potential litter issues) will be long-term and imperceptible. Regardless, mitigation measures will be implemented to manage potential litter effects.

12.8.3 Cumulative Effects

All relevant developments in the immediate environs of the proposed development, which have been approved but are not yet built or operational, have been considered. This section also considers relevant developments which have not yet been approved but which could if approved have a cumulative effect with the proposed development. There are a number of projects in the general area of the site under development however many of these comprise the very small developments such as one off houses or change in use of buildings and will not have a likely cumulative effect with the proposed development and as such are not considered further. The following developments have been identified as having the potential to give rise to cumulative effects with proposed development.

Council Reference: P822022:

Decision to proceed dated 28/03/2023. The development is for a proposed link and access road connection between the Dunboyne Business Park and the R157. The proposed project includes junctions, footpaths, bus stops, public lighting, accommodation and fencing/boundary works, landscaping works, drainage/attenuation works, and ancillary infrastructure and utility works.

This project is located ca. 600m south of the proposed Bennetstown LRD development and has the potential to be constructed at the same time as the proposed Bennetstown LRD development. A number of mitigation measures as identified within section 9.8 of this report will be implemented as part of the Dunboyne LRD development. As a result there will be no significant effect on land soils and geology and no likely significant effect when considered cumulatively with the proposed link and access road development.

Council Reference: 23424:

Further Information Requested The development will consist of: i. Construction of 3 no. office buildings with a cumulative gross floor area (GFA) of 13,729 sq.m ranging in height from 3 to 4- storeys and shall comprise the following: a. Building 1 (3,597 sq.m GFA) 3-storeys in height (12.35 metres to top of parapet), with a set back louvred screen 2m above parapet level. b. Building 2 (5,336 sq.m GFA) 4-storeys in height (16.125 metres to top of parapet), with a set back louvred screen 2m above parapet level. c. Building 3 (4,796 sq.m GFA) 4-storeys in height (16.125 metres to top of parapet), with a set back louvred screen 2m above parapet level. ii. Roof mounted solar PV panels (c. 180 sq.m combined area); iii. Provision of a 4-arm signalised junction replacing the existing Pace roundabout to include a new northern arm with segregated cycleway and footpath; iv. Access to the development is proposed from the new northern arm, with 6m wide internal access roads to serve the development; v. Upgrade works to the R157 and M3 Parkway access road to facilitate junction improvements; vi. A total of 275 surface car parking spaces including 14 disabled access bays and 55 electric car charging points; vii. 280 bicycle parking spaces in 3 secure cycle storage areas adjacent to the buildings; viii. Site signage is to be erected, all spot-lit and back-lit illuminated, including 2 no. type 1 entrance signs (6.15m x 2.4m) and 3 no. type 2 building signs (1.35m x 2.4m); ix. 3 standalone electricity substations; x. Foul sewer connection to existing public system including pumping station on site with rising mains along Kennedy Road and Navan Road; xi. Watermain connection to the north east of site at Pace for connection to Uisce Éireann Infrastructure; xii. Permission is also sought for associated landscaping, boundary treatments, public lighting, plant, waste storage and all ancillary site and development works

This project is located immediately north of the proposed Bennetstown LRD development and has the potential to be constructed at the same time as the proposed Bennetstown LRD development. A number of mitigation measures as identified within section 9.8 of this report will be implemented as part of the Bennetstown development. As a result there will be no significant effect on land soils and geology from the Bennetstown development and no likely significant effect when considered cumulatively with this office development.

Council Reference: 23424:

Further Information Requested Application for a 10-year permission for development in the Townlands of Bennetstown, Pace, and Dunboyne. The subject site (2.79ha) encompasses an area of

0.87ha situated to the south-west of the M3 Parkway and south-east of the Dunboyne Bypass (R157) located in the Townland of Bennetstown, and the balance (1.92ha) located in the Townlands of Pace, Bennetstown and Dunboyne including the Dunboyne Bypass (R157) and M3 Parkway access, Kennedy Road and Navan Road for infrastructure works. The development will consist of: i. Construction of a single-storey commercial building with a cumulative gross floor space (GFS) of 2,160 sq.m comprising: a. A supermarket with delivery, store and service area (1,880 sq.m), including net retail floorspace of 1,510 sq.m, and b. 2 commercial units (combined 280 sq.m) to facilitate Class 1 (Shop), Class 2 (Financial, Professional and Other Services) or Café (food and beverage) uses. ii. Provision of a 4-arm signalised junction replacing the existing Pace roundabout to include a new northern arm with segregated cycleway and footpath; iii. Upgrade works to the existing R157 and M3 Parkway access road to facilitate junction improvements; iv. Access to the development is proposed via a new 3-arm priority-controlled junction from the upgraded southern arm of the proposed 4-arm signalised junction, with 6m wide internal access roads to serve the development; v. A total of 118 surface level car parking spaces including 6 disabled access bays and 4 electric car charging points; vi. 20 short-stay bicycle parking spaces; vii. 1 Electricity substation / switch room; viii. Foul sewer connection to existing public system including pumping station on site with rising mains along Kennedy Road and Navan Road; ix. Permission is also sought for hard and soft landscaping, lighting, attenuation and drainage and all ancillary site development works.

This project is located immediately north of the proposed Bennetstown LRD development and has the potential to be constructed at the same time as the proposed Bennetstown LRD development. A number of mitigation measures as identified within section 5.9 of this report will be implemented as part of the Dunboyne LRD development. As a result there will be no significant effect on land soils and geology from the Dunboyne LRD development and no likely significant effect when considered cumulatively with this commercial development.

Dunboyne North Master Plan 2022:

The Master Plan considers the development of an overall site area of 74ha for residential, commercial, retail and open space in addition to upgraded roads and infrastructure services.

Built services will be provided for the Master Plan lands in accordance with best practice and in accordance with relevant standards. Utility providers will be consulted to confirm that adequate capacity is available prior to the grant of permission for future projects. Construction Resource and Waste Management Plans and Operational Waste Management Plans will be prepared for future developments.

The overall cumulative effects on Material Assets including Built Services and Waste will be negligible imperceptible and permanent.

12.9 Mitigation

12.9.1 Built Services

12.9.1.1 Construction Phase Mitigation

The following mitigation measures will be implemented during the construction phase;

- A project-specific Detailed Construction Environmental Management Plan (CEMP) will be prepared by the appointed Contractor prior to the commencement of construction works. This document will take account of, and further develop, all of the environmental considerations (including water, dust and noise nuisance control; soil / stockpile management; temporary groundwater management; appropriate Site management of compound area; fuel, oil and chemical storage and use; and waste management) set out in the Outline CEMP submitted as part of this planning application;

- The construction compounds will include adequate temporary welfare facilities including foul drainage and potable water supply. Foul drainage discharge from the compound will be removed off site to an appropriately licensed facility for disposal until a connection to the public foul drainage network has been established;

- All newly installed utilities/ services will be assessed, tested and certified as required prior to being fully commissioned;

- Connections to the existing and proposed foul networks will be coordinated with the relevant utility provider. All works associated with the existing and proposed utilities for the proposed development will be carried out in strict accordance with the guidelines of the relevant stakeholders (specifically ESB, eir and Uisce Éireann), and any additional site specific requirements;

- A copy of all available existing, and as built utility plans will be maintained on Site during the construction of the proposed development. Any existing services located onsite will be clearly marked and all Site personnel will be made aware of the known location of any onsite underground or over ground services during the construction phase; and,

- Street Lighting will be implemented in accordance with the Outdoor Lighting Report prepared by Morley Walsh Consulting Engineers (2023).

12.9.1.2 Operational Phase Mitigation

As no significant adverse effects are predicted to occur during the operational phase, no mitigation measures apply to the operational phase of the proposed development.

12.9.2 Waste Management

12.9.2.1 Construction Phase Mitigation

The following mitigation measures will be implemented during the construction phase:

- All waste management procedures implemented onsite during the construction phase will be in accordance with the Outline CWMP submitted as part of this planning application. In advance of commencement onsite, the Contractor will prepare a project specific Detailed Waste Management Plan which will further develop this outline plan, and will provide specific details in terms of proposed permitted haulage contractors, and permitted / licenced waste disposal / recovery facilities;

- Scheduling and planning the delivery of materials will be carried out on an 'as needed' basis to limit any surplus materials;
- Materials will be ordered in sufficient dimensions so as to optimise the use of these materials onsite, and will be carefully handled and stored so as to limit the potential for any damage;
- Where feasible, sub-contractors will be responsible for the provision of any materials they require onsite in order to help reduce any surplus waste;
- All loaded trucks entering and exiting the Site will be appropriately secured and covered; and,
- Mud will be controlled at entry and exits to the Site using wheel washes (as required) and/or road sweepers, and tools and plant will be washed out and cleaned in designated areas. Wheel / road sweeper washings will be contained and treated prior to discharge.

12.9.2.2 Operational Phase Mitigation

Waste management during the operational phase of the development will be undertaken by private waste contractors (in accordance with statutory waste management and environmental requirements, regional waste related policy, and best practice waste management guidance), and regulated by Meath County Council.

The following mitigation measures will be implemented during the operational phase in order to minimise the potential effect of litter pollution;

- Suitably sized waste receptacles will be provided in communal areas within the residential development and commercial units by private waste contractors;
- During the operational phase waste shall be collected on a regular basis; and,
- It will be the responsibility of residents, crèche users and maintenance workers to ensure that all waste generated is disposed of appropriately and responsibly, with penalties and legal sanctions being issued to anyone who is found to litter.

12.10 Residual Impact Assessment

Taking account of the proposed mitigation measures for Material Assets, specifically waste, the residual effects of the proposed development will be short-term and slight adverse during the construction phase, and long-term and not-significant during the operational phase.

Taking account of the proposed mitigation measures for Material Assets, specifically waste management, the residual effects of the proposed development will be short-term and imperceptible during the construction phase, and long-term and imperceptible during the operational phase.

12.10.1 Cumulative Residual Effects

The overall cumulative effects on Material Assets including Built Services and Waste will be negligible imperceptible and permanent.

12.11 Interactions

- Land Soils and Geology - Potential effects on the receiving Material Assets environment could also effect on Land Soils and Geology conditions present. However, the mitigation measures described in Chapter 5 – Land, Soils & Geology, and those relevant in Chapter 12 - Material Assets Service Infrastructure and Utilities will ensure that this will not occur.
- Hydrology & Hydrogeology - Potential effects on the receiving Material Assets could also effect on hydrology and hydrogeology conditions present. However, the mitigation measures described in Chapter 6– Hydrology & Hydrogeology, and those relevant in Chapter 12 - Material Assets Service Infrastructure and Utilities will ensure that this will not occur.

12.12 Monitoring

The Contractor will be responsible for maintaining waste records and documentation for the full duration of the construction phase. The Contractor will track and monitor all waste volumes transported offsite. All waste records will be maintained onsite throughout the project and will be made available for viewing by the Client, Employer's Representative and statutory consultees (MCC, EPA) as required.

No monitoring is required during the operational phase of the proposed development.

12.13 References and Sources

CIRIA report C753 'The SuDS Manual – v6;

EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EIAR)' (2022);

EPA Advice Notes for Preparing Environmental Impact Statements Draft September 2015;

Greater Dublin Strategic Drainage Study (GDSDS);

Meath County Council Meath County Development Plan 2021-2027;

Uisce Éireann Code of Practises and Technical Standards (IW-CDS-5030-01 to 04 & IW-TEC-800);

Uisce Éireann Pre-Connection Enquiry Application (water demand and foul water loading);

Uisce Éireann Statement of Design Acceptance;

Uisce Éireann Confirmation of Feasibility (Diversion);

Large Scale
Residential Development
at Dunboyne North, Co. Meath

Volume II

Environmental Impact Assessment Report

CHAPTER 13

Biodiversity

August 2023

McCutcheon Halley
CHARTERED PLANNING CONSULTANTS

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13 Biodiversity

13.1 Introduction

Enviroguide Consulting was commissioned by Marina Quarter Ltd., to prepare the Biodiversity Chapter of an Environmental Impact Assessment Report (EIAR) for a Proposed Large-scale Residential Development (LRD) (hereafter referred to as the 'Proposed Development') at lands at Bennetstown, Dunboyne, Co. Meath (hereafter referred to as the 'Site').

This chapter of the EIAR (the 'Chapter') details the Ecological Impact Assessment (EcIA) of the Proposed Development, which assesses the potential significant effects of the same on habitats and species; particularly those protected by national and international legislation or considered to be of particular nature conservation importance on or adjacent to the Site. This Chapter will describe the ecology of the Site, with emphasis on habitats, flora and fauna, and will assesses the potential effects of the Construction and Operational Phases of the Proposed Development on these ecological receptors. The chapter follows the *Guidelines for Ecological Impact Assessment in the UK and Ireland*, by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018) and supplemented by the National Roads Authority (2009) *Guidelines for Assessment of Ecological Impacts of National Road Schemes*. The purpose of this EcIA is to:

- Set out the methodologies used to inform the assessment.
- Identify Key Ecological Receptors (KERs) within the Zone of Influence (ZOI).
- Assess the impacts from the Proposed Development on the KERs and the resulting significant effects.
- Set out measures to avoid or mitigate negative impacts.
- Assess the residual effects after the incorporation of agreed avoidance or mitigation measures to ensure legal compliance.
- Set out agreed measures to offset significant residual effects.
- Set out opportunities for ecological enhancement.

This Chapter should be read in conjunction with the Appropriate Assessment (AA) Screening (Enviroguide, 2023a) and Natura Impact Statement (NIS) (Enviroguide, 2023b) that accompany this planning application under separate cover.

13.2 Expertise & Qualifications

This chapter of the EIAR has been prepared by LG of Enviroguide Consulting.

LG is a Senior Ecologist with Enviroguide and has a B.Sc. in Zoology (Hons) and a M.Sc. (Hons) in Wildlife Conservation and Management from University College Dublin. LG's MSc thesis was a literature scoping review on the ecosystem services provided by Irish bats, and has completed best practise guidance courses on bat survey and mitigation techniques such as: 'Bat Ecology & Survey' and 'Bat Impacts and Mitigation' both held by the Chartered Institute of Ecology and Environmental Management (CIEEM). LG is experienced in desktop research, literature scoping-review, and report writing, as well as practical field skills (Bats, habitats, invasive species, bird surveys). LG is experienced in compiling Biodiversity Chapters of EIARs, EcIAs, AA screenings and NIS reports, and in the overall assessment of potential impacts to ecological receptors from a range of developments. LG is a Qualifying member of the Chartered Institute of Ecology and Environmental Management (CIEEM).

LG has been involved in the preparation of numerous EIARs including the following projects:

- A LRD at lands to the south of Bóthar Maol and to the west of Blackrock Road at Haggardstown, Dundalk, Co. Louth (on behalf of Marina Quarter Ltd., in 2023).
- A LRD at lands at Milltown Park, Sandford Road, Dublin 6 (on behalf of Sandford Living Ltd., in 2023).

All surveying and reporting have been carried out by qualified and experienced ecologists and environmental consultants. LG, Senior Ecologist with Enviroguide authored this Chapter and undertook the desktop research and field surveys that informed it. LG and SH conducted the bat surveys carried out at the Site to date. LG, ED and BMcC conducted the various bird surveys carried out at the Site to date. LG and SC carried out the analysis of the bat survey data collected as part of this assessment.

ED is an Environmental Consultant and Ornithologist who has worked on a wide range of conservation, research, and ecological monitoring projects across Ireland. ED is the author of the best-selling books, The Complete Field Guide to Ireland's Birds and Finding Birds in Ireland and is experienced in coordinating and undertaking surveys along with being highly proficient in report writing and data management. ED is highly experienced with all survey methodology and has inputted in various EIARs, Environmental Assessments and AAs. ED is currently part of the team of field ornithologists undertaking the long-term Dublin Bay Wetlands Survey.

BMcC is a Project Ecologist and experienced Ornithologist with 11 years of birding experience. Brian is a longstanding and active member of Bird Watch Ireland and has provided Ornithology survey work for ecological consultancies, e.g., Vantage points surveys of Gulls, Terns, Raptors, Waders and Wildfowl; hinterland surveys of the above as well as riverine species; and breeding waders and country birds. BMcC is highly experienced with all survey methodologies and with surveying all species groups of Irish birds and migrants.

Dr SH has a B.Sc. (Hons) in Zoology and a Ph.D. in Marine Ecology from University College Dublin, and a wealth of experience in desktop research, bioinformatics analyses, literature review and reporting, as well as practical field and laboratory experience including habitat mapping, invasive species surveys, terrestrial fauna surveys (incl. mammal presence and bat activity surveys), freshwater and marine fish surveys and environmental DNA analysis. SH has prepared several Stage I and Stage II Appropriate Assessment Reports and Ecological Impact Assessments (EcIA). Additionally, SH has authored and supported the preparations of a number of Biodiversity Chapters for Environmental Impact Assessment Reports.

SC is an experienced Ecologist with a B.Sc. (Hons) in Botany from the University of Galway. SC has experience in surveying bats, birds, mammals, plants, habitats, and invasive species. SC's experience in ecological report writing extends from AA Screenings and NIS to EcIAs, Constraints Reports, and supporting submissions in EIAR chapters. SC has abundant experience in bat survey and data analysis; ranging from windfarms to housing developments.

13.3 Proposed Development

The full description of the Proposed Development is outlined in Chapter 2 'Development Description' of this EIAR.

The proposed LRD will consist of the construction of 267 no. residential units, a creche, a new link road between the R157 and the Old Navan Road including a bridge over the River Tolka, 2 no. signalised junctions, upgrade works and road improvements to the R157 and the M3 Parkway access road, and all associated site development works including drainage, landscaping, and boundary treatments.

The layout of the Proposed Development is shown in Figure 13.6 below.

13.3.1 Aspects Relevant to this Assessment

13.3.1.1 Site Location

The Site of the Proposed Development is 14.17 Ha in size with a developable area of 5.18 Ha. There is 9.52 Ha. of undevelopable area which includes non-residentially zoned lands F1 and E3 and a riparian strip along a drainage ditch in the south of the Site.

The Site of the Proposed Development comprises a greenfield site located on the northern outskirts of Dunboyne and in the townland of Bennetstown (Figure 13.5). The Site currently comprises several agricultural pasture fields and associated vegetated boundaries. The M3 Parkway is located adjacent to the north of the Proposed Development, along with third party lands also marked for development. The R157 Dunboyne Bypass runs adjacent to the west of the Site, with the River Tolka and its flood plain running along the east. The Site is bounded by agricultural fields to the south.

13.3.1.2 Construction Phase Description

13.3.1.2.1 Main Site Development Works

As per the Construction Environmental Management Plan (CEMP) prepared by Paul McGrail Consulting Engineers (PMG) (2023a), the assumed programme presented below is indicative of how the Proposed Development will be constructed. At each stage of the Development some or all of the following activities will be required.

- Archaeological watching brief.
- Geotechnical Investigation.
- Ecology Prep. and establishment of tree protection measures and ecological mitigation measures.
- Site clearance and enabling works.
- External Infrastructure works.
- Internal Service infrastructure works.
- Sub-Structure works.
- Super-Structure works.

- External works and finishes.

The Phasing included in the CEMP is indicative to allow for flexibility in terms of the development. In terms of the Delivery and Phasing of Development the following as detailed in the CEMP (PMG, 2023a) will be the key stages:

Phase 1a – Site Set Up

This task will take up to ca.3 months to complete with approximately up to 20 staff employed and will involve consultation with the Project Arborist, Archaeologist and Ecologist, Site clearance set up Site offices and contractors compound (in the west of the Site) and secure the construction Site and erection of signage for Site security purposes.

Phase 1b – Setting out of sites and provision of services

Given the significant work involved in the provision of drainage services, this stage will involve significant work and is estimated to take between 4-5 months and will involve up to 40 construction staff. This will involve the laying of sewers within the Site, the installation of attenuation tanks, the provision of footpaths, lighting and roadways. As part of any works (i.e. provision of services) along the public areas/roads in the vicinity of the Site, it will be ensured that the surface of the roads/areas will be re-instated to a high standard. Due to the catchment areas, the Site services associated with the phasing will be constructed as and when required; to ensure that all surface water is attenuated prior to discharging to the existing surface water network.

Phases 1-5 – Construction of Residential Units

The construction of the residential units will, to a certain degree respond to the demand/sale of the units involved. The Proposed Development is expected to take up to four (4) years to complete (subject to planning and market demand). The units will be developed on a sequential basis starting with the southern portion of the Site.

13.3.1.2.2 Bridge Construction

The Proposed Development entails the installation of a bridge across the River Tolka in the south-east of the Site. The proposed bridge has a clear span of 12m and traverses a section of the river (See Figure 13.1, Figure 13.2, Figure 13.3 and Figure 13.4). As advised by Atkins, consultant engineers for the Proposed Development, the bridge will be constructed using conventional construction methods as outlined below:

- Construct/cast precast beams at an established precast yard in Ireland.
- Establish piling equipment and install piles (including excavation as required). Assumed maximum piling depth of 20m (conservative assumption).
- Construct the foundation and abutments to beam seat level.
- Transport and place precast beams with appropriately sized crane equipment.
- Cast the top slab and deck diaphragms (with formwork supported off beams).
- Construct wing/return walls.

- Backfill behind abutments and wingwalls.
- Install bridge parapets, kerbs, and footpaths.
- Complete roadworks and implement any necessary scour protection measures.
- Landscaping and finish the road reserve.

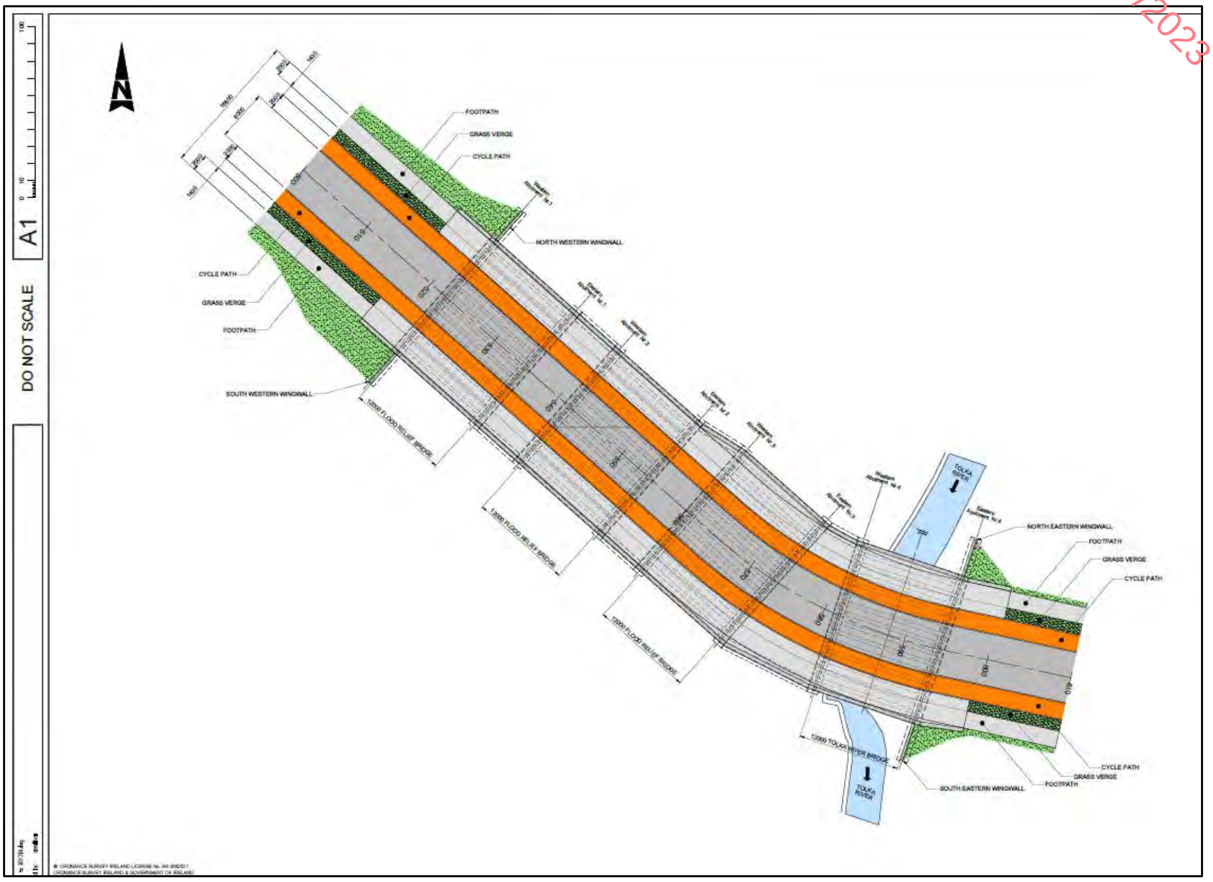


Figure 13.1 Image adapted from Atkins Drwg No: 205505-ATK-ZZ-ZZ-SK-CE-001701, showing overall bridge layout across floodplain.

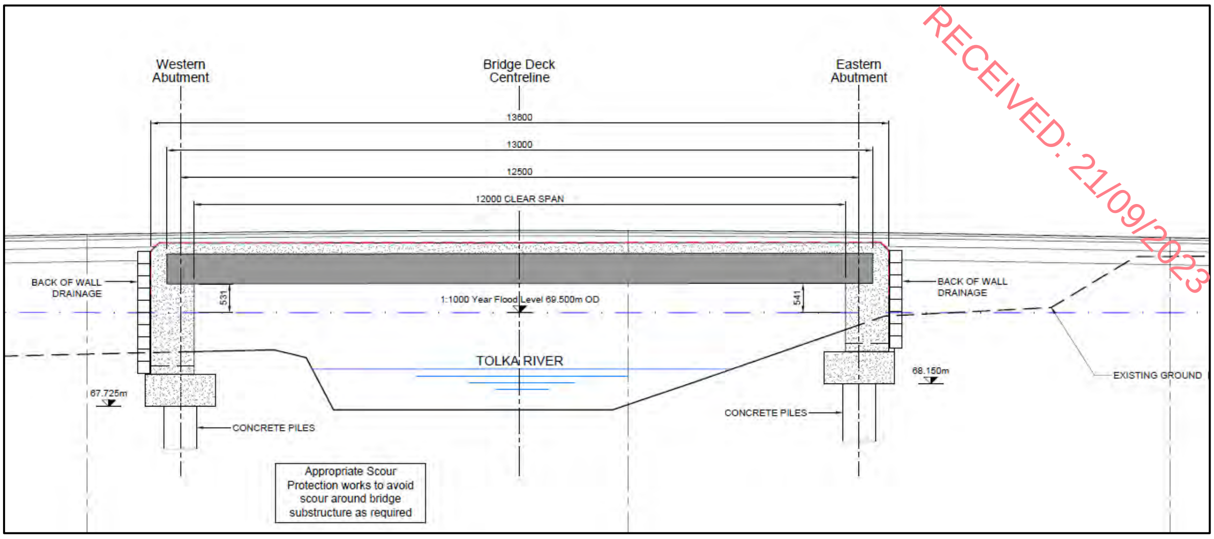


Figure 13.2. Image extracted from Atkins Drwg No: 5205505-ATK-ZZ-ZZ-SK-CE-001702, showing bridge's clear span design.

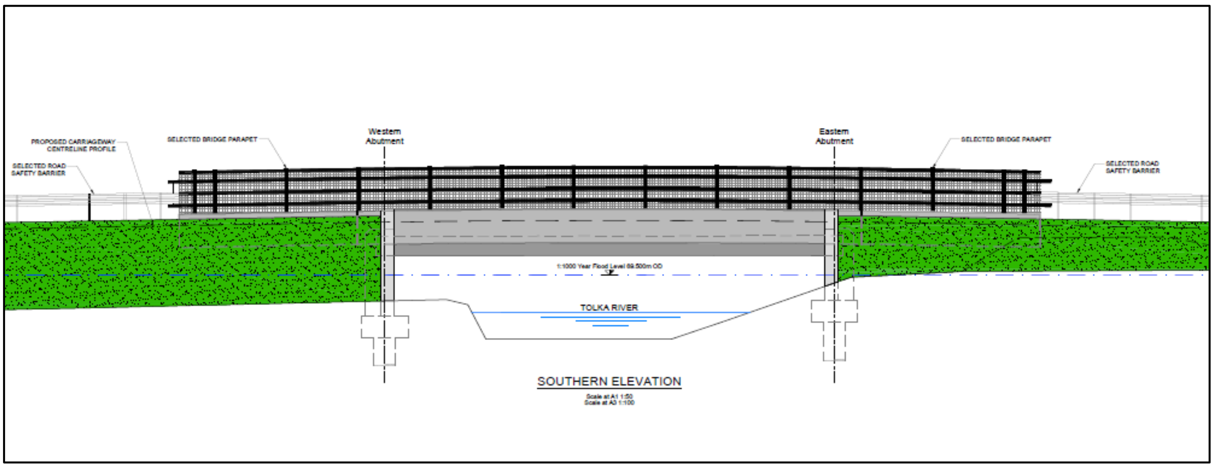


Figure 13.3. Image extracted from Atkins Drwg No: 5205505-ATK-ZZ-ZZ-SK-CE-001704 showing bridge's southern elevation.

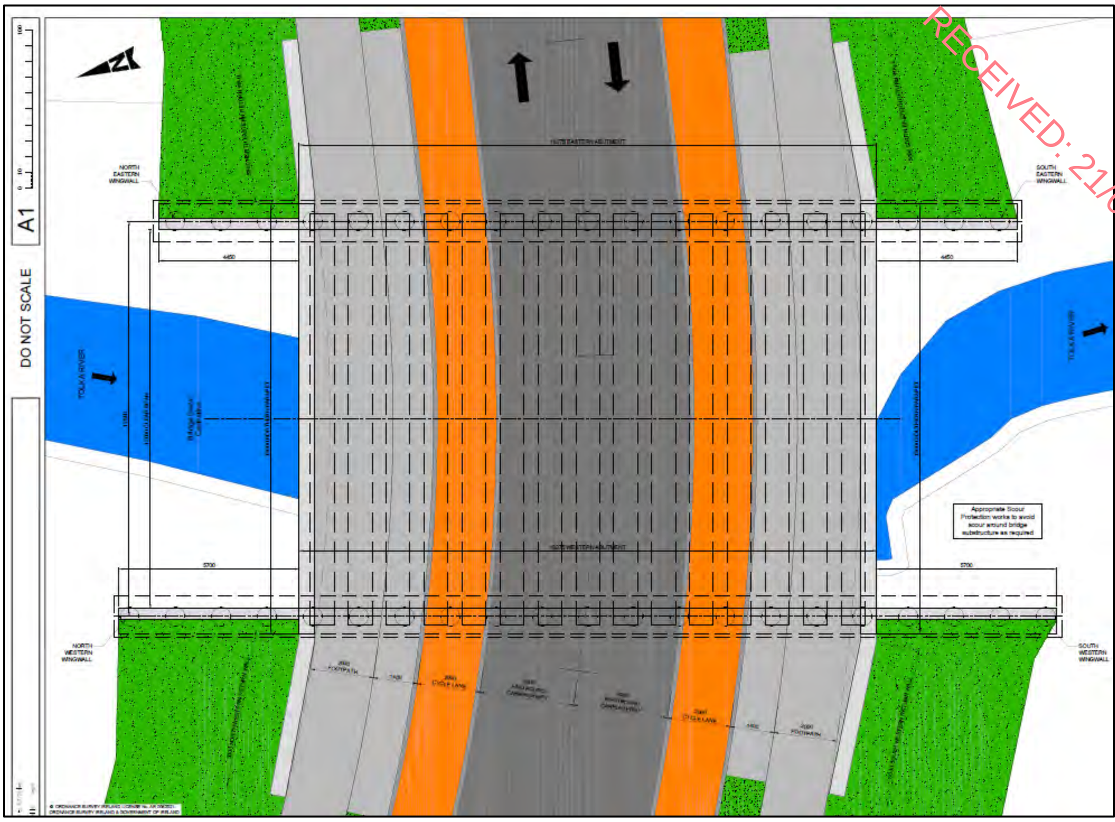


Figure 13.4. Image adapted from Atkins Drwg no: 5205505-ATK-ZZ-ZZ-SK-CE-001701, showing the proposed Layout Plan of the Bridge over the Tolka.

13.3.1.2.3 Proposed Earth Berm Construction & Removal of Existing Earth Berm

The Proposed Development will include works within the River Tolka's flood plain to ensure adequate flood capacity is present during the operation of the Proposed Development. This will entail the excavation of parts of the Tolka's western flood plain to increase capacity and the construction of earthen berms along the eastern length of the main housing development area at the Site. The works will also include the amendment of the existing flood protection berm present along the eastern bank of the Tolka in part, to allow for the road and bridge construction. As advised by Atkins consultant engineers, these works can be summarised as follows:

- Existing topsoil is to be removed over the extent of the proposed Berm area and excavation of subsoil material is to a minimum depth of 500mm below existing ground levels.
- Suitable clay material to be imported to the Site (or use of site-won clay material following testing of material to confirm permeability requirements).
- The Clay material is to be placed and compacted in layers greater than 250mm thick by the contractor.
- The Berm is to be shaped to have a slope no greater than 2:1 and to maximum height as indicated on the proposed Berm Detail and associated project Flood Risk Assessment (IE Consulting, 2023).

- 200mm topsoil to be placed on top of clay material to allow for grass seeding in accordance with landscape requirements.
- The topsoil of the existing Berm is to be removed and stored on Site adjacent to the works.
- The existing Berm is to be reduced to 200mm lower than the existing surrounding ground levels. Excavated material is to be removed from the Site.
- The topsoil is to be reused and placed over the removed berm location and grass seeding in accordance with landscape requirements.

13.3.1.3 Proposed Drainage

13.3.1.3.1 Surface Water

Storm and surface water arising from the Site will ultimately discharge to the River Tolka. A Sustainable Urban Drainage System (SUDS) has been included in the project design as per best practice and the guidance of the Greater Dublin Strategic Drainage Study (GDSDS). SUDS measures can therefore be considered as 'embedded mitigation' or 'mitigation by design', as they are not included to mitigate any harmful effects of the Proposed Development on any designated site, however, they will contribute to the general reduction of pollutant input to the Tolka and downstream.

The proposed SUDS will manage and treat surface water generated at the Site for the duration of its operational lifetime. The SUDS system has been designed to collect and attenuate storm/surface water arising from the Site and discharge same at the allowable greenfield runoff rate to the detention basins in the west and north-east of the Site, and the existing drainage ditch section to be retained in the south of the Site; running along the proposed link-road. Maximum discharges are limited to pre-development greenfield runoff rates, further reduced and diffused through the various nature based solution measures designed into the SUDS system. As detailed in the Engineering Report prepared by PMG (2023b), the suite of SUDS measures included in the design are as follows:

- **Permeable Paving:** Porous surfacing (paving block or open graded material) has been designed on private parking spaces and driveways.
- **Swales:** shallow, flat bottomed, vegetated open channels have been included within the proposed road layout along the kerb line.
- **Treepits:** Treepits are proposed in the east and north of the Site.
- **Detention Basins & Attenuation Tank:** Detention basins are proposed in the west, south and north-east of the Site to cater for excess flows during periods of heavy rainfall. The attenuation design has been based on the 1:100 year Return Period plus 20% Climate Change required storage volume. This has been achieved with a detention basin above ground for two of the catchments and a concrete tank for the final catchment. The tank was chosen due to the Site levels and the close proximately to the outfall. Prior to entering the tank the surface water will be cleaned with a min three stage SUDS approach.
- **Petrol Interceptors:** Petrol interceptors have been designed before the inlet chamber of each attenuation feature and have sufficient capacity to cater for each catchment area.

- **Hydrobrake Flow Control:** The Hydro-Brake® Flow Control is a self-activating vortex flow control device that reduce the stormwater runoff to greenfield flow rates. Surface water runoff from each surface water catchment, will be attenuated using a Hydrobrake on the surface water outlet.

The SUDS design includes silt removal traps and petrol interceptors within the drainage network. These are the primary mechanisms for preventing contaminated surface water run-off entering the River Tolka during the Operational Phase.

The traps and separators have been designed specifically to the capacity/flow for each part of the Site's drainage network with a minimum retention time to allow immiscible hydrocarbon pollutants to accumulate on the surface and suspended solids to sink to the bottom of the unit.

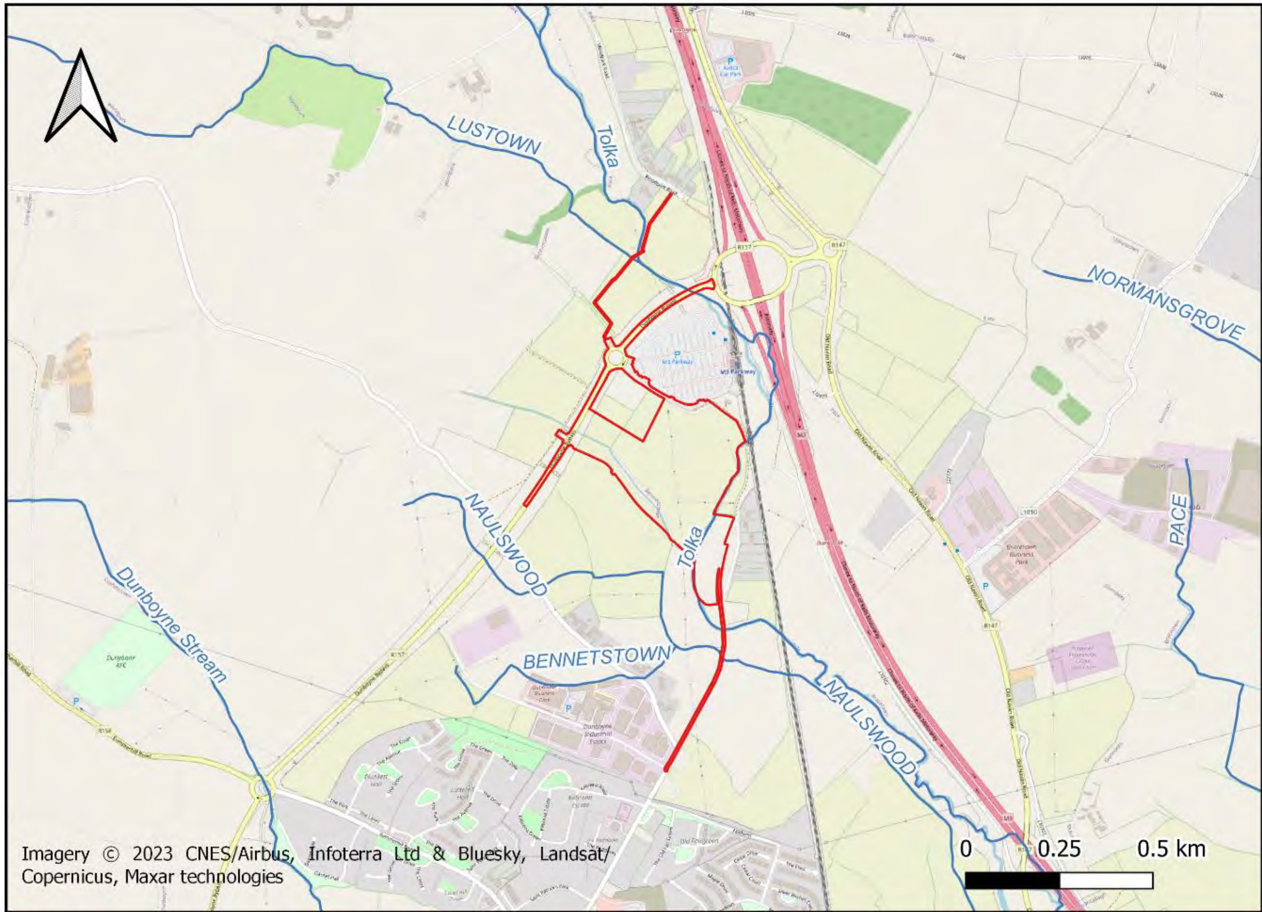
The most likely sources of contamination of the surface and storm runoff are general grit and silt arising from gardens and hard surfaces, hydrocarbons from vehicle exhausts and fuels or oil spills and leaks, vehicle tyre wear, burning plastics, wastewater from washing cars, pesticides etc., used for gardening and materials used in home maintenance. While these forms of contamination do pose potential risks to the water quality of the River Tolka, the likely volumes are expected to be low and to remain within the design capacity of the traps and interceptors, maintained and cleaned in line with the manufacturer's recommendations. This, along with the significant distance downstream between the Proposed Development and Dublin Bay makes the likelihood of potential impacts at designated sites as a result of the Operational Phase of the Proposed Development negligible.

While the risk of contamination from expected/design volumes of contamination will be removed by the traps and interceptors, functioning normally and maintained and cleaned in line with the manufacturer's recommendations, larger scale incidents such as a property fire could generate larger volumes of contaminated water which will enter the drainage system. As the traps and separators are unlikely, in such cases, to remove all the contaminants it is proposed that run-off associated with fire water run-off be temporarily stored in the detention basins and removed off site via tankers.

These procedures will ensure that in emergency situations larger volumes of contaminated water can be prevented from discharging to the River Tolka.

13.3.1.3.2 Foul Drainage

As per the Engineering Report prepared by PMG (2023b), the proposed foul sewer network will connect to the proposed pumping station located in the north of the Site; which will discharge to the existing Uisce Éireann (UÉ) foul sewer network. A Pre-Connection Enquiry has been submitted to UÉ and the Confirmation of Feasibility has been granted.



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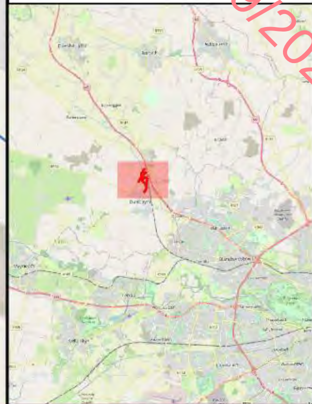

Legend:

- Site Outline
- EPA River Network

Applicant:	Project:	Location:	Figure Title:
Marina Quarter Ltd.	Proposed Large-scale Residential Development	Bennetstown, Dunboyne, Co. Meath.	Site location and nearby waterbodies.

Drawn By: LG	Projection: IRENET95 / Irish Transverse Mercator
Checked: BL	
Date: 01/09/2023	Scale @ A4: 1:14334

Notes:
Site boundaries shown are for illustration purposes only and do not represent legal or exact boundaries

Figure 13.5. Site Location

Figure 13.6. Proposed Site layout (Extracted from JFA Drwg no: DBN-SP-00-DR-JFA-AR-P1007).

Figure 13.7. Image extracted from Atkins Drwg no: 5205505-ATK-ZZ-ZZ-SK-CE-000025, showing the southern Link-road as it crosses the Tolka and flood plain.

Figure 13.8. Proposed Landscape Plan (Extracted from IRLA Drwg no: 1000.

13.4 Relevant Legislation & Guidance

An EcIA is a process of identifying, quantifying, and evaluating potential effects of development-related or other actions on habitats, species and ecosystems (CIEEM, 2018). The Proposed Development is a sub-threshold for an Environmental Impact Assessment (EIA) under the Planning and Development Regulations 2001-2021, as amended.

When an EcIA is undertaken as part of an EIA process it is subject to the EIA Regulations (under the EU Planning and Development Regulations 2001-2021). An EcIA is not a statutory requirement, however it is a best practice evaluation process. This EcIA is provided to assist the Competent Authority with its decision making in respect of the Proposed Development.

There is a number of pieces of legislation, regulations and policies specific to ecology which underpin this assessment. These may be applicable at a European, National or Local level. Legislation at the International level relevant to the Proposed Development are listed below:

- *Council Directive 92/43/EEC* on the Conservation of Natural Habitats and of Wild Fauna and Flora; hereafter the 'Habitats Directive'.
- *Directive 2009/147/EEC*, hereafter the 'Birds Directive'.
- *Directive 2011/92/EU*, hereafter the 'EIA Directive'.
- EU Regulation 1143/2014, on Invasive Alien Species.
- *Convention on the Conservation of European Wildlife and Natural Habitats 1982*, hereafter the 'Bern Convention'
- *The Convention on the Conservation of Migratory Species of Wild Animals 1983*, hereafter the 'Bonn Convention'.
- *Ramsar Convention on Wetlands 1971*, hereafter referred to as 'Ramsar'.
- *Water Framework Directive 2000/60/EC*, hereafter the 'WFD'.

National legislation and policy relevant to the Proposed Development are listed below:

- Wildlife Act 1976, as amended in 2000.
- Flora (Protection) Order 2015.
- The Planning and Development Act 2000.
- National Biodiversity Plan 2017-2021.

Additionally, Natural Heritage Areas (NHAs) are designations under the Wildlife Acts to protect habitats, species, or geology of national importance. The boundaries of many of the NHAs in Ireland overlap with Special Areas of Conservation (SAC) and/or Special Protection Area (SPA) sites. Although many NHA designations are not yet fully in force under this legislation (referred to as 'proposed NHAs' or pNHAs), they are offered protection in the meantime under planning policy which normally requires that planning authorities give recognition to their ecological value.

Local plans relevant to the Proposed Development are listed below:

- National Biodiversity Action Plan 2017-2021.
- Meath County Development Plan 2021 – 2027.
- County Meath Biodiversity Action Plan 2015-2020.

Further details on legislation and policy relevant to the Proposed Development are detailed in Appendix 13.1.

13.5 Consultation

Inland Fisheries Ireland (IFI) consulted and provided input via a phone call with Matt Carroll to McCutcheon Halley on 31st August 2023. Mr Carroll's comments were largely concerning the inclusion of SUDS and nature based solutions at the Site, along with the protection of the River Tolka in both the Construction and Operational Phases. Mr Carroll noted that the Tolka is a salmonid river system and is shallow, increasing its vulnerability. It was recommended that the bridge proposed be a clear span design with the existing bank vegetation retained as a riparian buffer along the Tolka.

IFI's comments and recommendations are in line with those that have already been considered and incorporated into the project design. A range of SUDS measures are proposed at the Site along with a suite of mitigation measures focused on protecting the River Tolka during the Construction Phase. The bridge proposed is of a clear span design and is set back from the banks so that they are retained along either side of the channel. The river floodplain of the Tolka will be augmented initially to add flood capacity but will then be left as a riparian buffer either side of the river; with native tree and hedgerow planting proposed to increase wildlife connectivity with the river corridor. The works along the Tolka, such as the bridge construction, will also be timed so as to avoid the salmon spawning season.

13.6 Methodology

13.6.1 Scope of Assessment

The specific aims and objectives of this Biodiversity Chapter were to:

- Undertake baseline ecological surveys and evaluate the nature conservation importance of the Site;
- Identify and assess the direct, indirect and cumulative ecological implications or impacts of the Proposed Development during its lifetime; and
- Where possible, propose mitigation measures to remove or reduce those impacts at the appropriate stage of the development.

13.6.2 Desk Study

A desktop study was carried out to collate and review available information, datasets and documentation sources pertaining to the Site's natural environment. The desk study, completed in September 2023, relied on the following sources:

- Information on species records and distributions, obtained from the National Biodiversity Data Centre (NBDC) at maps.biodiversityireland.ie;
- Information on Floral Protection Order (FPO) Bryophytes database at dahg.maps.arcgis.com;
- Information on waterbodies, catchment areas and hydrological connections obtained from the Environmental Protection Agency (EPA) at gis.epa.ie;

- Information on bedrock, groundwater, aquifers and their statuses, obtained from Geological Survey Ireland (GSI) at www.gsi.ie;
- Information on the network designated conservation sites, site boundaries, qualifying interests and conservation objectives, obtained from the National Parks and Wildlife Service (NPWS) at www.npws.ie;
- Satellite imagery and mapping obtained from various sources and dates including Google, Digital Globe, Bing and Ordnance Survey Ireland;
- Information on the existence of permitted development, or developments awaiting decision, in the vicinity of the Proposed Development from the National Planning Application Database (DHLGH, 2023); and
- Information on the extent, nature and location of the Proposed Development, provided by the applicant and/or their design team.

A comprehensive list of all the specific documents and information sources consulted in the completion of this Chapter is provided in Section 13.16 References & Sources.

13.6.3 Zone of Influence (ZOI)

The ZOI for a project is the area over which ecological features may be affected by changes as a result of the proposed development and associated activities. This is likely to extend beyond the development site, for example where there are ecological or hydrological links beyond the site boundaries (CIEEM, 2018). The ZOI will vary with different ecological features, depending on their sensitivities to an environmental change.

Furthermore, ZOI in relation to European sites is described as follows in the *'OPR Practice Note PN01 - Appropriate Assessment Screening for Development Management'* (OPR, 2021):

> *"The zone of influence of a proposed development is the geographical area over which it could affect the receiving environment in a way that could have significant effects on the Qualifying Interests of a European site. This should be established on a case-by-case basis using the Source-Pathway-Receptor framework and not by arbitrary distances (such as 15 km)."*

13.6.4 Identification of Relevant Designated Sites

To determine the ZOI of the proposed development for designated sites, reference was made to the OPR Practice Note PN01 - Appropriate Assessment Screening for Development Management' (OPR, 2021), a practice note produced by the Office of the Planning Regulator, Dublin. This note was published to provide guidance on screening for AA during the planning process, and although it focuses on the approach a planning authority should take in screening for AA, the methodology is also readily applied in the preparation of EcIA reports such as this to identify all relevant designated sites potentially linked to the proposed development.

As noted above, the most recent guidance advises against the use of arbitrary distances that serve as precautionary ZOI (e.g., 15km), and instead recommends the application of the Source-Pathway-Receptor (S-P-R) model in the identification of designated sites, stating that "*This should avoid lengthy descriptions of European sites, regardless of whether they are relevant to the proposed development,* *and a lack of focus on the relevant European sites and issues of importance*". Although this statement refers to European sites, it is also applicable to other designated sites.

Thus, the methodology used to identify relevant designated sites comprised the following:

- Identification of potential sources of effects based on the Proposed Development description and details;
- Identification of potential pathways between the Site of the Proposed Development and any designated sites within the ZOI of any of the identified sources of effects:
    - Water catchment data from the EPA (www.epa.ie) were used to establish or discount potential hydrological connectivity between the Proposed Development and any designated sites.
    - Groundwater and bedrock information used to establish or discount potential hydrogeological connectivity between the Proposed Development and any designated sites.
    - Air and land connectivity assessed based on Proposed Development details and proximity to designated sites.
    - Consideration of potential indirect pathways, e.g., impacts to flight paths, *ex-situ* habitats, etc.
- Review of Ireland's designated sites to identify those sites which could potentially be affected by the Proposed Development in view of the identified pathways, using the following sources:
    - European sites and nationally designated sites (e.g., NHAs and pNHAs) from the NPWS (www.npws.ie);
    - Ramsar sites from the Irish Ramsar Wetland Committee (https://irishwetlands.ie/irish-sites/);
    - Other internationally designated sites e.g., UNESCO Biosphere's; and
    - Regional development plans to identify any remaining sites or areas designated for nature conservation at a local level.

13.6.5 Field Surveys

A range of surveys have been carried out across the application Site since 2021, including habitat and flora surveys, bat surveys, bird surveys and mammal surveys. Survey data is typically considered to be valid for 3 years at the most (CIEEM 2019). As such, field survey dates from 2021 to 2023 are summarised in Table 13.1

Table 13.1 Field surveys undertaken at the Proposed Development Site between 2021 and 2023.

Survey Type	Date of Survey	Surveyor
Preliminary Site Walkover	18th February 2022	LG
Amphibian Survey		
Habitat & Flora Survey	28th July 2022 16th August 2023	LG
Invasive Flora Survey		
Mammal Survey		
Breeding Bird Surveys	8th June 2022 27th June 2022	BMcC

Survey Type	Date of Survey	Surveyor
Winter Bird Surveys	18th February 2022 13th March 2022 23rd March 2022	LG, ED
Potential Bat Roost (PBR) Survey & Dusk Bat transect survey	23rd September 2021	LG
Potential Bat Roost (PBR)/ Habitat Suitability Survey & Dusk Bat transect survey	6th September 2022	LG, SH
Dusk Bat transect survey	16th August 2023	LG
Static Bat Detector Survey of proposed bridge crossing of River Tolka (5 days)	16th August – 21st August 2023	LG
Otter *Lutra lutra* and Kingfisher *Alcedo atthis* Survey of stretch of River Tolka adjacent the Site (150m upstream and downstream)	16th August 2023	LG
Hedgerow Appraisal of hedgerows within the main Site area	16th August 2023	YM

The following sections outline the methodology employed by Enviroguide Consulting for each survey carried out.

13.6.5.1 Habitat and Flora Surveys

Habitat and flora surveys of the Site were conducted by Enviroguide on the 28th July 2022 and 16th August 2023. Habitats were categorised according to the Heritage Council's '*A Guide to Habitats in Ireland'* (Fossitt, 2000) to level 3. The habitat mapping exercise had regard to the 'Best Practice Guidance for Habitat Survey and Mapping' (Smith *et al.*, 2011) published by the Heritage Council. The habitats at the Site were also assessed for their potential to support protected and/or notable fauna.

In addition, the Site was searched for invasive flora with a particular focus on those listed on the Third Schedule of SI No. 477/2011, and their location and extent recorded if recorded on Site.

13.6.5.2 Hedgerow Appraisal Survey

A hedgerow appraisal of the Site was conducted by Enviroguide on the 16th August 2023. Hedgerows were categorised on their ecological value as ascertained from current research from Hedgerow Appraisal System (HAS) (Foulkes et al, 2013) and the Hedgerow Evaluation and Grading System (HEGS) (Clements and Toft, 1993). These systems follow a standardised methodology that grades hedgerows based on their overall structure, connectivity, botanical diversity and the presence of hedgerow features such as banks and ditches. Each hedgerow is then assigned a grade based on the results.

For full details on the methodology applied during the Hedgerow Appraisal please see Appendix 13.5.

13.6.5.3 Mammal Surveys

Mammal surveys of the Site were carried out in conjunction with the habitat surveys in 2022 and 2023. The mammal surveys conducted as part of this assessment had regard to the survey guidelines contained in *Guidelines for the Assessment of Ecological Impacts of National Road schemes* (NRA, 2009) and associated guidance *Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes* (NRA, 2009). The Site was searched for signs of mammals within the area, such as burrows, scatt, foraging signs, and tracks.

13.6.5.4 Otter and Kingfisher Survey

A survey of the stretch of the River Tolka that runs along the Proposed Development Site's eastern boundary was conducted on 16th August 2023, with a specific focus on the potential for Otter and/or Kingfisher to occur. The survey methodology comprised a walk of the river channel covering 150m upstream and 150m downstream of the proposed bridge crossing of the Tolka.

The river channel and banks of the Tolka were searched from within the river, and from along the banks, for signs of Otter presence e.g., holts, couches, slides, prints, spraints and food remains; that might indicate otter usage of this stretch of the Tolka. The banks of the river were assessed for their suitability for nesting/feeding Kingfisher (e.g., slow moving sections of watercourse with overhanging branches) and a search for suitable perches and nest holes was conducted along the stretch 150m upstream and 150m downstream of the proposed bridge crossing.

The surveys were carried out with cognisance of the NRA (2009a*) Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes* and no limitations were encountered during these surveys. This guidance document (NRA, 2009a) states in relation to both Otter and Kingfisher that the survey effort/extent of watercourse to be surveyed should be proportionate to the nature and scale of the proposed works and the associated potential for disturbance to these species. The survey distance of 150m upstream and downstream of the proposed bridge was deemed appropriate based on the nature of the works i.e., a singular bridge crossing, and the general set-back of the main Site works and Proposed Development from the Tolka. The main source of potential impacts to Otter and Kingfisher was deemed to be the bridges construction and operation.

13.6.5.5 Amphibian Surveys

The Site was assessed for suitable amphibian habitat, with a particular focus on the more widespread species; Common Frog (*Rana temporaria)* and Smooth Newt (*Lissotriton vulgaris).* Natterjack Toad (*Bufo calamita)* is more restricted in its distribution (Counties Kerry and Wexford) and is unlikely to be present in the vicinity of the Site of the Proposed Development. The Site was surveyed for potential amphibian breeding habitat (i.e., areas of pooling, wet ditches), and signs of breeding activity (amphibian adults, spawn and juveniles). Survey methodology took consideration of the National Roads Authority (NRA, 2009), now Transport Infrastructure Ireland (TII) *Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes*, The Irish Wildlife Trust *National Smooth Newt Survey 2013 Report* (Meehan, 2013) and the *National Frog Survey of Ireland 2010/11* (Reid et al. 2013).

13.6.5.6 Bird Surveys

A bird scoping survey was carried out on the 18th of February 2021 during the preliminary Site walkover; to scope out the breeding and non-breeding bird potential at the Site based on habitats. Additionally, all bird species encountered during the survey were recorded and activity noted where possible.

The survey methodology employed was based on that recommended in standard literature used by for example the British Trust for Ornithology (BTO) (Gillings et al, 2007; Bibby et al, 1992 and Gilbert et al, 1998), which has subsequently been adapted into guidelines for ecological consultants by the

Bird Survey & Assessment Steering Group (2022). During the surveys, the Site was walked slowly, approaching all habitats within and adjacent to the Proposed Development and scanning and listening for birds.

13.6.5.6.1 Breeding Bird Surveys

To inform an evaluation of the on-site habitats for bird species, two breeding bird survey visits were undertaken on the 8th June and 27th June, 2022. Three transects were walked through the Site with all the species present recorded. Each transect was divided up into four parts (all a similar distance), with each transect walked and all species noted at each side of the ecologist. Distance brackets were also used, however, the majority of species were recorded within the site boundary and within 50 meters each side of the surveyor on each transect.

13.6.5.6.2 Non-breeding Bird Surveys

To inform an evaluation of the on-site habitats for wintering bird species, three late winter bird survey visits were undertaken on 8th February 2022, 13th March 2022 and 23rd March 2022.

The objective of these surveys was:

- To assess the potential usage of the Site by waterbirds during the winter months as an *ex-situ* site; and
- To determine the composition, numbers, frequency, and heights of species in flight over the Site of the Proposed Development, if any, in order to inform decisions on potential disturbance to flight-lines of birds commuting to/from roost sites and/or between feeding sites as a result of the construction of the proposed buildings.

No SPAs designated for waterbirds are located in proximity to the Site and *ex-situ* usage is not considered to be a potential issue.

The Proposed Development does not include any high-rise buildings and so flight-line obstruction/collision risk is not deemed to be a significant concern in this instance.

The survey methodology followed the non-breeding bird survey guidance published by the Bird Survey & Assessment Steering Group (2022) '*Bird Survey Guidelines for assessing ecological impacts'.* Each survey consists of a combination of walked transects of the Site (being walked at a slow, ambling pace, stopping to scan priority habitat/features where appropriate) and vantage point observation from fixed points, as required. The flight-line survey component consists of vantage point observation by a surveyor using binoculars and identification guides where necessary to identify all target species in flight over the Site.

All surveys were undertaken using:

- Opticron 8x42 binoculars (or equivalent).
- Opticron 20x Telescope (or equivalent).
- Agreed survey methodology.
- A4 map of the survey area.

13.6.5.7 Bat Surveys

13.6.5.7.1 Preliminary Bat Roost Assessment

A preliminary bat roost assessment of Potential Roost Features (PRFs) within trees at the Site was completed during the day on the 23rd September 2021 & 6th September 2022, prior to the dusk transect survey carried out on each date. These surveys were carried out in adherence to best practice guidelines (Collins, 2016 and Marnell et al., 2022); to determine the suitability of the Site for roosting bats and the potential requirement for further surveys to be undertaken. PRFs can be defined in four broad terms of suitability as detailed below:

- Negligible – No suitable features observed.
- Low – A structure with one or more roost features as used by individual bats or a tree of sufficient size to contain roost features but none observed from the ground.
- Moderate – A structure or tree with one or more roost features and able to support one or more bats but unlikely to support a roost of high conservation status.
- High - A structure or tree with one or more roost features that are obviously suitable for use by a larger number of bats on a regular basis, and potentially for longer periods of time.

13.6.5.7.2 Bat Habitat Suitability Assessment

A Bat Habitat Suitability Assessment was carried out in conjunction with the roost assessment on the 6th September 2022. This assessment evaluated the habitats present on Site and in the wider area for bat foraging and commuting suitability. Habitat suitability is assessed qualitatively from Negligible to High:

- Negligible – No suitable foraging or commuting habitats on Site
- Low – Suitable but isolated habitats that could be used by small numbers of commuting and/or foraging bats, such as poorly connected, fragmented hedgerows, lone trees, unvegetated streams, etc.
- Moderate – Suitable continuous habitat connected to the wider landscape that could be used by commuting and/or foraging bats, such as treelines, scrub, grassland, water, etc.
- High – Continuous high-quality habitat that is well-connected to the wider landscape, and is likely used regularly by commuting and/or foraging bats, such as river valleys, broadleaved woodland, woodland edge, grazed parkland, etc.

13.6.5.7.3 Bat Activity Transect Surveys

The Site was assessed by an experienced ecologist (LG) in relation to the potential bat foraging habitat and commuting routes. Dusk activity transect surveys were conducted on three dates; 23rd September 2021, 6th September 2022 and 16th August 2023 during favourable weather conditions.

All survey methodologies follow those of the Bat Conservation Trust *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (Collins, 2016) and have been undertaken within the recommended survey period of May to September inclusive. The surveyors were equipped with a Elekon Batlogger M2 detector and powerful L.E.D. torch and head torches. To comply with best practice guidelines, dusk transect surveys began 15 minutes before sunrise and were sustained for a minimum of 2 hours (Collins, 2016). The aim of the activity surveys was to determine if bats were present on Site, and if so, to monitor their behaviours such as feeding, commuting, or roosting. Each survey comprised of a walked transect around the Site with particular attention being given to linear features within the Site.

The methodology was changed slightly during the 2023 survey, with the set of transect routes also including a number of predetermined stopping points where the surveyors spent a period of 9 minutes stationary and recording activity (See Figure 13.9). This combination of stopping points and walked transects allows any hotspots in bat activity along the various field boundaries at the Site to be captured and compared and may reveal areas of particular importance to the local bat population.

Weather conditions (Collins, 2016) and the time of year (Marnell et al., 2022) were suitable for bat surveys. The weather conditions for are described fully in Table 13.2.

Table 13.2. Summary of weather conditions during dusk transect surveys

Survey Date	Weather	Start Temp	End Temp
23/09/2021	Good, dry, calm.	17°c	13°c
06/09/2022	Light rain/breeze at start.	15°c	14°c
16/08/2023	Light breeze, dry, calm.	16°c	13°c

13.6.5.7.4 Static Bat Detector Deployment

One (1 No.) Song Meter SM4BAT FS Ultrasonic static bat detector was deployed on the 16th August 2023 at the point of the Proposed bridge crossing over the river Tolka (See Figure 13.9). The SM4 unit was set up to record from 20 minutes prior to sunset each night and it was deployed at this location for a period of 5 nights (16th – 21st August).

13.6.5.7.5 Bat Data Analysis

Species were identified from recordings using Elekon's BatExplorer software (Version 2.1.10.1) for transect data collecting using the BatLogger M2, and using Kaleidoscope Version 5.6.0c for the SM4 static data. BatExplorer and Kaleidoscope allows bat calls to be observed both audibly and on a sonograph to determine species identification. Bat data was analysed and species assigned to each record with reference to species identification guides such as Russ (2012).

Each record i.e., a sequence of bat calls/pulses, is noted as a bat pass; to indicate the level of bat activity for each species recorded. Each bat pass does not correlate to an individual bat but is representative of bat activity levels. Some bats such as *Pipistrelle* species may continuously fly around a habitat or feature, therefore, it is possible that a series of bat passes within a similar time frame is representative of an individual bat. On the other hand, Leisler's bats (*Nyctalus leisleri*) tend to travel through an area quickly, and as such, an individual sequence or bat pass is more likely to be indicative of individual bats.

Figure 13.9. Image showing the transect and point count locations used during the 2023 dusk activity survey, along with the location of the deployed SM4 static detector.

13.6.6 Ecological Assessment

This Biodiversity Chapter was prepared following the methodology set out in *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine* (CIEEM, 2018); and with reference to the National Roads Authority *'Guidelines for Assessment of Ecological Impacts of National Road Schemes'* (NRA, 2009c), the Environmental Protection Agency (EPA) '*Guidelines on the information to be contained in Environmental Impact Assessment Reports'* (EPA, 2022) and BS 42020:2013 *Biodiversity: Code of practice for planning and development* (BSI, 2013).

The evaluation of significant effects should be based on available scientific evidence. Based on the precautionary principle, if the available information is not sufficient, then a significant effect may be assumed likely to occur.

13.6.6.1 Evaluation of Ecological Features

The value of the ecological features, i.e., the habitats and species present or potentially present, was determined using the ecological evaluation at different geographical scales (NRA, 2009c), presented in Appendix 13.2. This evaluation scheme, with values ranging from locally important to internationally important, seeks to provide value ratings for habitats and species present that are considered ecological receptors of impacts that may ensue from a proposal. Based on best practice (CIEEM, 2018), any features considered to be less than of local value are not assessed within this EcIA.

13.6.6.2 Impact Assessment

As per the NRA guidelines, impact assessment is only undertaken of Key Ecological Receptors (KERs). The assessment of the potential impact of the Proposed Development on the identified KERs was carried out with regard to the criteria outlined in the EPA Guidelines (EPA, 2022), presented in Appendix 13.3. These guidelines set out a number of parameters that should be considered when determining which elements of the Proposed Development could constitute impact or sources of impacts. These include:

- Positive, neutral or negative effect;
- Significance;
- Extent;
- Probability;
- Duration;
- Timing;
- Frequency; and
- Reversibility.

The impact assessment process considers both direct and indirect impacts: direct ecological impacts are changes that are directly attributable to a defined action, e.g. the physical loss of habitat. Indirect ecological impacts are attributable to an action, but which affect ecological resources through effects on an intermediary ecosystem, process, or feature, e.g., the creation of roads which cause hydrological changes, which, in the absence of mitigation, could lead to an adverse effect of a sensitive habitat.

13.6.6.3 Assessment of Cumulative Impacts and Effects

Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a location. Cumulative effects can occur where a Proposed Development results in individually insignificant impacts that, when considered in combination with impacts of other proposed or permitted plans and projects, can result in significant effects.

Relevant plans and policies (see Appendix 13.1) were reviewed to identify any potential for negative cumulative impacts with the Proposed Development. Additionally, existing planning permissions from the past five years (from 2018 onwards) within the ZOI of the Proposed Development were reviewed, with particular focus on potential cumulative impacts on the identified KERs. Long-term developments were also considered where applicable.

13.6.6.4 Avoidance, Mitigation, Compensation and Enhancement Measures

Where potentially significant effects have been identified, the mitigation hierarchy has been applied, as recommended in the CIEEM Guidelines. The mitigation hierarchy sets out a sequential approach beginning with the avoidance of impacts where possible, the application of mitigation measures to minimise unavoidable impacts and then compensation for any remaining impacts. Once avoidance and mitigation measures have been applied residual effects are then identified along with any necessary compensation measures, and incorporation of opportunities for enhancement. When seeking mitigation or compensation solutions, efforts should be consistent with the geographical scale at which an effect is significant. For example, mitigation and compensation for effects on a species population significant at a county scale should ensure no net loss of the population at a county scale. The relative geographical scale at which the effect is significant will have a bearing on the required outcome which must be achieved.

It is important for the EcIA to clearly differentiate between avoidance, mitigation, compensation and enhancement and these terms are defined here as follows:

- **Avoidance** is used where an impact has been avoided, e.g., through changes in scheme design. In practice, avoidance measures are typically implemented during the design stage via discussions and re-design (e.g., avoiding a sensitive habitat by relocating a building). Avoidance measures are therefore rarely reported within an EcIA, which focuses on assessing the final design.
- **Mitigation** is used to refer to measures to reduce or remedy a specific negative impact in situ.
- **Compensation** describes measures taken to offset residual effects, i.e. where mitigation in situ is not possible.
- **Enhancement** is the provision of new benefits for biodiversity that are additional to those provided as part of mitigation or compensation measures, although they can be complementary.

13.7 Difficulties Encountered

Every effort has been made to provide a comprehensive description of the ecology of the Site, and an extensive search of available datasets for records of rare and protected species within proximity of the Proposed Development has been undertaken as part of this assessment. However, the records from these datasets do not constitute a complete species list. The absence of species from these datasets does not necessarily confirm an absence of species in the area.

No significant limitations of the field surveys and desk-based work completed to date were encountered which would prevent robust conclusions being drawn as to the potential impacts of the Proposed Development.

13.8 Baseline Environment

13.8.1 Hydrology, Geology and Hydrogeology

The application Site is located in the Liffey and Dublin Bay Catchment (Catchment I.D 09) and in the Tolka_SC_010 Sub-catchment (Sub-catchment ID 09_10) (EPA, 2023).

The River Tolka flows along the eastern boundary of the Proposed Development. The Naulswood and another watercourse; the Bennetstown, flow in a south-easterly direction before joining with the Tolka approx. 1.4km to the south-east of the Site. These rivers flow as the main Tolka channel due south-east through Blanchardstown and central Dublin, before outflowing into Dublin Bay approx. 20km downstream of the Site (EPA 2023). Another watercourse, the Lustown, also runs to the north of the main Site area and intersects with the north-western services arm of the Proposed Development as it flows south-east before joining the Tolka.

These waterbodies are identified with the same EU code (IE_EA_09T010600) and are assessed as a single entity under the Water Framework Directive (WFD) ID TOLKA_020. The WFD status of these waterbodies is *Moderate* and they have been projected to be *At Risk* of not achieving their WFD objectives (EPA 2023). The reported Q-value results from station 'Dunboyne Rd Br u/s Clonee' (located approx. 1.6km south-east of the Site) of 3-4 indicate that water quality in the TOLKA_020 is *Moderate* downstream the Site. Additionally, a prominent drainage ditch with a confirmed flow towards the Tolka was noted along the southern boundary of the Site during the walkover ecological surveys.

The Site of the Proposed Development is situated on the Dublin (IE_EA_G_008) groundwater body that has been assessed as having *Good* WFD status for the period 2016-2021. The bedrock aquifer identified beneath the Site is mapped as "Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones" (L) (GSI 2023). The Groundwater Vulnerability Rating assigned to groundwater beneath the Site ranges from largely *Low (L)* for most of the Site to *Moderate (M)* along the Tolka (GSI, 2023).

13.8.2 Site Drainage

The agricultural lands containing the Site currently drain to a network of deep drainage ditches in the north, east and south of the Site. This network of drainage ditches has a confirmed flow towards the Tolka, as was noted during the walkover ecological surveys. This ditch is steep with banks ca.2.5m high in some places. This ditch was dry during the bat survey in September 2021, and observed to carry a fast flow during a Site visit in February 2022 after heavy rainfall. The ditch was observed as dry in July 2022, with a flow recorded during the walkover survey in August 2023. This ditch likely holds transient flows during periods of high rainfall and directs them to the River Tolka to the south-east.

13.8.3 Designated Sites

All European sites potentially linked to the Proposed Development have been identified and fully assessed in the AA Screening Report (Enviroguide, 2023a) and NIS (Enviroguide, 2023b) accompanying this submission under separate cover. A summary of the AA conclusions is given below.

Other nationally or internationally designated sites potentially linked to the Proposed Development are identified in Section 13.8.3.2.

13.8.3.1 European sites – Appropriate Assessment

The AA Screening Report concluded that a degree of uncertainty exists in whether the Proposed Development could give rise to potentially significant effects on the following European sites, namely:

- North Dublin Bay SAC (000206).
- South Dublin Bay and River Tolka Estuary SPA (004024).
- North Bull Island SPA (004006).

Therefore, a NIS has been prepared for the Proposed Development, the conclusions of which are as follows:

"This NIS details the findings of the Stage 2 AA conducted to further examine the potential direct and indirect impacts of the Proposed Development at lands at Bennetstown, Dunboyne, Co. Meath, on the following European Sites:

- *North Dublin Bay SAC (000206).*
- *South Dublin Bay and River Tolka Estuary SPA (004024).*
- *North Bull Island SPA (004006).*

The above sites were identified by a screening exercise that assessed likely significant effects of a range of impacts that have the potential to arise from the Proposed Development. The AA investigated the potential direct and indirect effects of the proposed works, both during construction and operation, on the integrity and qualifying interests of the above European sites, alone and in combination with other plans and projects, taking into account each site's structure, function and conservation objectives.

Where potentially significant effects were identified, a range of mitigation and avoidance measures have been suggested to avoid them. This NIS has concluded that, once the avoidance and mitigation measures are implemented as proposed, the Proposed Development will not have an adverse effect on the integrity of the above European sites, individually or in combination with other plans and projects. Where applicable, a suite of monitoring has been proposed to ensure the efficacy of said measures in ensuring no adverse impacts on the relevant European sites downstream.

As a result of the complete, precise and definitive findings in of this NIS, it has been concluded, beyond reasonable scientific doubt, that the Proposed Development will have no significant adverse effects on the QIs, SCIs and on the integrity and extent of the relevant European sites".

As such, European sites are not considered further in this report as they have been assessed in full in the aforementioned AA and NIS.

13.8.3.2 Other Designated Sites

13.8.3.2.1 S-P-R Links to Designated Sites

Potential impact pathways are discussed in the following sections in the context of the Proposed Development, as it is described in Chapter 2 of this EIAR.

13.8.3.2.1.1 Direct Pathways

Hydrological pathways

The Site is located adjacent to the River Tolka, which is linked to the Proposed Development via a network of drainage ditches. The Tolka eventually flows into Dublin Bay over 20km downstream, which is designated as a UNESCO Biosphere[1]. In addition, Dublin Bay hosts the following additional designated sites:

- Two Ramsar sites: Sandymount Strand/Tolka Estuary (832) and North Bull Island (406).

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[1] A biosphere is a special designation awarded by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) but managed in partnership by communities, NGOs and local and national governments (https://www.dublinbaybiosphere.ie/).

- Two pNHAs; South Dublin Bay pNHA (000210) and North Dublin Bay pNHA (000206).

In the event of heavy and persistent rainfall, surface water discharges from the Site likely flow into the Tolka. However, the intervening distance between the Site and the designated sites located along the outflow path from the Tolka is considered to provide sufficient dilution and dispersion capacity to eliminate any potential for causing significant impacts on these designated sites.

The Proposed Development includes the construction of a bridge over the Tolka and excavation works within its floodplain. Therefore, in a worst case scenario, construction related pollution events at the Site could contribute to a reduction in water quality at downstream designated sites. This precautionary approach is therefore adopted, and also considers the largely unquantifiable number of developments underway along the River Tolka between the Site of the Proposed Development and Dublin Bay; which could act synergistically to contribute to an overall reduction in water quality through pollution events, in the absence of mitigation measures.

As such, this hydrological pathway to the above listed designated sites is considered further in this Chapter.

Hydrogeological pathways

During groundworks and other construction activities, the ground will be exposed and any potential accidental discharges to ground could potentially migrate vertically downward to the underlying bedrock aquifer and laterally within the aquifer to the Tolka. However, due to the significant intervening distance between the Site and Dublin Bay via the Tolka, it is considered the likely ZOI via hydrogeological pathways is limited to the immediate habitats within and adjacent to the Site. A hydrogeological impact pathway to designated Sites is therefore screened out.

Air and land pathways

The likely ZOI via air and land pathways is considered to be limited to surrounding areas within approx. 200-300m from the Site boundary for any noise and dust sources, depending on prevailing weather conditions. Additionally, light spill is considered to be limited to areas within the Site and habitats immediately adjacent to the boundaries.

The Construction Phase of the Proposed Development could introduce dust and noise impacts transferable via air and land pathways, as well as increased lighting and human activity at the Site and in the vicinity of the Site during the Construction and Operational Phases. The nearest designated site to the proposed development is the Royal Canal pNHA (002103), located approx. 4.9km southeast of the Site. As such, it is considered to be located outside of the potential ZOI via land and air pathways. No other designated sites are linked to the Site via air and land pathways.

13.8.3.2.1.2 Indirect Pathways

The Proposed Development will be served by separate foul water and surface water sewers during its Operational Phase. It is noted that there is a weak indirect hydrological pathway between the Site and the designated sites in Dublin Bay via this sewerage network, which will eventually be processed and treated at Ringsend Wastewater Treatment Plant (WWTP) prior to discharge to Dublin Bay. The main area of dispersal of the treated effluent from Ringsend WWTP is in the Tolka Basin and around North

Bull Island. However, the potential for foul waters generated at the Site of the Proposed Development to reach the designated sites within Dublin Bay and cause significant effects, during the Construction and Operational Phases, is negligible due to the following reasons:

- The ongoing upgrade works to Ringsend WWTP which will increase the capacity of the facility from 1.6 million Population Equivalent (PE) to 2.4 million PE.
- It is considered that effects on marine biodiversity and the European sites within Dublin Bay from the current operation of Ringsend WWTP are unlikely.
- The main area of dispersal of the treated effluent from Ringsend WWTP is in the Tolka Basin and around North Bull Island. South Dublin Bay is unaffected by the effluent from the plant (Irish Water, 2018).

The increase of the PE load at the facility as a result of the Proposed Development, assuming each PE unit was not previously supported by the WWTP, is considered to be an insignificant increase in terms of the overall scale of the facility. The increased load does not have the capacity to alter the effluent released from the WWTP to such an extent as to result in likely significant effects on designated sites in Dublin Bay.

13.8.3.3 Relevant Designated Sites

A designated site will only be at risk from likely significant effects where an S-P-R link of note exists between the Proposed Development and the designated site. All designated sites considered as part of the S-P-R method (excl. European sites) are listed in Table 13.3.

Table 13.3. Designated sites considered with the Source-Pathway-Receptor (S-P-R) method to establish notable links between the sources of effects arising from the Proposed Development, and any relevant designated sites. Those sites with notable S-P-R links that are further assessed in this report are highlighted in green (if any).

Site Name & Site Code	Designation Rationale / Qualifying Interests	Potential Pathways
Internationally Designated Sites		
Sandymount Strand/Tolka Estuary (832) Ramsar Site	An intertidal system supporting a large bed of eelgrass (*Zostera noltii*) with extensive areas of sandflats. The site is important for various species of waterbirds, supporting internationally important numbers of Brent Geese and large numbers of roosting gulls and terns. Various species of annalids, bivalves and small gastropods occur. Bait-digging is a regular activity on the sandy flats.	Weak direct hydrological pathway via the surface water network and the Tolka. Weak indirect pathway via foul water treatment at Ringsend WWTP, deemed insignificant due to upgrade works at WWTP and scale of Proposed Development.
North Bull Island (406) Ramsar Site	A small island built up over 200 years against a harbour wall and the adjoining foreshore of sandy beaches, saltmarshes and mudflats. The site is unique in Ireland because it supports well-developed saltmarsh and dune systems displaying all	

Site Name & Site Code	Designation Rationale / Qualifying Interests	Potential Pathways
	stages of development from the earliest phase of colonization to full maturity. The site supports five protected or threatened plant species and nationally important populations of three insect species. The area is important for nesting *Sterna albifrons* (80 pairs, or about 30% of the Irish population) and for numerous species of wintering waterbirds. Human activities include bait digging.	
Dublin Bay UNESCO Biosphere	In 1981, UNESCO recognised the importance of Dublin Bay by designating North Bull Island as a Biosphere because of its rare and internationally important habitats and species of wildlife. To support sustainable development, UNESCO's concept of a Biosphere has evolved to include not just areas of ecological value but also the areas around them and the communities that live and work within these areas. There have since been additional international and national designations, covering much of Dublin Bay, to ensure the protection of its water quality and biodiversity. To fulfil these broader management aims for the ecosystem, the Biosphere was expanded in 2015. The Biosphere now covers Dublin Bay, reflecting its significant environmental, economic, cultural and tourism importance, and extends to over 300km². Over 300,000 people live within the newly enlarged Biosphere.	
Nationally Designated Sites		
South Dublin Bay pNHA (000210) Linear Distance to Proposed Development: approx. 19.8km ESE	*None available, assumed to overlap with South Dublin Bay SAC:* As per SDF update 10/2020 Habitats 1210 Annual vegetation of drift lines. 1310 Salicornia and other annuals colonising mud and sand. 2110 Embryonic shifting dunes. 1140 Mudflats and sandflats not covered by seawater at low tide.	Weak indirect pathway via foul water treatment at Ringsend WWTP, deemed insignificant due to upgrade works at WWTP and scale of Proposed Development.

Site Name & Site Code	**Designation Rationale / Qualifying Interests**	**Potential Pathways**
North Dublin Bay pNHA (000206). Linear Distance to Proposed Development: approx. 17.54km ESE	*None available, assumed to overlap with North Dublin Bay SAC:* <u>As per SDF update 10/2020</u> Habitats 1140 Mudflats and sandflats not covered by seawater at low tide 1210 Annual vegetation of drift lines 1310 *Salicornia* and other annuals colonising mud and sand 1320 Spartina swards (*Spartinion maritimae*) 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) 1410 Mediterranean salt meadows (*Juncetalia maritimi*) 2110 Embryonic shifting dunes 2120 Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) 2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)* 2190 Humid dune slacks Species 1395 Petalwort (*Petalophyllum ralfsii*)	Weak direct hydrological pathway via the surface water network and the Tolka. Weak indirect pathway via foul water treatment at Ringsend WWTP, deemed insignificant due to upgrade works at WWTP and scale of Proposed Development.
Royal Canal pNHA (002103) Linear Distance to Proposed Development: approx. 4.9km SE	A number of different habitats are found within the canal boundaries - hedgerow, tall herbs, calcareous grassland, reed fringe, open water, scrub and woodland. The hedgerow, although diverse, is dominated by Hawthorn (*Crataegus monogyna*). Otter spraints are found along the towpath, particularly where the canal passes over a river or stream. The rare and legally protected Opposite-leaved Pondweed (*Groenlandia densa*) (Flora Protection Order 1987) is present at one site in Dublin, between Locks 4 and 5. *Tolypella intricata* (a stonewort listed in the Red Data Book as being vulnerable) is also in the Royal Canal in Dublin, the only site in Ireland where it is now found. The ecological value of the canal lies more in the diversity of species it supports along	No S-P-R linkage links the Proposed Development to this Site.

Site Name & Site Code	Designation Rationale / Qualifying Interests	Potential Pathways
	its linear habitats than in the presence of rare species. It crosses through agricultural land and therefore provides a refuge for species threatened by modern farming methods.	

The following designated sites have been identified as being connected to the Proposed Development by S-P-R linkages:

- Sandymount Strand/Tolka Estuary Ramsar Site (832).
- and North Bull Island Ramsar Site (406).
- Dublin Bay UNESCO Biosphere.
- North Dublin Bay pNHA (000206).

The above sites are all linked to the Site via a weak hydrological pathway during the Construction Phase; via works in proximity to and over the River Tolka. A detailed assessment of potential impacts relating to Dublin Bay European sites is provided in the AA Screening Report (Enviroguide, 2023a) and NIS (Enviroguide, 2023b) that accompany this application under separate cover. The AA Screening Report concluded that the potential for likely significant effects to downstream Dublin Bay European sites could not be ruled out and an NIS was therefore prepared.

The NIS details the mitigation measures required to negate any likely significant effects on downstream Dublin Bay European sites and concludes that no significant effects are likely to occur once the recommended mitigation is put in place. This conclusion also applies by proxy to North Dublin Bay pNHA, the Dublin Bay UNESCO Biosphere and the two named RAMSAR sites, which overlap with South Dublin Bay and River Tolka Estuary SPA (004024), North Dublin Bay SAC (000206) and North Bull Island SPA (004006), and are designated for similar reasons. This is due to the weak and singular nature of the hydrological impact pathway that connects them to the Proposed Development (i.e., being located ca. 20km downstream along the River Tolka).

As these designated sites have been assessed (and any potential significant effects addressed through mitigation) in the AA Screening and NIS Reports that accompany this application under separate cover, they will not be assessed or discussed specifically in this Report. General mentions in this Chapter of the receiving downstream environment and associated mitigation measures are analogous with those proposed in the NIS to protect the above protected sites.

The distances and lack of S-P-R impact pathways between the Site and any further designated sites are sufficient to exclude the possibility of significant effects arising from: emissions of noise, dust, pollutants and/or vibrations emitted from the Site during the Construction Phase; increased traffic volumes during the Construction and Operational Phase and associated emissions; potential increased lighting emitted from the Site during Construction and Operational Phase; and increased human presence at the Site during Construction and Operational Phase.

13.8.4 Habitats

The majority of the Site is comprised of agricultural grassland (Fossits code: GA1), with some linear stretches dry meadows (GS2) located along the northern margin of the Site, and treeline (WL2) and hedgerow (WL1) habitats located in the west, south and north-east of the Site. A prominent drainage ditch (FW4) mirrors the hedgerows and treelines in the west and south/south-east of the Site. Wet grassland (GS4) habitat is present in the form of the Tolka's western floodplain. The River Tolka represents lowland depositing river habitat (FW2) as it runs through the east of the Site. A GA1 field lies to the east of the river, with its associated field boundary hedgerows and treelines. Small sections of flowerbeds and borders (BC4) and grassy verge (GS2) habitats exist in the form of low ornamental planting associated with the M3 Parkway carpark and roadside verges respectively that are included within the Site's overall redline boundary.

No rare or invasive flora species were recorded at the Site during any of the Site visits.

13.8.4.1 Grassland habitats

Overall the grassland habitats are highly agricultural and species poor, with perennial ryegrass (*Lolium perenne*) dominating the GA1 sward throughout the Site. Other grass species recorded in this habitat included cocksfoot (*Dactylis glomerata*) and Yorkshire fog (*Holcus lanatus*); with forb species comprising white clover (*Trifolium repens*), dandelion (*Taraxacum officinale*), common mouse-ear (*Cerastium fontanum*), creeping buttercup (*Ranunculus repens*), meadow buttercup (*Ranunculus acris*), broadleaved dock (*Rumex obtusifolius*), creeping thistle (*Cirsium arvense*), and common nettle (*Urtica dioica*). Cattle and sheep were recorded grazing the lands within and to the south of the Site and the swards were notably short during Site visits.

GS4 wet grassland habitat within the Tolka's flood plain is waterlogged in places and was observed to be flooded during winter visits to the Site. Species were similar to GA1 in nature but with more aquatic tolerant species such as silverweed (*Potentilla anserina*) present within the sward. The less managed GS4 margin along the River consisted of species such as great willowherb (*Epilobium hirsutum*), Meadowsweet (*Filipendula ulmaria*), nettle, false oatgrass (*Arrhenatherum elatius*), hedge bindweed (*Calystegia sepium*) and field bindweed (*Convolvulus arvensis*).

A strip of GS2 in the northern boundary of the Site, along the margin of the M3 Parkway Carpark, supported false oatgrass, Yorkshire fog, creeping thistle, dock, nettle, common vetch (*Vicia sativa*), rosebay willowherb (*Chamaenerion angustifolium*), great willowherb, dog rose (*Rosa canina*), and twelve planted immature ash trees (*Fraxinus excelsior*).

The grassland habitats at the Site are intensively managed as cattle and sheep pasture, evidenced by the low species diversity they support and the dominance of agricultural species present. These habitats are deemed to be of overall **less than local importance**.

13.8.4.2 Built land/artificial habitats

Artificial surfaces (BL3) habitat occur at the Site in the form of the stretches of tarmac road and pavement included within the redline boundary. An small strip of low ornamental planting (BC4); part of the landscaping of the M3 Parkway carpark, is located in the north of the Site. These habitats are highly anthropogenic and are of **negligible ecological** value.

13.8.4.3 Hedgerows, Treelines and Ditches

Hedgerows (WL1) and treelines (WL2) are present within the western, southern, eastern and northern sections of the Site. These are mirrored by drainage ditches (FW4) in the west and south of the Site. Hedgerows in the west mostly comprised of elder (*Sambucus nigra*), hawthorn, blackthorn (*Prunus spinosa*), bramble (*Rubus fructicosus*), spindle (*Euonymus europaeus*), dog rose, and willow species (*Salix spp.*). An overgrown ditch was present within this hedgerow that contained water in February 2022 but was dry in July 2022. This hedgerow was labelled H1 in the Hedgerow Appraisal conducted by Enviroguide in 2023 (See Appendix 13.5), and was assigned a HAS score of *2- Favourable* and a HEGS score of *Grade 1 - High to very high value*.

The treeline that runs north perpendicular to H1 above, is labelled H2 in the Hedgerow Appraisal Report (Enviroguide, 2023c). This treeline comprised largely of planted sycamore (*Acer pseudoplatanus*), with a shrub layer consisting of hawthorn, elder and brambles. The ditch itself was damp underfoot in July 2022, and supported species such as nettle, bramble, ivy, soft-shield fern (*Polystichum setiferum*), Hart's tongue fern (*Asplenium scolopendrium*), cleavers (*Galium aparine*), lords and ladies (*Arum maculatum*) and herb Robert (*Geranium robertianum*). H2 was assessed as having a HAS score *of 2- Favourable* and a HEGS score *of Grade 2- Moderately high to high value*.

The hedgerow that runs east-west along the route of the proposed link road mostly comprised of hawthorn (occasionally very mature specimens), blackthorn, elder and holly (*Ilex aquifolium*), with a bramble dominant understorey. The skeletal remains of dead immature ash trees, likely the result of ash die-back, were evident along all hedgerows at the Site, and were present as lying dead wood where they had fallen. The drainage ditch along this hedgerow was largely covered in ivy (*Hedera hibernica*) with Hart's tongue fern occasionally present.

Further south-east along this same hedgerow similar species occurred, with the addition of gorse (*Ulex europaeus*) and sycamore. The ditch in this location was more open and supported the same species as the other ditches. The above two sections of the hedgerow made up what is labelled H3 in the Hedgerow Appraisal (Enviroguide, 2023c), and was assigned a HAS score of *2- Favourable* and a HEGS score of *Grade 1 - High to very high value.*

Overall, the hedgerows scored well as regards for structural variables, such as width, height, and having escaped profiles and deep wet internal drainage ditches, as well as for biodiversity. Negative components recorded along the hedgerows include the evidence of ash die-back along their lengths, severe livestock poaching at their bases (particularly along H3), gaps and the lack of grassy margins in some locations, and the presence of nutrient rich plant species i.e., common agricultural ruderals such as dock, thistles (*Cirsium spp.*) nettle and ragwort (*Senecio sp.*), and non-native/ invasive sycamore stands. Please see the Hedgerow Appraisal Report in Appendix 13.5 for further detail.

Due to their favourable condition and their provision of wildlife corridors through a biodiversity poor agricultural landscape, these hedgerows are considered to be of **local importance (higher value).**

13.8.4.4 The River Tolka (FW2)

The river depth on the 16th August 2023 varied from approx. 30-50cm and the width of the river varied from approx. 2-3m in width. The banks of the river varied in their degree of vegetation cover; from open grass verge and fencing along the west bank upstream of the proposed bridge crossing, where agricultural fields directly abut the channel, to shaded treelined banks downstream of same (See Figure 13.5 and Figure 13.6). The river bed was noted to comprise of both silts and cobbles, with areas of sediment build-up noted where livestock access to the river was possible (particularly at the proposed bridge location) (Figure 13.10). The Tolka is a salmonid river system and this particular stretch was observed to support both kingfisher and otter, indicating sufficient fish stocks are supported by the river in the vicinity of the Site. This stretch also provides a wildlife corridor through an intensively managed agricultural landscape and, as such, is considered to be of **County Importance.**

Figure 13.10. Images showing the river bed (left) and areas of livestock access and poaching at the location of the proposed bridge crossing (right).

Legend:

Site boundary

Habitats

I. Linear habitats
- FW2 - Depositing/lowland rivers
- FW4 - Drainage ditches
- WL1 - Hedgerows
- WL2 - Treelines

II. Habitat areas
- BC4 - Flower beds and borders
- BL3 - Buildings and artificial surfaces
- GA1 - Improved agricultural grassland
- GS2 - Dry meadows and grassy verges
- GS4 - Wet grassland

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Applicant:	Figure Title:	Drawn By: LG	Checked: BL
Marina Quarter Ltd.	Habitat map	Date: 11/09/2023	
		Projection: IRENET95 / Irish Transverse Mercator	
Project:	**Location:**	Scale @ A4: 1:3705	
Proposed Large-scale Residential Development	Bennetstown, Dunboyne, Co. Meath.	**Notes:** Site boundaries shown are for illustration purposes only and do not represent legal or exact boundaries.	

Figure 13.11. Habitat Map of the Site of the Proposed Development.

13.8.5 Species and Species Groups

13.8.5.1 Flora

13.8.5.1.1 Rare and Protected

The Site of the Proposed Development is located within the Ordnance Survey 2km Grid Square O04B and 10km square O04. Species records from the NBDC online database were studied for the presence of rare and/or protected species within these grid squares within the last 20 years. This database contained no records of protected flora within the last 20 years. The FPO Bryophytes database was also checked for rare and protected flora records within the vicinity of the Proposed Development, however no records for rare or protected bryophytes exist within 10km of the Proposed Development.

13.8.5.1.1.1 Invasive species

There are records for two species of flora considered to be invasive within the grid square which encompasses the Site of the Proposed Development. Details of these records are listed in Table 13.4.

Table 13.4. Records of invasive species of flowering plant for the surrounding 2km (O04B) grid square associated with the Site from the National Biodiversity Data Centre.

Species	Date of Last Record	Source	Designations
Butterfly-bush (*Buddleja davidii*)	21/09/2013	Irish Vascular Plant Data - Paul Green	Medium Impact Invasive Species
Sycamore (*Acer pseudoplatanus*)	21/09/2013	Irish Vascular Plant Data - Paul Green	Medium Impact Invasive Species

The only invasive floral species recorded at the Site during field surveys was the sycamore. Despite being classified as a *Medium* impact invasive species, sycamore has recently been nominated as a potential structural replacement for ash due to the similar ecological requirements and ability to support similar species (Short and Hawe, 2018). As such, the need for their removal as an invasive species is considered low priority where not required due to health and safety.

13.8.5.2 Non-volant Mammals

13.8.5.2.1 Desk Study Results

Records for terrestrial mammals were obtained from the NBDC online database. Table 13.5 lists these species, their date of last record and summarises their protected status/designation. In total, two mammal species (one native and one non-native/invasive) were recorded within the O04B 2km grid square which encompass the Proposed Development Site.

Table 13.5. Records of mammals for the surrounding 2km (O04B) grid square associated with the Site from the National Biodiversity Data Centre.

Species	Date of Last Record	Source	Designations
Native Mammals			
West European Hedgehog (*Erinaceus europaeus*)	01/04/2022	Hedgehogs of Ireland	Protected Species: Wildlife Acts
Non-native			
Eastern Grey Squirrel (*Sciurus carolinensis*)	20/09/2012	Atlas of Mammals in Ireland 2010-2015	High Impact Invasive Species Regulation S.I. 477/2011 (Ireland)

13.8.5.2.2 Field Survey Results

Signs of mammals were found along the southern boundary hedgerow that runs west to south-east. No signs of mammals were recorded in the northern sections of the Site despite thorough checks. Some potential hedgehog habitat exists along the hedgerows within the Site.

Evidence of predation was recorded in the south in the form of prey remains (possibly woodpigeon (*Columba palumbus*)), likely the result of red fox. Fox prints were also found within the mud at the base of the southern drainage ditch.

What could be an old disused badger sett or Fox den was recorded in the banks of the same drainage ditch (Figure 13.12). Three visible entrances were present at the top of the bank and were observed to be filled with debris – twigs, leaves brambles etc, indicating a lack recent use.

Figure 13.12. Old disused mammal burrows (possibly badger) located along bank of southern drainage ditch.

A clump of badger fur was recorded further north on the bank of the same southern boundary hedgerow/ditch (Figure 13.13), and a latrine was present further south along the same hedgerow and contained a scatt comprised largely of grain and beetle carapaces (Figure 13.14). Mammal trails were observed entering the dense undergrowth to the south of the Site.

Figure 13.13. Clump of badger fur noted along the bank of the southern boundary ditch.

Figure 13.14. Badger latrine located along the southern hedgerow in the south-east of the Site.

No active setts were recorded within the Site, despite thorough checks of the dense undergrowth along the southern hedgerow, and it appears that the Site is part of a wider foraging territory for badger.

13.8.5.2.3 Otter Survey

The river depth on the 16th August 2023 varied from approx. 30-50cm and was safe to walk during the survey. The width of the river varied from approx. 2-3m in width, with the banks varying in their degree of vegetation cover; from open grass verge and fencing along the west bank upstream of the proposed bridge crossing, to shaded treelined banks downstream of same (Figure 13.16).

Figure 13.15. Image of typical Tolka channel north of the proposed bridge crossing (facing south). The banks varied from overgrown to more open fenced in nature along the west bank.

Figure 13.16. Typical Tolka channel south of the proposed bridge crossing. Banks were more wooded and shaded by trees along this stretch.

One confirmed otter sign and three potential signs were recorded during the survey (see Figure 13.20). A confirmed spraint was present approx. 150m downstream of the proposed bridge crossing (Figure 13.17 and Figure 13.18), located on the eastern bank along a concrete weir structure located within the river. The spraint contained small crustacean remains and fish skeletal material. Four potential slides were also recorded along the eastern bank; three upstream of the proposed bridge, and one near the spraint downstream, with flattened vegetation and faint trails leading into the undergrowth. These possibly could be as a result of otter accessing the channel (Figure 13.19).

Figure 13.17. Otter Spraint recorded downstream of the proposed bridge on a weir structure.

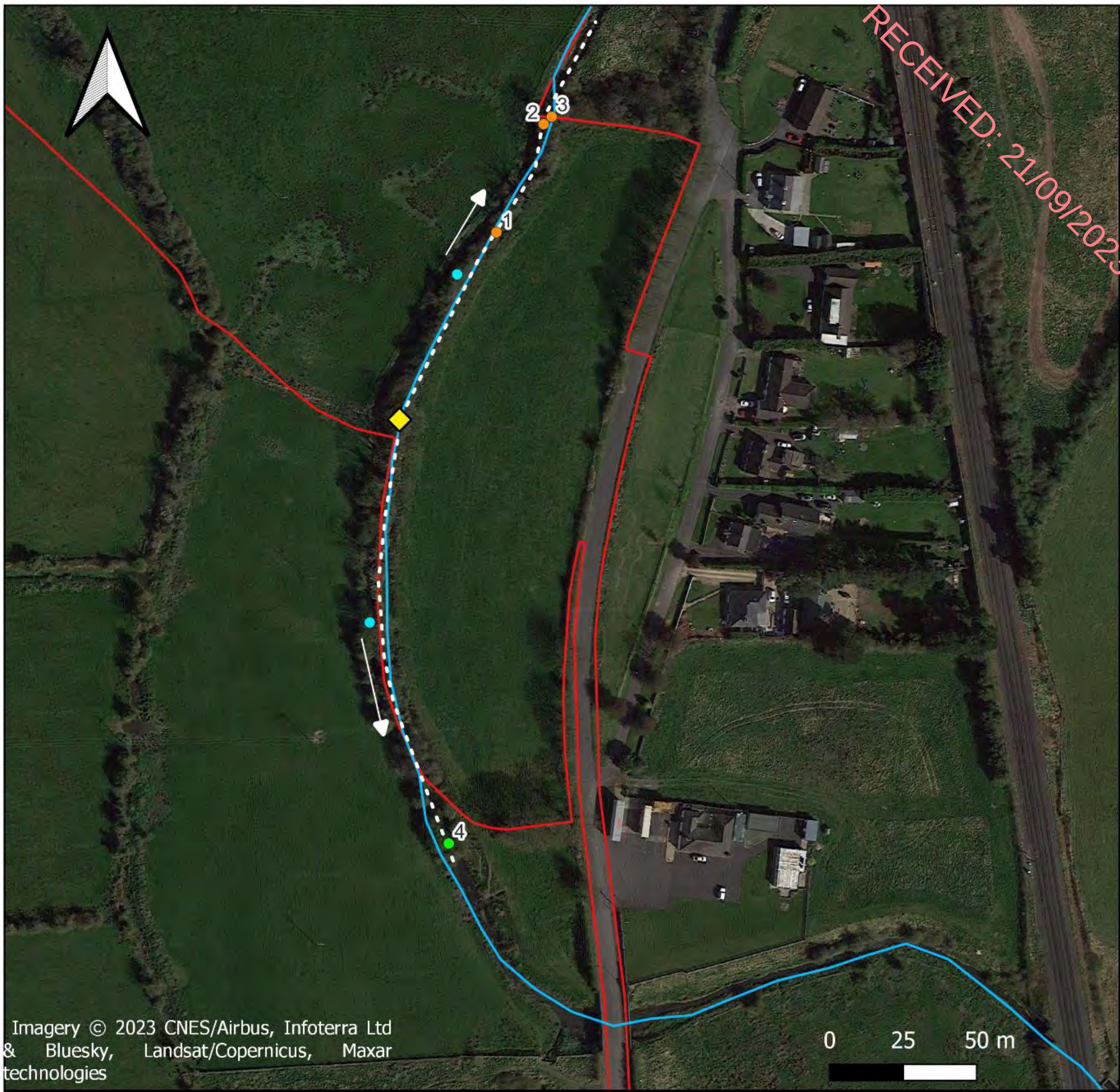
Figure 13.18. Location of spraint in red, recorded along a concrete weir structure.

Figure 13.19. Potential slides recorded along the upstream section of the eastern bank.

13.8.5.2.4 Evaluation

The Site could potentially support resident and regularly occurring and locally important populations of some of the smaller native mammals, such hedgehog. This species is less likely to be recorded during walkover surveys due to its nocturnal nature and small size. However, the fields are well grazed and the hedgerows were observed to be largely open within the Site itself, and so offer limited habitat for hedgehog.

Evidence of badger usage of the Site was recorded and it likely forms part of a badger's territory, although no active setts were recorded. Otter usage of the Tolka downstream and possibly upstream of the proposed bridge was observed, although no couches or holts were recorded, however, the riverbanks along this stretch could be used in future. The Site is therefore considered to be of **local importance (higher value)** to hedgehog, badger and otter.



Legend:

- Site boundary
- Approx Bridge Crossing

Survey 16.08.2023

- Kingfisher Sightings with flight directions indicated

Otter Survey Observations

- Slide
- Spraint & Slide

- - - Survey Extent 150m DS & US of proposed bridge

Waterbodies

- River Tolka

Enviroguide a DNV company	**Applicant:**	**Figure Title:**	Drawn By: LG	Checked: BL
	Marina Quarter Ltd.	Results of the Otter and Kingfisher survey conducted 16th August 2023.	Date: 12/09/2023	
			Projection: IRENET95 / Irish Transverse Mercator	
a 3D Core C, Block 71, The Plaza Park West, Dublin 12 D12F9TN w www.enviroguide.ie e info@enviroguide.ie t +353 (0)1 565 4730	**Project:**	**Location:**	Scale @ A4: 1:1833	
	Proposed Large-scale Residential Development	Bennetstown, Dunboyne, Co. Meath.	**Notes:** Site boundaries shown are for illustration purposes only and do not represent legal or exact boundaries.	

Figure 13.20. Results of the Otter and Kingfisher survey conducted 150m upstream and downstream of the proposed bridge crossing.

13.8.5.3 Birds

13.8.5.3.1 Desk study Results

A total of 78 bird species have been recorded within the O04 10 km grid square. Of these, 24 are amber listed birds and 14 are red listed birds as identified on the '*Birds of Conservational Concern in Ireland 4*' (BoCCI 4) (Gilbert et al. 2021). Details of amber and red listed species are given in Table 13.6. Of the remaining species 39 are green listed and one, the common pheasant (*Phasianus colchicus*) is not included in BoCCI 4 due to it being a non-native introduction for hunting.

Table 13.6. Bird species recorded within the 10km grid square containing the Site of the Proposed Development from the National Biodiversity Data Centre.

Species	Scientific name	Date of record	BOCCI status
Barn Swallow	*Hirundo rustica*	31/12/2011	Amber
Black-headed Gull	*Larus ridibundus*	31/12/2011	Amber
Brambling	*Fringilla montifringilla*	31/12/2011	Amber
Common Coot	*Fulica atra*	31/12/2011	Amber
Common Kingfisher	*Alcedo atthis*	31/12/2011	Amber
Common Linnet	*Carduelis cannabina*	07/01/2018	Amber
Common Starling	*Sturnus vulgaris*	31/12/2011	Amber
Eurasian Teal	*Anas crecca*	31/12/2011	Amber
Eurasian Tree Sparrow	*Passer montanus*	07/01/2018	Amber
European Greenfinch	*Carduelis chloris*	04/01/2018	Amber
Goldcrest	*Regulus regulus*	31/12/2011	Amber
Herring Gull	*Larus argentatus*	31/12/2011	Amber
House Martin	*Delichon urbicum*	31/12/2011	Amber
House Sparrow	*Passer domesticus*	07/01/2018	Amber
Lesser Black-backed Gull	*Larus fuscus*	31/12/2011	Amber
Mallard	*Anas platyrhynchos*	23/04/2022	Amber
Merlin	*Falco columbarius*	31/12/2011	Amber
Mew Gull	*Larus canus*	31/12/2011	Amber
Mute Swan	*Cygnus olor*	31/12/2011	Amber
Northern Wheatear	*Oenanthe oenanthe*	31/12/2011	Amber

Species	Scientific name	Date of record	BOCCI status
Sky Lark	*Alauda arvensis*	31/12/2011	Amber
Spotted Flycatcher	*Muscicapa striata*	31/12/2011	Amber
Tufted Duck	*Aythya fuligula*	31/12/2011	Amber
Willow Warbler	*Phylloscopus trochilus*	31/12/2011	Amber
Barn Owl	*Tyto alba*	22/03/2023	Red
Common Kestrel	*Falco tinnunculus*	02/02/2023	Red
Common Snipe	*Gallinago gallinago*	31/12/2011	Red
Common Swift	*Apus apus*	31/12/2011	Red
Eurasian Curlew	*Numenius arquata*	31/12/2011	Red
Eurasian Woodcock	*Scolopax rusticola*	31/12/2011	Red
European Golden Plover	*Pluvialis apricaria*	03/01/2021	Red
Grey Wagtail	*Motacilla cinerea*	31/12/2011	Red
Meadow Pipit	*Anthus pratensis*	31/12/2011	Red
Northern Lapwing	*Vanellus vanellus*	31/12/2011	Red
Red Kite	*Milvus milvus*	01/02/2023	Red
Redwing	*Turdus iliacus*	04/01/2018	Red
Stock Pigeon	*Columba oenas*	31/12/2011	Red
Yellowhammer	*Emberiza citrinella*	25/02/2023	Red

13.8.5.3.2 Field Survey Results

13.8.5.3.2.1 Kingfisher Survey

The kingfisher survey conducted on the 16th August 2023 assessed the habitat suitability of the stretch of the Tolka along the Site for kingfisher. The banks for the most part were overgrown in the upstream section, with little exposed bank to be seen and overall low bank-heights observed (approx. 1m). Some suitable perching habitat was observed in the form of fence posts along the western bank side and some overhanging trees along the western bank. No potential nest holes were recorded along either bank along the upstream stretch walked.

The downstream stretch of river supported potential perching habitat due to the higher level of overhanging tree cover along either side of the channel. The banks were approx.1m-1.5m high in places but supported little suitable nesting habitat and no nest holes were recorded despite thorough checks undertaken.

A single kingfisher was flushed by the surveyor at 15.2 on 16th August, 2023; from a fence post perch approx. 50m upstream of the proposed bridge crossing; the bird calling and then flying due north along the river and out of sight. A subsequent record of kingfisher was made at 17.24 as a bird called and flew south and over the head of the surveyor, along the river channel. This may be the same individual recorded twice (see Figure 13.20).

13.8.5.3.2.2 Breeding Birds

The breeding bird surveys commenced on the morning of the 8th June 2022 and on the 27th June 2022 respectively. Three transects were walked through the Site to record all the species present. A total of 22 No. species were recorded on the 8th of June and 25 No. species were recorded on the 27th of June. In total 26 individual species were recorded across both surveys, as shown in Table 13.7.

Each transect was divided up into four parts (all of a similar distance) and the transect was walked with all species noted at each side of the ecologist. Distance brackets were also used, however, the majority of species were recorded inside the Site boundary and within 50 meters each side of the surveyor on each transect. No Red Listed species were recorded during the first survey, however, two Red Listed species; Grey Wagtail (*Motacilla cinerea)* and Meadow Pipit (*Anthus pratensis*) were noted during the second survey.

Table 13.7. Breeding bird survey results: 8th and 27th of June 2022.

Species	Scientific name	BOCCI Status	Survey (1 / 2 / 1&2)	Breeding Activity
Blackbird	*Turdus merula*	Green	1 & 2	Recently fledged young
Blackcap	*Sylvia atricapilla*	Green	1 & 2	
Blue Tit	*Cyanistes caeruleus*	Green	1 & 2	Recently fledged young
Bullfinch	*Pyrrhula pyrrhula*	Green	2 only	Recently fledged young
Chaffinch	*Fringilla coelebs*	Green	1 & 2	
Collared Dove	*Streptopelia decaocto*	Green	1 & 2	
Dunnock	*Prunella modularis*	Green	1 & 2	
Goldcrest	*Regulus regulus*	Amber	1 & 2	
Goldfinch	*Carduelis carduelis*	Green	1 & 2	Recently fledged young
Greenfinch	*Chloris chloris*	Amber	1 & 2	
Grey Wagtail	*Motacilla cinerea*	Red	2 only	
House Martin	*Delichon urbicum*	Amber	1 & 2	
Linnet	*Carduelis cannabina*	Amber	1 & 2	Recently fledged young
Magpie	*Pica pica*	Green	1 & 2	
Meadow Pipit	*Anthus pratensis*	Red	2 only	
Pheasant	*Phasianus colchicus*	Unclassified	1 only	
Robin	*Erithacus rubecula*	Green	1 & 2	Carrying food
Reed Bunting	*Emberiza schoeniclus*	Green	1 & 2	
Rook	*Corvus frugilegus*	Green	1 & 2	
Starling	*Sturnus vulgaris*	Amber	1 & 2	Recently fledged young
Stonechat	*Saxicola torquatus*	Green	2 only	

Species	Scientific name	BOCCI Status	Survey (1 / 2 / 1&2)	Breeding Activity
Song Thrush	*Turdus philomelos*	Green	1 & 2	Recently fledged young
Swallow	*Hirundo rustica*	Amber	1 & 2	
Whitethroat	*Curruca communis*	Green	1 & 2	
Woodpigeon	*Columba palumbus*	Green	1 & 2	
Wren	*Troglodytes troglodytes*	Green	1 & 2	

13.8.5.3.2.3 Winter Bird Survey Results

Winter Bird Surveys were conducted at the Site on the 18th February, 13th March and 23rd March, 2022, and lasted 5 hours each.

The main area of the site is a large area of agricultural land with mature hedgerows separating sections of the Site and along some sections of the boundary. The Site was walked on each date and viewed for the use by wintering birds, with a special emphasis on waterbirds.

Limited waterbird usage of the lands were recorded during the three surveys. One snipe (*Gallinago gallinago*) was flushed in the wet grassland in the east of the Site during the February survey. Ten (10 No.) Herring Gull (*Larus argentatus*) were observed swimming in the Tolka flood waters to the south-east of the Site.

The only bird of note observed on both March survey days was a single Common Buzzard (*Buteo buteo*). A flock of ca. 30 Redwing (*Turdus iliacus*) was observed in the eastern part of the Site foraging on the fields by the flood plain during the early part of the February survey. This flock grew to approx. 120 birds (a mix of Redwing and Starling (*Sturnus vulgaris*)) an hour later located on the field in the east of the Site.

Red-listed Bird Species

One species on the Red List of the Birds of Conservation Concern in Ireland was recorded during the Wintering Bird Surveys; a single Yellowhammer (*Emberiza citrinella*) within the southern hedgerow.

Amber-listed Bird Species

Two species which are on the Amber List of the Birds of Conservation Concern in Ireland were recorded during the Wintering Bird Surveys; Snipe and Starling.

13.8.5.3.3 Evaluation

Considering the variety of bird species recorded both in the historical records and during the various field surveys, as well as the evidence of breeding passrines at the Site, it is considered that the Site contains resident and regularly occurring, locally important populations of breeding bird species protected under the Wildlife Act i.e., of **local importance (higher value).** The wintering bird population is considered to be insignificant in the local context, particularly taking into consideration the availability of resources in the surrounding landscapes, and is therefore deemed to be of **local importance (lower value).**

13.8.5.4 Bats

13.8.5.4.1 Desk Study Results

A total of six bat species have been recorded within the 10km (O04) grid square which encompasses the Site (Table 13.8).

Table 13.8. Records of bats for the surrounding 10km grid square (O04) associated with the Site from the NBDC.

Species	Date of last record	Database	Designation
Brown Long-eared Bat (*Plecotus auritus*)	02/05/2007	National Bat Database of Ireland	EU Habitats Directive - Annex IV Wildlife Act 1976 (as amended)
Daubenton's Bat (*Myotis daubentonii*)	07/10/2007	National Bat Database of Ireland	EU Habitats Directive - Annex IV Wildlife Act 1976 (as amended)
Leisler's Bat (*Nyctalus leisleri*)	01/05/2014	National Bat Database of Ireland	EU Habitats Directive - Annex IV Wildlife Act 1976 (as amended)
Natterer's Bat (*Myotis nattereri*)	31/12/2007	National Bat Database of Ireland	EU Habitats Directive - Annex IV Wildlife Act 1976 (as amended)
Common Pipistrelle (*Pipistrellus pipistrellus*)	01/05/2014	National Bat Database of Ireland	EU Habitats Directive - Annex IV Wildlife Act 1976 (as amended)
Soprano Pipistrelle (*Pipistrellus pygmaeus*)	07/10/2010	National Bat Database of Ireland	EU Habitats Directive - Annex IV Wildlife Act 1976 (as amended)

13.8.5.4.2 Field Survey Results

13.8.5.4.2.1 Preliminary Bat Roost Assessment (PBRA) and Habitat Suitability Assessment.

The PBRA assessment conducted on 6th September 2022 discovered no confirmed roosts within any of the trees surveyed during the assessment. Roost suitability at the Site was largely negligible or low. One large sycamore located in the south-west of the Site was assessed as having moderate roost suitability based on its size and the presence of dense ivy lattices along its trunk. This tree is being retained as park of the Proposed Development design and light spill along this treeline will be avoided/minimised by way of a bat friendly lighting plan devised by the ecologist and the lighting consultant.

Figure 13.21. Large sycamore with moderate bat roost suitability in south-west of Site.

The Site was assessed as having moderate habitat suitability in the context of the wider landscape; due to the presence of some hedgerows and drainage ditches that link the Site with the River Tolka's riparian corridor. The lands themselves are relatively poor quality agricultural grazed pastureland, however, the presence of insects and livestock/manure was noted during the surveys, which would contribute to the provision of suitable foraging habitat for bats on Site.

13.8.5.4.2.2 Bat Activity Transect Surveys

2021 Survey Results

During the 2021 dusk transect survey, bat activity was largely focused on the hedgerows and treelines located in the west and north-east of the Site, with some activity located along the southern boundary hedgerow also. Much of the activity in the west of the fields containing the Site were associated with the sycamore treeline within adjacent lands to the north, and outside the Site's redline boundary.

The most common species recorded was Common Pipistrelle (*Pipistrellus pipistrellus),* followed by equal numbers of records of Leisler *(Nyctalus leisleri)* and Soprano Pipistrelle (*Pipistrellus pygmaeus*) (See Table 13.9 and Figure 13.22). Foraging activity was observed with feeding buzzes recorded by the bat detector; indicating prey pursuit and capture. Social calls were also emitted by both pipistrelle species. Leisler's bats were recorded on 4 occasions; mostly out in the open across the Site, but with one set of calls indicative of a bat foraging in clutter along trees to the south-west of the Site (See Figure 13.23).

Table 13.9. Summary of bat species recorded at the Site during the 2021 dusk transect survey.

Common Name	Scientific Name	Records [#]	Calls [#]
Common Pipistrelle	*Pipistrellus pipistrellus*	64	1096
Leisler's Bat	*Nyctalus leisleri*	4	38
Soprano Pipistrelle	*Pipistrellus pygmaeus*	4	74

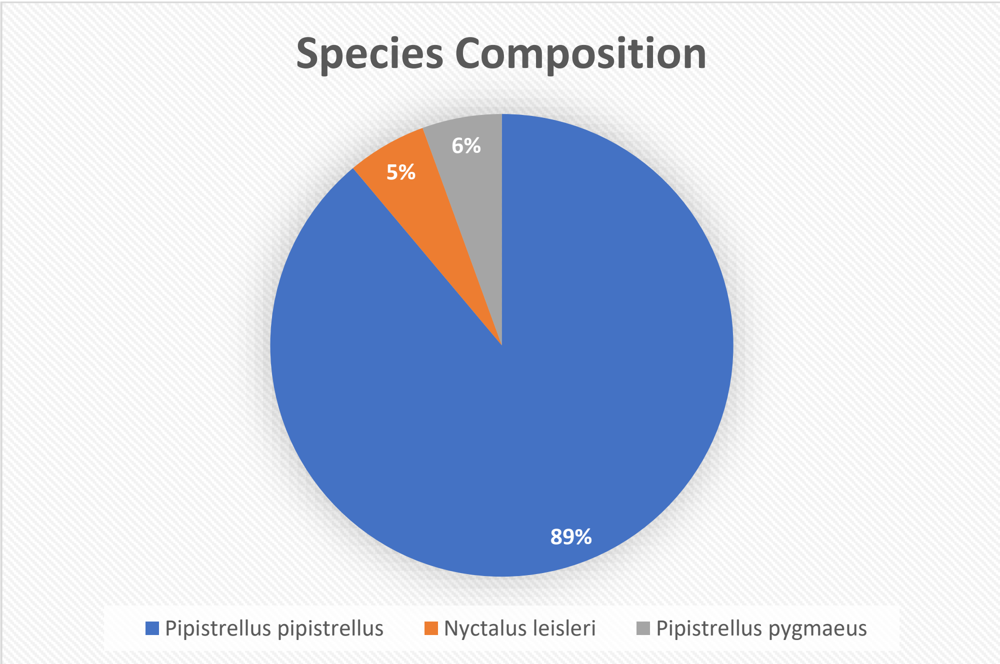


Figure 13.22. The relative compositions of bats recorded during the 2021 survey.

Figure 13.23 Dusk transect survey results for 2021 survey

2022 Survey Results

During the 2022 survey, activity was also largely associated with the linear vegetative features present at the Site. The southern boundary hedgerow and the River Tolka riparian strip were the main focuses of the activity recorded on Site. Common Pipistrelle and Soprano Pipistrelle were both recorded along the southern boundary, foraging and commuting with both feeding buzzes and social calls noted during the analysis. Activity for these species along the southern hedgerow boundary lasted approximately 18 mins i.e., for the duration of the two laps walked by the surveyor, indicating it is a foraging and commuting corridor through the Site (See Figure 13.25).

Soprano Pipistrelles were observed foraging over the river to the north-east of the Site (at least 2 No. bats observed at one time) and were also the dominant species recorded to the south-east of the Site; near where the proposed bridge and link-road is to be located. In this location bat activity was largely linked to the treelines along the Tolka and running east-west across this small field, however, call shapes indicated bats both foraging close to vegetation and out in the open. Common Pipistrelle was also recorded in this location; along this east-west treeline. The calls in this area were produced by several bats, with at least 2No. bats calling at one time.

Leisler's bats were recorded in three locations in the east of the lands containing the Site; along a treeline in the north-east, along the southern boundary hedgerow and along the Tolka's riparian treeline. Calls indicated bats foraging at height in the open.

The most common species recorded during this survey was Soprano Pipistrelle, followed by Common Pipistrelle and Leisler's bat (See Table 13.10 and Figure 13.24).

Table 13.10. Summary of bat species recorded at the Site during the 2022 dusk transect survey.

Common Name	Scientific Name	Records [#]	Calls [#]
Common Pipistrelle	*Pipistrellus pipistrellus*	60	1158
Leisler's Bat	*Nyctalus leisleri*	7	21
Soprano Pipistrelle	*Pipistrellus pygmaeus*	78	2025

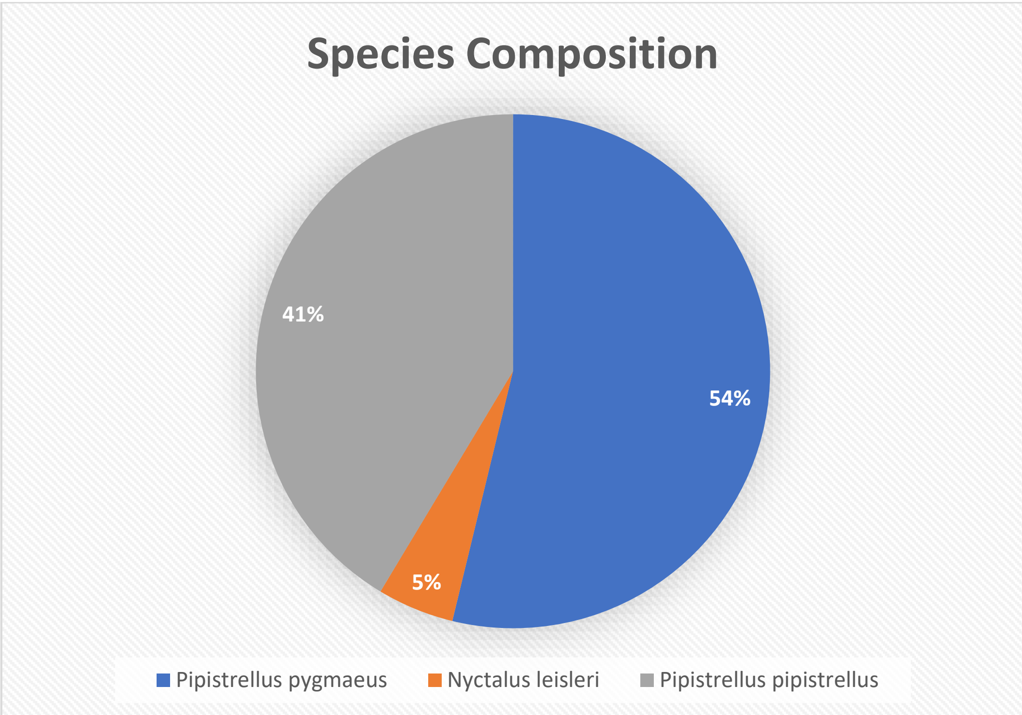


Figure 13.24. The relative compositions of bats recorded during the 2022 survey

Figure 13.25. Dusk transect survey results for 2022 survey

2023 Survey Results

A total of 106 bat passes were recorded during the dusk activity survey. Soprano pipistrelle (*n*=53) was the most frequently recorded bat species accounting for 50% of all bat passes, followed by Common pipistrelle (*n*=49) accounting for 46% of all bat passes. Leisler's bat (*n*=4) accounted for 4%. Common pipistrelle activity was focused along the northern and southern treeline/hedgerows, with bats recorded foraging repeatedly along the treeline at stopping point 8 for the duration of the 9 minutes at this location. Similarly, Soprano pipistrelle was recorded foraging back and forth along the Tolka at point 7 for the duration of the count (at least two bats observed). Points 11 and 5 were both located along the southern east-west hedgerow and recorded repeated passes by Common pipistrelle, with Soprano and Leisler's bat also recorded at this location. Point 4 in the west of the Site (along the sycamore treeline) supported foraging soprano and common pipistrelle activity, with bats observed flying back and forth along the treeline. Little to no activity was recorded out in the open field at the Site (e.g., Point 9), and little activity was recorded along the eastern floodplain. Bat activity was focused along the existing hedgerows and treelines at the Site, as was the case in the previous years surveys.

Table 13.11. Summary of bat species recorded at the Site during the 2023 dusk transect survey.

Common Name	Scientific Name	Records [#]	Calls [#]
Common Pipistrelle	*Pipistrellus pipistrellus*	49	925
Leisler's Bat	*Nyctalus leisleri*	4	32
Soprano Pipistrelle	*Pipistrellus pygmaeus*	53	889

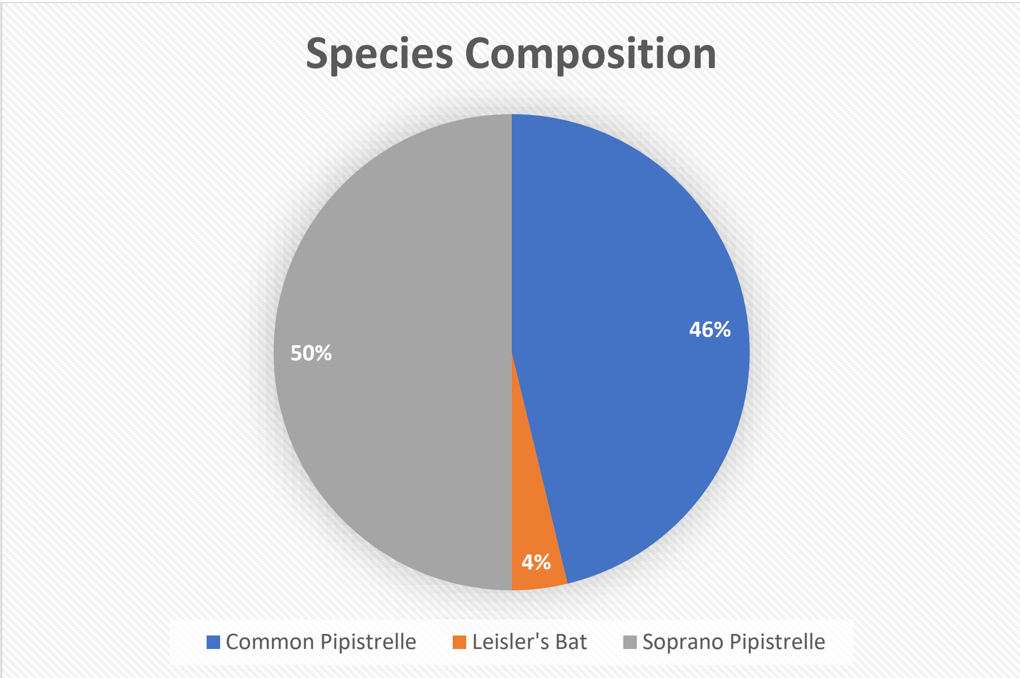


Figure 13.26. The relative compositions of bats recorded during the 2022 survey

Figure 13.27. Dusk transect survey results for 2023 survey

13.8.5.4.2.3 Static Bat Detector Results

The SM4 was located at the proposed bridge crossing of the Tolka and identified a total of 1,561 bat passes from four species of bat commuting and foraging over the detector during the five-night period. Soprano pipistrelle (n=1,164) was the most active bat species at this location accounting for 74% of all bat passes. This was followed by Common pipistrelle (n=340). Two other species were far less common, namely Leisler's bat (n=41) and Myotis sp. (n=16) which accounted for 3% and <1% respectively. Species composition for this detector are shown in Figure 13.28.

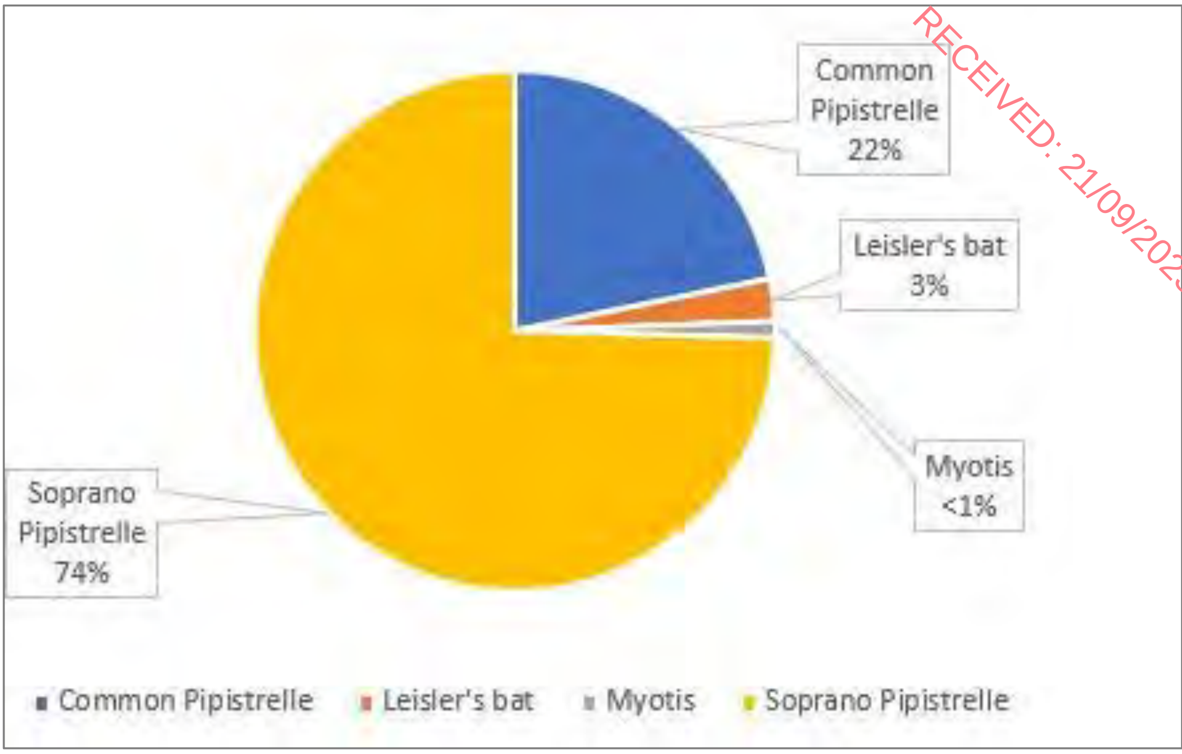


Figure 13.28. Species composition recorded on the Static from the 16th to the 21st of August 2023

13.8.5.4.3 Evaluation

The bat surveys conducted at the Site indicate that the hedgerows and treelines within and around the Site provide a commuting and foraging route for local bats. Bats were recorded flying back and forth along the various vegetative boundaries, with little activity recorded out in the open; as would be expected as the hedgerows support higher levels of insect prey compared to grazed agricultural grassland, and also provide insect prey shelter from the elements. Similarly, the smaller bat species e.g., the pipistrelles etc., will commute along these structures to evade predation from birds of prey, while also using them as echolocation guides to move between roosts to feeding grounds. Bats were also recorded along the Tolka River during both the transect surveys and by the SM4 static monitor, and likely use this linear feature as a commuting foraging route as well; as it links the various agricultural fields and their hedgerow/treeline networks together.

The bat population at the Site largely consisted of the three species commonly recorded in agricultural settings; Common pipistrelle, Soprano pipistrelle and Leisler's bat. No roosts were confirmed on Site and overall, there negligible roosting opportunities present bar one moderate suitability sycamore being retained in the west of the Site. The Site provides this local bat population with foraging and commuting opportunities, linking with the surrounding lands via the hedgerow network and the River Tolka's riparian corridor. As such, the bat population at the Site is deemed to be of **local importance (higher value).**

13.8.5.5 Other Fauna

13.8.5.5.1 Amphibians and Reptiles

Common frog has been recorded in the 2km (O04B) grid square encompassing the Site of the Proposed Development. Neither smooth newt nor common lizard (*Lacerta vivipara*) have been recorded by the NBDC to date.

No Signs of amphibians were recorded during the various Site visits or the amphibian survey in February 2022. The southern drainage ditch is steep with banks ca.2.5m high in some places. This ditch likely holds transient flows during periods of high rainfall and directs them to the River Tolka to the south-east.

The Site itself is comprised of well drained agricultural grassland in the west and south of the Site; grazed by cattle during the Site visits and containing no suitable spawning habitat for amphibians. The suitability for amphibians increases to the south-east and east of the Site where the Tolka flood plain provides wetter ground with flooding observed in February 2022. The southern ditch offers limited potential for amphibians however, one area of pooling is present in the south-central section of the Site; at a culvert of the ditch between the southern and northern fields. In adopting the precautionary principle, amphibians may be present in this area of pooling and could be subject to impacts relating to the proposed culverting of part of this ditch. A such amphibians are considered to be of **local importance (higher value)** at the Site.

The Site has limited potential to support a common lizard population of note, with the habitats present homogenous in nature and lacking the preferred mosaic structure that lizards would utilise. The dense hedgerows do provide some shelter and habitat, however the Site is unlikely to support a significant lizard population, and therefore lizards are considered to be of **less than local importance** at the Site.

13.8.5.5.2 Fish Species

There are no records of notable fish species within the relevant 10km grid square associated with the Site from the NBDC database. However, the Site is hydrologically linked to the Tolka which is known to support a variety of salmonids, such as brown trout (*Salmo trutta*), as well as lamprey species (*Lampetra spp.*) and European eel (*Anguilla Anguilla*). As such, the fish assemblage of the Tolka is considered to be of **County Importance.**

13.8.6 Evaluation of Ecological Features

Habitats have been evaluated for their conservation importance, based on the NRA evaluation scheme (NRA, 2009b). Those selected as KERs are those which are evaluated to be of at least local importance (higher value).

Fauna that has the potential to utilise the Site and immediate area of the Proposed Development, or for which records exist in the wider area, have been evaluated for their conservation importance. This evaluation follows the Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009b).

The impacts of the Proposed Development on the identified KERs are assessed in Section 13.9. Table 13.12 below summarises the evaluation rating assigned to each ecological feature and the rationale behind these evaluations is also provided.

Table 13.12. Evaluation of Designated Sites, Habitats, Flora, and Fauna associated with the Site of the Proposed Development. KERs are highlighted in green.

Designated sites/Species/Habitats	Evaluation	Key Ecological Receptor (KER)	Rationale
Designated sites			
Sandymount Strand/Tolka Estuary Ramsar Site (832).	International importance	No	These sites have been assessed by proxy in the AA Screening and NIS that accompany this application under separate cover. No significant impacts envisaged after mitigation measures are put in place
North Bull Island Ramsar Site (406).	International importance	No	
Dublin Bay UNESCO Biosphere.	International importance	No	
North Dublin Bay pNHA (000206).	National importance	No	
Habitats			
Grassland Habitats: Improved Agricultural Grassland (GA1), Dry Meadows and Grassy Verges (GS2) and Wet Grassland (GS4).	Less than local importance	No	Largely low biodiversity intensive agricultural grassland.
Artificial surfaces (BL3) and Beds and borders (BC4)	Less than local importance	No	Negligible ecological value.
Hedgerows (WL1),Treelines (WL2) and Drainage Ditches (FW4)	Local importance (Higher Value)	Yes	Hedgerows largely assessed as *favourable* during the Hedgerow Appraisal (Enviroguide, 2023c) and along with ditches and treelines, form ecological corridors across an agricultural landscape.
River Tolka	County Importance	Yes	A salmonid river that forms an ecological corridor through the Site and surrounding agricultural land. Supports both kingfisher and otter adjacent to the Site.
Fauna			
Breeding bird assemblage	Local importance (Higher Value)	Yes	Good numbers of species recorded breeding with two red-listed species also using the Site. Kingfisher recorded along the Tolka.
Wintering bird assemblage	Local importance (Lower Value)	No	No nearby SPAs or important wetlands. Some occasional usage of the Site by wintering waterbirds may occur, however minimal usage observed during the winter bird surveys.

Designated sites/Species/Habitats	Evaluation	Key Ecological Receptor (KER)	Rationale
Non-volant mammals (exc. Fox)	Local importance (Higher Value)	Yes	Some suitable habitat for smaller mammals such as Hedgehog in hedgerows. Evidence of badger and otter at the Site/ downstream of the Site respectively.
Bat assemblage	Local importance (Higher Value)	Yes	Four species of bat recorded within the Site during surveys 2021, 2022, and 2023. Good activity recorded along boundaries of the Site and established commuting/foraging corridors are evident.
Common Frog	Local importance (Higher Value)	Yes	Suitable some breeding and foraging habitat present in wetter parts of the Site. Species likely present.
Viviparous Lizard	Less than local importance	No	Minimal suitable habitat on Site. Unlikely to be present.
Fish assemblage of the Tolka	County Importance	Yes	A salmonid river that supports both kingfisher and otter adjacent to the Site.

13.9 Potential Significant Effects

As per the relevant guidelines, likely effects have been assessed for KERs only, as listed in Table 13.12. The KERs identified as part of this EcIA are as follows:

- Hedgerows (WL1), Treelines (WL2) and Drainage Ditches (FW4).
- River Tolka (FW2).
- Hedgehog, Badger and Otter.
- Breeding Bird Assemblage.
- Bat Assemblage.
- Common Frog.
- Fish Assemblage of the Tolka.

The following sections provide an assessment of the impact of the Proposed Development on local ecology. As per CIEEM (2018), where mitigation is fully integrated into the scheme and there is high confidence that it will be implemented the significance of effects of the mitigated project are assessed. Where mitigation has not been integrated into the scheme, for example where it is necessary to include specific measures within a Construction Environmental Management Plan (CEMP), the potential impacts are assessed in the absence of mitigation. The following is extracted from CIEEM (2018):

"Presenting the results of the assessment 'with' and 'without' mitigation allows the need for mitigation and/or compensation to be clearly identified. Where mitigation is fully integrated into the scheme and there is high confidence that it will be implemented, it may be appropriate simply to assess the

significance of effects of the mitigated project, with this assessment reflecting the likelihood of the incorporated measures being successful. Where there is any uncertainty, then the with/without mitigation approach to assessment described above should be used to ensure transparency".

In this instance, mitigation has been integrated into the surface water drainage of the Site (via SUDS), landscape plan and public lighting plan. As such, the impact of these plans is taken into account when assessing other relevant impacts (e.g., habitat loss).

13.9.1 Construction Phase

The Proposed Development will see a change in land use from a complex of former pasture fields bounded by hedgerows and dominated by grassland, to a large-scale residential development.

Potential Construction Phase impacts that could arise as a result of the Proposed Development include, but are not limited to, habitat loss or damage, habitat fragmentation, increases in noise and dust emissions, direct mortality or disturbance of protected species, runoff of sediment or other water borne pollutants into surface waterbodies and designated sites located downstream and light pollution.

It is considered that any negative impacts arising because of the Proposed Development can be readily mitigated through avoidance measures, the use of standard best practice construction measures, and biodiversity enhancement measures that will be incorporated into the Proposed Development plan.

13.9.1.1 Impacts on Habitats

Construction Phase damage could occur to trees and hedgerows in the absence of tree protection measures. This represents a **short-term, negative, significant** impact at the **Site scale**, in the absence of mitigation measures depending on the amount of damage to trees and hedges at the Site.

13.9.1.2 Impacts to Mammals

Hedgehog may utilise the grassland and hedgerow habitats at the Site. Signs of badger were recorded at the Site and although no active sets were recorded at the Site, badger could potentially occupy the Site prior to the commencement of works and thus be affected by the Proposed Development. The Proposed Development may result in the injury/mortality of these species during the vegetation clearance works if carried out during the hibernation period for Hedgehog in particular. This could result in **short-term, negative, significant** impacts to these mammals at the **Site scale**, in the absence of mitigation.

Construction sites can pose a source of harm for mammals should they find themselves trapped in an excavation or uncapped pipe for instance. Badger in particular are known to utilise long established mammal pathways regardless if they have been developed upon, and this can lead to mortality or entrapment in some cases. Due to the know presence of badger in the area, there is a potential for **short-term, negative, significant** impacts at the Site scale, via harm/entrapment, in the absence of construction mitigation.

Signs of otter were recorded along the Tolka to the east of the Site, although no holts or couches were recorded. Although unlikely to utilise the Site, otter could be impacted through a reduction in water quality in the Tolka should a pollution or sedimentation event occur as a result of the construction works (e.g., bridge construction). This could result in **short-term, negative, significant** impacts to otter, via a direct reduction in fitness or in feeding resources, at the **scale of the stretch of Tolka downstream of the Site**, in the absence of mitigation.

There will likely be noise disturbance to local fauna at the Site during the construction works. This will represent a **short-term, negative, slight** impact at the **Site scale.**

13.9.1.3 Impacts to Breeding Birds

Should any vegetation clearance take place within the breeding bird season (within period March 1st to August 31st inclusive), there is the potential for harm/mortality to nesting birds and their eggs/young. This would represent a **short-term, negative, profound** impact to breeding birds at the **Site scale** in the absence of mitigation.

There will be likely noise disturbance to local birds at the Site during the construction works. This will represent a **short-term, negative, slight** impact at the **Site scale.**

13.9.1.4 Impacts to Amphibians

Common Frog are noted as being of *Least Concern* in the NPWS 2011 Redlist (King et al., 2011), and Common Frog are noted as having *Favourable* status in NPWS (2019) due to their adaptability to land use changes and their widespread abundance. Should works take place within the area of pooling along the southern drainage ditch during the breeding period for amphibians such as Common Frog, there is the potential for mortality of young and adults. This would represent a **short-term, negative, significant** impact to frog at the **Site scale** in the absence of mitigation.

13.9.1.5 Impacts to the River Tolka and Fish Assemblage

13.9.1.5.1 Contaminated run-off and Sedimentation

In the absence of mitigation there is the potential for Construction Phase surface waters containing sediment, pollutants and/or cementitious materials to enter the Tolka during the proposed excavation works within the flood plain and the construction of the link-road and bridge over the river.

Such pollutant events could lead to a reduction in fitness and spawning success in fish populations downstream of the Site, especially should they occur within the spawning season. The reduction in fish stocks could have detrimental knock on effects on populations of predators such as kingfisher and otter which are known to use the stretch of the river near the Site.

These impacts are hard to quantify but in a worst case scenario, they could lead to **short-term, negative, significant** impacts in the sections of the Tolka downstream of the Site, in the absence of mitigation.

13.9.1.5.2 Dust Deposition

Dust from construction sites deposited on vegetation can cause ecological stress to plants, adversely affecting photosynthesis and other biological functions. Rainfall, although removing the deposited dust from foliage, can also rapidly leach chemicals in the dust into the soil. Plant communities near short-term works are likely to recover within a year of the dust soiling stress ceasing (Holman et al., 2014). However, large scale construction sites may give rise to dust deposition over an extended period of time and have more significant effects on vascular plant communities.

According to Institute of Air Quality Management Guidance on the Assessment of Mineral Dust Impacts for Planning (IAQM, 2016), the experience of the IAQM Working Group together with published studies and anecdotal evidence on the change in both airborne concentrations and the rate of deposition with distance, suggests that dust impacts will occur mainly within 400m of the operation, even at the dustiest of sites. Adverse impacts from dust generating activities are uncommon beyond 250m, and continuous or stark concerns about dust are most likely to be experienced within 100m of the dust source; the greatest potential for high rates of dust deposition and elevated particulate matter (PM10) concentrations occurs within this distance.

Meteorological conditions greatly affect the level of dust emissions and subsequent deposition downwind of the source; the most predominant being rainfall and wind speed. Adverse impacts can occur in any direction from a site; however, they are more likely to occur downwind of the prevailing wind direction and/or close to the site. Relatively high levels of moisture in the surrounding air, soils, and precipitation helps to suppress dust due to the cohesive properties of water between dust particles. The least favourable meteorological conditions for dust generation would typically be warm days with strong winds and low precipitation.

Much of the main body of the Site of the Proposed Development is within 400m of the River Tolka, with some parts within the 250m and 100m ranges. The sensitive receptors in this case are the Tolka and its associated plant and animal communities. Potential impacts relating to dust are considered to be **short-term**, **negative** and **significant** in nature, at the scale of **the stretch of the Tolka within 100m of the Proposed Development,** in the absence of mitigation**.**

13.9.2 Operational Phase

13.9.2.1 Impact to habitats

The Proposed Development will result in the removal of majority of the existing hedgerows and drainage ditches in the west of the Site to facilitate the development footprint. This will be mitigated somewhat by the proposed compensatory planting across the Site, but particularly in the east and south-east within the Tolka's floodplain where there is the potential to create new high-value semi-natural habitats. However, in order to minimise the residual impact these new habitats will need to be maintained in a semi-natural state. If this does not occur then the impact of the loss of hedgerow will be more significant. If new hedgerow and treeline habitats are highly maintained or intensively managed, the loss of the existing habitats is considered **long-term, negative, moderate** in nature **at the Site scale**.

13.9.2.2 Impacts to Bats

13.9.2.2.1 Loss of Habitat

The construction works will impact local bats through the loss of some sections of east-west running hedgerow along the southern section of the Site. This will be offset by the proposed landscaping at the Site including additional hedgerow and tree planting in the west of the Site and along the Tolka.

Commuting and foraging habitat will change at the Site as a result of the Proposed Development. The southern east-west hedgerow will be removed along much of its western extent to facilitate the Proposed Development footprint and that of the Southern link road. This will remove most of an existing commuting/foraging route in the west and south-west of the Site for bats. The landscaping plan has worked to compensate for this loss through the increase in planting across the east and south-east of the Site. New native hedgerow and tree planting is proposed within the F1 zoned lands that make up the Tolka's floodplain. Currently, there are no linear vegetated features connecting the hedgerows within the Site to the Tolka's riparian corridor. It is proposed to create new wildlife corridors linking the Site to the Tolka, via the planting of native aquatic tolerant tree species such as willow, alder (*Alnus glutinosa*), along with rowan (*Sorbus acuparia*), holly, hawthorn and silver birch (*Betula pendula*). These new hedgerows and treelines will guide bats away from the proposed link road and its associated public lighting, and direct bats north through new areas of planting along the Tolka. The habitats within the flood plain will be part maintained as parkland meadow, but will be allowed to form more natural wilder habitat along the new wildlife corridor planting.

There will be short-medium term loss of habitat for bats at the Site until the new planted corridors in the south-east and east establish. Once this occurs, habitat connectivity will be provided with the Tolka corridor and the surrounding lands. The loss of agricultural grassland habitat will be offset by the provision of higher diversity planted habitats via the gardens and open space areas, and night-time lighting will be a determining factor in terms of how much habitat is accessible/lost to bats at the Site. Therefore, physical habitat loss represents a **short-medium term, negative, moderate** impact to bats at the **Site scale,** when the proposed landscape plan is taken into account.

13.9.2.2.2 Night-Time Lighting

Operational Phase public lighting could reduce areas of foraging and commuting habitat for local bats and nocturnal fauna. The bridge over the Tolka has the potential to disturb bats commuting and foraging along the river, should the lighting of same cause light spill onto the river or its banks. This represents a **negative, permanent, significant** impact at the **Site scale** in the absence of mitigation.

13.9.2.3 Impacts to Breeding Birds

The Proposed Development will impact local birds through the loss of some foraging/nesting habitat in the form of areas of hedgerow. This will be somewhat offset by the proposed landscaping at the Site including the provision of wildflower meadow areas and additional tree and hedgerow planting across the Site. There will be a period between the removal of existing vegetation and when the new planting establishes, however once this occurs the impact will become reduced to neutral. The Proposed Development will therefore have a **short-medium term, negative, moderate** impact to birds at the **Site scale**, through loss of foraging/nesting habitat for some species, with impacts becoming **neutral** once the landscaping establishes.

It is noted that the potential for collisions between flying kingfisher and traffic using the proposed bridge was considered during the impact assessment. The proposed bridge design is a clear span bridge which allows space between the river water level and the underside of the bridge. Kingfisher have no problem flying under bridges as they often fly low along the water surface when commuting. The potential for collisions is therefore considered to be negligible.

13.9.2.4 Operational Phase Surface Water Impacts

It is proposed to discharge surface water generated at the Site into the existing drainage ditch network via a suite of SUDS measures during the Operational Phase of the Proposed Development. Operational surface waters could carry hydrocarbons, detergents and other harmful contaminants associated with an active residential development, into the Tolka via this drainage system and adversely affect ecological receptors such as the Tolka's fish assemblage and associated predators. These impacts are hard to define, but given the integrated SUDS measures that have been incorporated into the Proposed Development design, as per best practice, it is not envisaged that Operational Phase surface water has the potential to cause significant effects to downstream sensitivities. As such, potential operational surface water impacts are considered to be **neutral, permanent, imperceptible** in nature. These embedded mitigation measures are described in Section 13.3.1.3.1.

13.9.3 Cumulative Effects

A search of planning applications located within a 500m radius of the Site of the Proposed Development was conducted using online planning resources such as the National Planning Application Database (NPAD) (MyPlan.ie) and Meath County Council Planning Applications online map. Any planning applications listed as granted or decision pending from within the last five years were assessed for their potential to act in-combination with the Proposed Development and cause likely significant effects on the relevant European sites. Long-term developments granted outside of this time period were also considered where applicable. The larger developments within the vicinity of the Site are listed in Table 13.13 below:

Table 13.13. Granted and Pending Development applications within 500 m of the Proposed Development. Location and distance given is relative to the Proposed Development.

<table>
<tr><th>Planning Reference</th><th>Planning Authority</th><th>Status</th><th>Location</th></tr>
<tr><td>P822022</td><td>Meath CoCo</td><td>Part 8</td><td>Approx. 300m SW of Proposed Development (along R157)</td></tr>
<tr><td colspan="4">Dunboyne Link Road – Dunboyne Business Park and the R157.
Development Description: The proposed development will consist of:
▪ The provision of a new Link Road (approximately 340m long), from the existing Dunboyne Business Park Road to a new priority junction on the R157.
▪ The provision of a new Access Road (approximately 50m long), to provide access to the Recycling and Civic Amenity Centre, and other adjacent landholdings.
▪ Provision of footpaths and raised cycle tracks on both sides of the proposed Link Road.
▪ Provision of a footpath on the eastern side of the proposed Recycling Centre Access Road.
▪ Priority junction implementation between the proposed Link Road and the R157.
▪ Priority junction implementation between the proposed Link Road and proposed Recycling Centre Access Road.
▪ Provision of off-line bus stops on both sides of the proposed Link Road.
▪ Public lighting, accommodation and fencing/boundary works, landscaping works, drainage/attenuation works, and ancillary infrastructure and utility works.</td></tr>
<tr><td>23/424</td><td>Meath CoCo</td><td>Decision due: 13/06/2023</td><td>Adjacent to the NW</td></tr>
</table>

Planning Reference	Planning Authority	Status	Location
Bennetstown, Pace, Dunboyne, Co. Meath The development will consist of: i. Construction of 3 no. office buildings with a cumulative gross floor area (GFA) of 13,729 sq.m ranging in height from 3 to 4- storeys and shall comprise the following: a. Building 1 (3,597 sq.m GFA) 3-storeys in height (12.35 metres to top of parapet), with a set back louvred screen 2m above parapet level. b. Building 2 (5,336 sq.m GFA) 4-storeys in height (16.125 metres to top of parapet), with a set back louvred screen 2m above parapet level. c. Building 3 (4,796 sq.m GFA) 4-storeys in height (16.125 metres to top of parapet), with a set back louvred screen 2m above parapet level. ii. Roof mounted solar PV panels (c. 180 sq.m combined area); iii. Provision of a 4-arm signalised junction replacing the existing Pace roundabout to include a new northern arm with segregated cycleway and footpath; iv. Access to the development is proposed from the new northern arm, with 6m wide internal access roads to serve the development; v. Upgrade works to the R157 and M3 Parkway access road to facilitate junction improvements; vi. A total of 275 surface car parking spaces including 14 disabled access bays and 55 electric car charging points; vii. 280 bicycle parking spaces in 3 secure cycle storage areas adjacent to the buildings; viii. Site signage is to be erected, all spot-lit and back-lit illuminated, including 2 no. type 1 entrance signs (6.15m x 2.4m) and 3 no. type 2 building signs (1.35m x 2.4m); ix. 3 standalone electricity substations; x. Foul sewer connection to existing public system including pumping station on site with rising mains along Kennedy Road and Navan Road; xi. Watermain connection to the north east of site at Pace for connection to Irish Water Infrastructure; xii. Permission is also sought for associated landscaping, boundary treatments, public lighting, plant, waste storage and all ancillary site and development works. A Natura Impact Statement (NIS) has been prepared in respect of the proposed development.			
2360065	**Meath CoCo**	**Further Info Requested: 221/07/2023**	**Adjacent to the NW**
A 10-year permission for development in the Townlands of Bennetstown, Pace, and Dunboyne. The subject site (2.79ha) encompasses an area of 0.87ha situated to the south-west of the M3 Parkway and south-east of the Dunboyne Bypass (R157) located in the Townland of Bennetstown, and the balance (1.92ha) located in the Townlands of Pace, Bennetstown and Dunboyne including the Dunboyne Bypass (R157) and M3 Parkway access, Kennedy Road and Navan Road for infrastructure works. The development will consist of: i. Construction of a single-storey commercial building with a cumulative gross floor space (GFS) of 2,160 sq.m comprising: a. A supermarket with delivery, store and service area (1,880 sq.m), including net retail floorspace of 1,510 sq.m, and b. 2 commercial units (combined 280 sq.m) to facilitate Class 1 (Shop), Class 2 (Financial, Professional and Other Services) or Café (food and beverage) uses. ii. Provision of a 4-arm signalised junction replacing the existing Pace roundabout to include a new northern arm with segregated cycleway and footpath; iii. Upgrade works to the existing R157 and M3 Parkway access road to facilitate junction improvements; iv. Access to the development is proposed via a new 3-arm priority-controlled junction from the upgraded southern arm of the proposed 4-arm signalised junction, with 6m wide internal access roads to serve the development; v. A total of 118 surface level car parking spaces including 6 disabled access bays and 4 electric car charging points; vi. 20 short-stay bicycle parking spaces; vii. 1 Electricity substation / switch room; viii. Foul sewer connection to existing public system including pumping station on site with rising mains along Kennedy Road and Navan Road; ix. Permission is also sought for hard and soft landscaping, lighting, attenuation and drainage and all ancillary site development works.			

The granted and pending developments listed above were all accompanied by the appropriate environmental reports. These reports, where necessary, included relevant mitigation to avoid potential negative impacts to the surrounding environments as well as to any European and other designated sites. Based on the tenuous nature of the impact pathway linking the Proposed Development to designated sites in Dublin Bay (i.e., approx. 20km of the River Tolka), it is deemed that no potential for significant in-combination effects on any such sites is likely to occur from the Proposed Development together with any of the above granted and pending developments.

The Proposed Development will also act in combination with other developments in the Dunboyne area; through the general loss of semi-natural habitats to development. The Site and other agricultural lands in the surrounding area are zoned for residential development and so a future land-use change is expected. The loss of the agricultural grassland at the Site to development is not considered a significant loss of natural habitats. The Proposed Development design has included areas of new meadow, hedgerow, tree and shrub planting to offset the loss of some existing hedgerow in the west of the Site. Therefore, habitat connectivity with the surrounding lands (particularly the Tolka corridor to the east) will be maintained for local birds, bats, small mammals and pollinators/insects into the future. Overall, it is not envisaged that the Proposed Development will act cumulatively with any other development to significantly affect local ecological receptors.

13.10 Mitigation

The following sections outline the avoidance and mitigation measures identified to eliminate the potential for significant adverse impacts on KERs and the ecology of the Site and its surrounds. Once the recommended measures outlined in the following sections are implemented in full, no significant adverse impacts on the relevant KERs are anticipated as a result of the Proposed Development. These mitigation measures will be included in a CEMP that will be prepared prior to commencing works by the appointed construction contractor.

13.10.1 Summary of Potential Effects

Potential effects arising from the **Construction Phase** include:

- Damage to retained vegetation during the works.
- Direct harm and mortality to mammals and birds during vegetation clearance and/or Construction works.
- Direct harm to common frog during drainage ditch works.
- Noise disturbance to local wildlife.
- Water quality impacts on the Tolka River and aquatic species; arising from contaminated surface water run-off during the Construction Phase.
- Dust related impacts to River Tolka.

Potential effects arising from the **Operational Phase** include:

- Night-time light disturbance to local wildlife, in particular bats.
- Habitat loss for breeding birds, bats and small mammals.
- General loss of habitat quality at the Site e.g., Hedgerows.

13.10.2 Construction Phase Mitigation

13.10.2.1 Mitigation 1: Pre-construction Surveys : Badger and Otter

A minimum of 2-3 months prior to the commencement of works on Site (including enabling works), a suitably qualified Ecologist will be instructed to carry out surveys of the Site and river Tolka upstream and downstream of the proposed bridge crossing, for the below listed species. The results of these pre-commencement surveys will be provided to Meath CoCo prior to commencement of works on Site.

- Badger.
- Otter.

These pre-commencement surveys will ensure that no change has occurred in the status of these species at or near the Site since planning was submitted. The above surveys should confirm whether any nesting/resting places etc., for the above three species have occurred since previous surveys and will advise further mitigation measures etc as required.

13.10.2.2 Mitigation 2: Construction Environmental Management Plan (CEMP)

A CEMP based on the mitigation commitments presented in the various EIAR Chapters and this NIS, will be prepared for the Construction Phase.

A planning stage CEMP has been prepared for submission with the planning application (PMG, 2023b), which entails an Environmental Management Section. This outline document provides a framework for the contractor to develop further as the project moves into the Construction Phase.

The Construction Phase CEMP will collate and set out the environmental control measures required to minimise, and control adverse environmental impacts associated with the Proposed Development. It is intended that the CEMP will be a live document, which will capture all Construction Phase environmental mitigation measures included within the EIAR, NIS and any other measures which become apparent through the EIA consultation process and/or are prescribed through planning conditions etc. The CEMP will include enabling and decommissioning works.

- All construction and operations are to be carefully planned and implemented with a series of environmental management and control procedures. The CEMP will detail the general pollution prevention principles and measures which are to be implemented, water and sediment management measures to prevent pollution during the Construction Phase and measures to ensure the potential for pollution fuel, oil, chemicals and other construction materials is minimised.

- **The Contractor shall engage a suitably experienced ecologist, the Project Ecologist/Ecological Clerk of Works (ECoW),** who will be a full member of a relevant professional institute such as CIEEM, have relevant experience in the management of ecological constraints during construction. The Project Ecologist shall be appointed sufficiently in advance of construction to arrange for any mitigation requirements to be incorporated into the CEMP and any site-specific method statements.

- The construction management of the Site will take account of the recommendations of the Construction Industry Research and Information Association (CIRIA) guides '*Control of Water Pollution from Construction Sites'* and *'Groundwater control - design and practice'* to minimise as far as possible the risk of pollution.

- The Contractor shall take all necessary precautions **to prevent pollution or siltation of surface or groundwaters** from construction activities; with a particular focus on the <u>protection of existing drainage ditches and the River Tolka.</u> The following management, control and mitigation measures will be implemented:

- Any groundwater temporarily dewatered during the construction of the attenuation basins and any deep building foundations will be treated via the installation of a temporary *in-situ* water treatment system;
- This system should be designed and sized to ensure that all pumped groundwater water is treated prior to discharge to a selected onsite location (via a temporary soakaway).
- The Contractor will be required to provide a site-specific dewatering plan, clearly setting out proposed excavation methodology, estimated dewatering rates, details of the proposed treatment system, and discharge location.
- Surface water attenuation measures are to be designed which will not be overwhelmed by one-off adverse precipitation events.
- Where practical, cut-off V drains will be utilised to divert water entering Site and reduce the amount of water to be managed on-Site. Attention will be given to the maintenance and protection of all drains and temporary channels to minimise scour and the mobilisation of suspended solids (e.g. lining with hessian or clean stone, check dams, silt fencing etc.).
- Mud will be controlled at entry and exits to the site using wheel washes and/or road sweepers, and tools and plant will be washed out and cleaned in designated areas. Wheel washings will be contained and treated prior to discharge.
- Runoff will be directed to and intercepted by temporary settlement lagoons. The size of the settlement lagoon will be determined from predicted flow rates and retention times based on sediment particle size and density.
- Neither groundwater nor surface water runoff from the working areas will be permitted to discharge directly to the environment (e.g., existing ditches or River Tolka). Runoff generated within the site during construction will be filtered and treated to remove hydrocarbons and sediment. Total Suspended Solids (TSS), pH/EC and colour will be monitored daily and outlets from sedimentation ponds will incorporate a turbidity monitor with alarm at a high level.
- Subject to consent, water that is unpolluted, aside from its silt content, may be pumped out over adjacent vegetated ground, where appropriate, with consideration given to groundwater level and saturation, wildlife importance and proximity to drainage channels.
- In the event of surface water failing to meet the required standards water will be recirculated to the inlet of the sediment pond to provide further time for settlement. A penstock will be provided on the outlet from the sediment pond to control discharge from the site.
- The performance of the surface water drainage network will be maintained and monitored throughout the construction of the Proposed Development, noting that the proposed storm system will include permanent hydrocarbon separators.

- Where the Contractor utilises pumping to drain works areas, a back-up pump and generator must be provided on Site for use in the event of the primary pump failing.
- Procedures are to be put in place to ensure the identification, remediation and correct reporting of any silt or other pollution incidents that may occur.

- **During localised construction works along the existing drainage ditch in the west and south of the Site** (to facilitate the culverting of parts of the ditch and construction of headwalls/outfalls), a construction methodology will be drawn up. This will detail the approach to the construction and installation of culverts along the southern drainage ditch (both the western and eastern sections).
- Any such works e.g., re-profiling of ditch and channel, are to take part in dry weather conditions, when the ditch bed is dry, to minimise sedimentation of watercourses downstream.
- Any minor volumes of stripped soils from these works will be stockpiled a minimum distance of 10m from the channel and will be appropriately covered. A temporary stormwater management system will be implemented by the Contractor.
- Areas will be designated where stockpiles will be established in order to facilitate the efficient transfers of material within the Site. Stockpiles will be stabilised as soon as possible (e.g. sealed, closed over, seeded or covered using geotextile mats), and bunded by earth or silt fences at the toe to intercept silt-laden runoff during rainfall events.
- Appropriate working practices to avoid the repetitive handling of excavated substrates, minimise vehicle movements, limit the size, number and frequency of stockpiles, reduce the compaction and erosion of soils etc. and control the generation of dust. The implementation of a construction traffic management plan and controls on the locations of plant and materials will minimise the compaction and erosion of soil. Excavation is to be restricted during high winds and heavy rainfall to minimise dust generation and contaminated surface runoff.
- Excavated materials are to be inspected for signs of possible contamination, such as staining or strong odours. Should any be noticed, substrates are to be segregated and samples analysed for contaminants to determine an appropriate means of disposal to licensed/permitted facilities appropriate for the waste classification.
- In order **to prevent any potential surface water/groundwater impacts via. release of hydrocarbon/chemical contaminants** the following standard measures will be implemented:
    - The Contractor will ensure all Site personnel are trained in the handling of materials, the sensitive nature of the receiving environment, the drainage system and the consequences of accidental spillages.
    - Fuels, lubricants and hydraulic fluids for equipment used on the construction Site, as well as any solvents, oils, and paints, will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to best codes of practice;

- Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the Proposed Development for disposal or recycling;
- Any spillage of fuels, lubricants or hydraulic oils will be immediately contained and the contaminated soil removed from the Proposed Development and properly disposed of;
- All Site vehicles used will be refuelled in bunded and adequately sealed and covered areas in the construction compound area.
- Strict supervision of contractors will be adhered to in order to ensure that all plant and equipment utilised on Site is in good working condition. Any equipment not meeting the required standard will not be permitted for use within the Site. This will minimise the risk of groundwater becoming contaminated through Site activity.
- All oil stored on Site for construction vehicles will be kept in a locked and bunded area;
- Generators, pumps and similar plant will be placed on drip-trays to prevent contamination;
- All temporary construction fuel tanks will also be located in a suitably bunded area and all tanks will be double skinned. Relevant Material Safety Data Sheets along with oil absorbent materials will be kept on Site in close proximity to any fuel storage tanks or bowsers during proposed Site development works; and,
- All fuel/oil deliveries to on Site oil storage tanks will be supervised, and records will be kept of delivery dates and volumes.
- Fixed plant shall be self-bunded; mobile plant shall be in good working order, kept clean, fitted with drip trays where appropriate and subject to regular inspection. Drip trays will be covered, emptied regularly as required and disposed of off Site having regard for local waste management legislation.
- Spill kits and oil absorbent material shall be carried with mobile plant and located at vulnerable locations around the Site to reduce the risk of spillages entering the sub-surface or groundwater environment; booms shall be held on-site for works near drains or dewatering points.
- Procedures are to be put in place to ensure the identification, remediation and correct reporting of any fuel, oil, chemical or other pollution incidents that may occur.

- In order **to prevent any potential surface water/groundwater impacts via. release of cementitious materials** the following measures will be implemented:
    - No mixing of concrete will be carried in close proximity to existing watercourses or drainage ditches as will be detailed in the CEMP. The measures detailed below will be employed where poured concrete is being used in the construction process;
    - The production, transport and placement of all cementitious materials will be strictly planned and supervised;

- Shutters will be designed to prevent failure. Grout loss will be prevented from shuttered pours by ensuring that all joints between panels achieve a close fit or that they are sealed;
- Any spillages will be cleaned up and disposed of correctly;
- Where concrete is to be placed by means of a skip, the opening gate of the delivery chute will be securely fastened to prevent accidental opening;
- Where possible, concrete skips, pumps and machine buckets will be prevented from slewing over water when placing concrete;
- Surplus concrete will be returned to batch plant after completion of a pour; and
- The Contractor will dispose of all alkaline wastewaters and contaminated stormwater offsite having regard for local waste management legislation.

- The Contractor will implement procurement procedures to ensure that aggregate, fill material and topsoil are acquired from reputable sources with suitable environmental management systems as well as regulatory and legal compliance.
- The Contractor will vet the source of aggregate, fill material and topsoil imported to the Site in order to ensure that it is of a reputable origin and that it is "clean" (i.e. it will not contaminate the environment).
- All material to be disposed of off Site to a facility licensed having regard for local waste management legislation. Where material is to be stockpiled on site prior to disposal, the Contractor will control all run-off to prevent contamination of surrounding watercourses (via silt-fencing etc.).
- The CEMP will include an Emergency Response Plan (ERP) based on the Contractor's Risk Assessment, to be reviewed and approved by the Project Ecologist. The ERP will include (but not limited to):
  - Training of relevant staff, including cover staff, in the implementation of the ERP and the use of spill kits;
  - Procedures to be undertaken in the event of the release of any sediment into a watercourse, or any spillage of chemicals, fuel, oil or other hazardous materials or wastes;
  - Procedures to be undertaken in the event of any non-compliance incidents with any permit or licence, or other such risks that could lead to a pollution incident, including flood risks;
  - The number, specification and location of all spill kits which shall be carried/kept on the site; and
  - Information on clean-up and reporting procedures; etc.

While it is expected that the Site drainage system will be installed and commissioned early in the Site construction programme, and will therefore be operational for much of the Construction Phase, there will be a period of the construction phase during which the Site drainage system will not be operational. The CEMP is required to cover this period and to deal with other issues during the Construction Phase.

13.10.2.3 Mitigation 3: Construction Programme

The CEMP will include a section setting out the construction programme and will include all the environmental control measures required to avoid impacts to salmonids and other species, as set out below.

All discrete elements involving construction over or within the River Tolka (such as bridge construction, banks works etc.) are to be programmed to take place <u>outside the spawning season for salmonids</u> (i.e. they will **take place between July and September**) to ensure that impacts to protected fish species are avoided.

13.10.2.4 Mitigation 4: Bridge Construction

The installation of a bridge over the River Tolka will bring works close to the river channel. The proposed bridge has a clear span of 12m and traverses a section of the river (See Figure 13.2 and Figure 13.3). Consequently, bridge abutment construction will be several metres away from the channel which will reduce the risk of silt or construction debris entering the watercourse in the event of spillages during the excavation or construction process.

During the construction of the bridge, the Contractor will ensure that the river is protected from any inputs of contaminants/pollutants for the duration of the works. To minimise risks, best practise Construction measures for works within, or in the vicinity of watercourses will also be followed as per '*Guidelines for the crossing of watercourses during the construction of national road schemes*' (TII, 2008) and '*Control of water pollution from linear construction projects - CIRIA C648'* (CIRIA, 2006). The below measures will be included in the Contractor's CEMP to prevent the release of hydrocarbons, polluting chemicals, sediment/silt and contaminated waters into the receiving surface water network:

- A **Construction Method Statement** for the bridge construction will be prepared by the Contractor and signed off by the Project Ecologist/ECoW. This Method Statement will detail the mitigation/protection measures that will be put in place to protect the river during these works.
- All works adjacent to the River Tolka will be carried out in accordance with Inland Fisheries Ireland (IFI), "*Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters*".
- Prior to commencement on Site, **contact will be made with IFI** to ensure the works comply with the provisions of the Fisheries Act and Habitats Regulations, and that said works will be in accordance with any detailed operational and construction requirements issued by IFI.
- Works will be carried out from the bank side, **and in-stream works will be restricted to the period 1st July through 30th September,** to comply with the seasonal restrictions in salmonid rivers.
- A **suitably qualified ECoW** will be present on-site during the installation of the bridge and associated bank works.

- Wet concrete works in proximity to the watercourse will be avoided as much as practicable and the use of precast elements to form retaining structures and bridge foundations (e.g., segmental retaining walls, driven piles) will form part of the construction specification where feasible in lieu of in-situ concrete alternatives.

- It will be ensured that **all river protection measures will be maintained in good and effective condition** for the duration of the proposed works and checked regularly to ensure that the silt fencing and other mitigation measures are operating effectively.

- To prevent elevated levels of erosion and sedimentation at the Site during the Construction Phase, surface water at the Site will be managed and controlled for the duration of the construction works, until the permanent surface water drainage system (including attenuation and storage) for the Proposed Development is complete.

- Entry to the river channel by vehicles will be avoided, while vehicle usage along the banks will be restricted as much as practicable. Any machines working in the watercourse must be protected against leakage or spillage of fuels, oils, greases and hydraulic fuels.

- Works involving the breaking of river banks e.g., any reprofiling of the river bank, will be carried out with suitable and effective mitigation in place to minimise/ prevent sediment release to the river i.e., cofferdams, Silt-traps and other suitable in-stream measures for the collection/filtration of sediment.

- Suitable temporary erosion control measures will be employed where required, to prevent sedimentation/erosion arising from any newly profiled banks until new vegetation establishes e.g., **jute/coir mesh blankets** (plastic will be avoided where possible).

- Features such as silt fencing and berms, will be installed prior to the commencement of construction to ensure the protection of the river during construction works. A silt fence set back **at least 10m** from the watercourse will be required, to be constructed of a suitable geotextile membrane to ensure water can pass through, but that silt will be retained.

- An interceptor trench will be required in front of the silt fencing where space allows. The silt fence must be capable of preventing 425µ (micron) and above sediment from passing through. It should also be resistant to damage during deformation resulting from loading by entrapped sediment.

- The silt fences will be monitored to ensure that they remain functional throughout construction of the Proposed Development. Where necessary, maintenance will be carried out on the fences to ensure that they continue to be effective. This will be particularly important after heavy rainfall events. The checks will be undertaken by a suitably qualified person. The frequency of monitoring will depend on the stage of works, and local environmental conditions. Daily checks may be appropriate during the initial site clearance, during works in the vicinity of the watercourse, and during and after storm events. Weekly or bi-weekly checks may be appropriate at other times.

- When cofferdams are being kept dry by pumping, the discharge must be routed to an approved settlement facility before return to the river.

- Every care must be taken to insure against spillage of concrete or leakage of cement grout within cofferdams if being used.
- In a worst case scenario where a spillage of pollutants or cement grout etc into the river occurs during the construction of the bridge, the source of the pollution will be addressed immediately and works will cease until the situation has been rectified.
- Should such a spillage occur, the project ECoW, Meath CoCo and IFI will be contacted and informed immediately.

13.10.2.5 Mitigation 5: Timing of Vegetation Clearance

To ensure compliance with the Wildlife Act 2000 as amended, the removal of areas of vegetation will not take place within the nesting bird season (March 1st to August 31st inclusive) to ensure that no significant impacts (i.e., nest/egg destruction, harm to juvenile birds) occur as a result of the Proposed Development. Where any removal of vegetation within this period is deemed unavoidable, a qualified ecologist will be instructed to survey the vegetation prior to any removal taking place. Should nesting birds be found, then the area of habitat in question will be noted and suitably protected until the ecologist confirms the young have fledged.

Table 13.14 provides guidance for when vegetation clearance is permissible. Information sources include The Herpetological Society of Ireland, British Hedgehog Preservation Society's *Hedgehogs and Development* and *The Wildlife (Amendment) Act, 2000*.

The preferred period for vegetation clearance is **within the months of September and October**. Vegetation will be removed in sections working in a consistent direction to prevent entrapment of protected fauna potentially present (e.g., Hedgehog). Where this seasonal restriction cannot be observed, a check for active roosts and nests, as well as signs of amphibians and Lizards, will be carried out immediately prior to any Site clearance by an appropriately qualified ecologist and repeated as required to ensure compliance with legislative requirements.

Table 13.14. Seasonal restrictions on habitat/vegetation removal. Red boxes indicate periods when clearance/works are not permissible.

<table>
<tr><th>Ecological Feature</th><th>January</th><th>February</th><th>March</th><th>April</th><th>May</th><th>June</th><th>July</th><th>August</th><th>September</th><th>October</th><th>November</th><th>December</th></tr>
<tr><td>Breeding Birds</td><td colspan="2">Vegetation clearance permissible (Sept - Feb)</td><td colspan="6"><u>Nesting bird season</u>.
No clearance of vegetation unless confirmed to be devoid of nesting birds by an ecologist. (Mar - Aug)</td><td colspan="4">Vegetation clearance permissible (Sept - Feb)</td></tr>
<tr><td>Bats</td><td colspan="8">Tree felling to be avoided unless confirmed to be devoid of bats by an ecologist. (Jan - Aug)</td><td colspan="2">Preferred period for tree-felling (Sep - Oct)</td><td colspan="2">Tree felling to be avoided unless confirmed to be devoid of bats by an ecologist (Nov - Dec)</td></tr>
<tr><td>Hibernating mammals (e.g., Hedgehog)</td><td colspan="3"><u>Mammal hibernation season.</u>
No clearance of vegetation unless confirmed to be devoid of hibernating mammals by an ecologist.
(Jan - Mar)</td><td colspan="7">Vegetation clearance permissible (Apr - Oct)</td><td colspan="2"><u>Mammal hibernation season</u>.
No clearance of vegetation unless confirmed to be devoid of hibernating mammals by an ecologist. (Nov - Dec)</td></tr>
<tr><td>Amphibians</td><td colspan="2">Habitat clearance permissible (Jan - Feb)</td><td colspan="4"><u>Amphibian breeding season</u> (estimated). No habitat destruction (Ponds, drainage ditches) unless confirmed to be devoid of tadpoles and other signs of amphibians. (Mar - June)</td><td colspan="6">Habitat clearance permissible if devoid of tadpoles and signs of amphibians (July - Dec)</td></tr>
</table>

13.10.2.6 Mitigation 6: Protection of Mammals

As best-practise all construction-related rubbish on site e.g., plastic sheeting, netting etc. will be kept in a designated area and kept off ground level so as to prevent small mammals such as Hedgehogs from entrapment and death.

Trenches/pits must be either covered at the end of each working day or include a means of escape for any animal falling in e.g., a plank or objects placed in the corner of an excavation. (Species such as badgers will continue to use established paths across a site even when construction work has started).

Any temporarily exposed open pipe system will be capped in such a way as to prevent animals gaining access as may happen when contractors are off Site.

13.10.2.7 Mitigation 7: Tree Protection

Protective tree fencing in compliance with BS 5837:2012 'Trees in relation to design, demolition and construction – Recommendations' will be erected prior to any Construction works being undertaken to prevent damage to the canopy and root protection areas of existing trees at the Site. The fencing should be signed off by a qualified arborist prior to Construction to ensure it has been properly erected. No ground clearance, earthworks, stock-piling or machinery movement will be undertaken within these areas.

The project Arborist will be instructed prior to commencement on Site; to ensure that appropriate tree protection measures are in place. These measures will entail robust fencing around the root protection zones of all trees and hedgerows being retained on Site. An adequate level of signage will also be provided to highlight 'no work zones' and ensure that Site creep and damage to retained habitats does not occur. The areas of the southern east-west hedgerow that are to be retained at the Site must be sufficiently protected for the duration of the Construction Phase to ensure maximise their value in the final landscape plan. The project Arborist, the project Ecologist and the Site Manager will work together to ensure these sections of hedgerow protected for the duration of the works.

13.10.2.8 Mitigation 8: Noise Control

Short-term increases in disturbance levels as a direct result of human activity and through increased generation of noise during the Construction Phase can have a range of impacts depending upon the sensitivity of the ecological receptor, the nature and duration of the disturbance and its timing.

Noise generated during the Construction Phase of the Proposed Development could cause temporary disturbance to a number of faunal species in the vicinity of the Site of the Proposed Development. To mitigate this disturbance, the following measures will be implemented:

- Selection of plant with low inherent potential for generating noise.
- Siting of plant as far away from sensitive receptors as permitted by site constraints.
- Avoidance of unnecessary revving of engines and switch off plant items when not required.
- Keep plant machinery and vehicles adequately maintained and serviced.
- Proper balancing of plant items with rotating parts.
- Keep internal routes well maintained and avoid steep gradients.
- Minimise drop heights for materials or ensure a resilient material underlies.
- Where noise originates from resonating body panels and cover plates, additional stiffening ribs or materials should be safely applied where appropriate.

- Limiting the hours during which site activities likely to create high levels of noise are permitted.
- Appointing a site representative responsible for matters relating to noise.
- Monitoring typical levels of noise during critical periods and at sensitive locations.

These measures will ensure that any noise disturbance to nesting birds or any other fauna species in the vicinity of the Site of the Proposed Development will be reduced to a minimum.

13.10.2.9 Mitigation 9: Dust Control

The objective of dust control at the Site is to ensure that no significant nuisance occurs at nearby sensitive receptors, including the River Tolka. In order to develop a workable and transparent dust control strategy, a Dust Management Plan (DMP) will be implemented and included within the Contractor's CEMP. The following measures will be included:

General Monitoring

- Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This will include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100 m of Site boundary, with cleaning to be provided if necessary.
- Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked. Increase the frequency of site inspections by the person accountable for air quality and dust issues on Site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
- Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority. Baseline monitoring will commence at least three months before work commences on site or before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.

Communications

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
- Display the name and contact details of person accountable for air quality and dust issues on the site boundary.
- Display the head or regional office contact information.
- Develop and implement a DMP, which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk and should include as a minimum the measures in this document. The desirable measures should be included as appropriate for the site.

Site Management

- Regular inspections of the Site and boundary, particularly vegetation along the banks of the Tolka, will be carried out to monitor dust, records and notes on these inspections should be logged.
- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
- Make the complaints log available to the local authority when asked.
- Record any exceptional incidents that cause dust and/or air emissions, either on- or off Site, and the action taken to resolve the situation in the logbook.

Preparing and Maintaining the Site

- Plan Site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on Site.
- Fully enclose specific operations where there is a high potential for dust production and the Site is active for an extensive period.
- Avoid Site runoff of water or mud.
- Keep Site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from Site as soon as possible, unless being re-used on Site. If they are being re-used on Site cover as described below.
- Cover stockpiles to prevent wind whipping.

Operating Vehicles / Machinery and Sustainable Travel

- Ensure all vehicles switch off engines when stationary - no idling vehicles.
- Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable.
- Impose and signpost a maximum-speed-limit of 20 kph haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing)

Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g., suitable local exhaust ventilation systems.

- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

Measures Specific to Earthworks

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- Use Hessian or mulches where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
- Only remove the cover in small areas during work and not all at once.
- During dry and windy periods, and when there is a likelihood of dust nuisance, a bowser will operate to ensure moisture content is high enough to increase the stability of the soil and thus suppress dust.

Measures Specific to Construction

- Avoid scabbling (roughening of concrete surfaces) if possible.
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
- For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.

Measures Specific to Trackout

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

- A speed restriction of 15 km/hr will be applied as an effective control measure for dust for on Site vehicles.
- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the Site. This may require the sweeper being continuously in use.
- Avoid dry sweeping of large areas.

- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on Site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a Site log book.
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the Site exit, wherever site size and layout permits.
- Access gates to be located at least 10 m from receptors where possible.

Dust Control – Public Roads

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

- Vehicles delivering material with potential for dust emissions to an off Site location shall be enclosed or covered with tarpaulin always to restrict the escape of dust;
- Public roads outside the Site shall be regularly inspected for cleanliness, as a minimum daily, and cleaned as necessary. A road sweeper will be made available to ensure that public roads are kept free of debris.
- If practicable, a wheel wash facility will be employed at the exit of the Site so that traffic leaving the Site compound will not generate dust or cause the build-up of aggregates and fine material in the public domain.

13.10.3 Operational Phase Mitigation

13.10.3.1 Mitigation 10: Bat Friendly Lighting

In order to minimise disturbance to bats commuting/foraging in the vicinity of the Site, lighting has been designed to minimise light-spill onto any hedgerows or treelines to be retained or planted at the Site. This can be achieved by ensuring that the design of lighting adheres to the guidelines presented in the Bat Conservation Trust & Institute of Lighting Engineers *'Bats and Lighting in the UK - Bats and Built Environment Series',* (ILP, 2018) the Bat Conservation Trust *'Artificial Lighting and Wildlife Interim Guidance'* and the Bat Conservation Trust *'Statement on the impact and design of artificial light on bats'*.

Through coordination between Enviroguide and the lighting consultants Morely Walsh Consulting Engineers, the lighting scheme will include the following:

- The minimisation of night-time lighting emitted during both the Construction and Operational Phases of the Proposed Development (once health and safety requirements are met).
- The avoidance of direct lighting of existing treelines and hedgerows and those to be planted at the Site, as much as is practicable.
- Dark corridors to be provided for movement of bats along the south-eastern, eastern and northern external boundaries of the Site at night.
- The avoidance of light spill onto the Tolka River from the proposed bridge.
- Planting will provide areas of darkness suitable for bats to feed and commute.
- Lighting to be directed downwards away from the treetops i.e., no spotlighting.
- The public lighting will have photocell/timer control to minimise lighting during the hours of darkness.
- Unnecessary light spill on to areas of retained/planted hedgerow controlled through a combination of directional lighting and hooded / shielded luminaires.
- All luminaires shall lack UV elements when manufactured and shall be LED.
- A warm white spectrum (2700-3000 Kelvin) will be used to reduce blue light component.
- Luminaires will feature peak wavelengths higher than 550 nm.

A post construction check of the proposed lighting will be carried out by a suitably qualified bat ecologist once the development is complete; to ensure that it is operating effectively and that impacts to bats through operational lighting at the Proposed Development are minimised and mitigation has been successful. Where necessary the bat ecologist will make recommendations to address any problem areas for bats and lighting. The bat ecologist will furnish the Biodiversity officer/Parks Department of Meath CoCo with a report detailing the survey results and mitigation installed once complete.

13.10.3.2 Mitigation 11: Hedgerow Management Plan

The existing hedgerows proposed to be retained within the south of the Site, along with any reinstated hedgerows, will be managed in a way that maximises the ecological value they provide at the Site, with habitat connectivity maintained along the south-eastern, eastern and northern margins of the Site; connecting it in with the wider field boundary network in the area and the River Tolka riparian corridor.

This connectivity is vital for wildlife such as birds, bats, mammals and insect pollinators in a human landscape such as that which will be provided by the Proposed Development. Additionally, by managing hedgerows and treelines in a more natural way, they will provide more in terms of biodiversity; through increased plant diversity, increase provision of food resources and higher quality shelter to wildlife inhabiting and commuting through the area.

To ensure the retained and newly planted hedgerows provide an adequate replacement of continuous habitat for the hedgerows to be removed at the Site, a Hedgerow Management Plan (HMP) will be prepared by a suitably qualified Ecologist. The HMP will specify the management of the retained and newly planted hedgerows for the party who will take charge of the operational landscape management of the Site. The HMP will be prepared in line with the recommendations made in the Hedgerow Appraisal Report (Enviroguide, 2023c) appended to this Chapter (provided in Appendix 13.5).

To mitigate and compensate for the impact of the Proposed Development on hedgerows at the Site, it is recommended that areas of new hedgerows planted at the Site will be maintained in such a way that they achieve the same or higher condition scores as those hedgerows that will be lost as a result of the Proposed Development, namely: their overall score as per the HAS (Foulkes et al, 2013) **should be 2- Favourable or 3- Highly favourable.**

In practice, to achieve these scores the new hedgerows should be ultimately have the following characteristics:

- A minimum 2.5m in height.
- A minimum of 2m in width.
- Have a dense base (regardless of whether they are to be topped or 'escaped' (un-topped) hedgerows).
- Have >2m meadow margin on one side at least.
- Have <5% gaps.
- Support <20% noxious species and no invasive species.

This low-intervention management approach may not be appropriate for internal ornamental hedgerows planted within the main residential component of the Proposed Development, due to aesthetic or logistical reasons, however, it is best suited for external hedgerows to be located along the margins of the Site. In the case of this Proposed Development, the eastern and southern boundaries along with the F1 zoned lands within the River Tolka's flood plain are ideal areas for the provision of this semi-natural, high biodiversity value hedgerows (See Figure 13.29). <u>The goal of the HMP will be to ensure a semi-natural, network of wildlife corridors is created</u>; leading from the south of the main Site area, along the link road and connecting with the Tolka riparian corridor.

Figure 13.29. Image extracted from the Landscape Design Context Plan (irla Drwg: 1000) showing the proposed new network of hedgerow/tree planting linking the south of the Site with the Tolka riparian corridor.

Generally, hedgerows with high ecological value can be divided into two types of profiles, namely: <u>escaped hedges,</u> which remain un-topped but can be side-trimmed, and <u>topped hedges,</u> which are trimmed to an A-shaped cross-section with a wide base, excluding occasional trees. Both profiles should have a flowering canopy. Although the original hedgerows to be lost at the Site have the profile of escaped hedges, the management of the proposed hedgerows will ultimately depend on their location and feasibility within the Proposed Development.

The period, frequency and intensity of management will depend on the choice of whether escaped hedges, managed with coppicing and laying, or topped hedges are being proposed. In any case, it is desirable that partial cutting/laying is carried out every year, e.g., a third of the entire length of the hedge annually and done in multi-year (three years at the minimum) rotation, and that the management and maintenance is continued in perpetuity, with monitoring conducted until the new hedges achieve the targeted overall scores (for details see Appendix 13.5 –Hedgerow Appraisal Report).

The following measures will also be included in the HMP:

- The hedgerows located along the outer boundaries of the Site will, as much as is practicable, link up with each other. The provision of an almost continuous vegetative margin around the

Site; through planted native hedgerows and trees, will maintain habitat connectivity with the surrounding environment.

- Hedgerows will be maintained with a **natural meadow strip of 1-2m** at their base wherever possible. Hedges with plenty of naturally occurring flowers and grasses at the base support will provide higher quality habitat for local wildlife using the hedges.
- The 1-2m strip at the base of the hedgerow will be cut on a reduced mowing regime to encourage wildflower growth and maximise the value of the hedgerow for pollinators. A **two-cut management approach** is ideal for suppressing coarse grasses and encouraging wild flowers. Cut the hedgerow basal strip **once during February and March** (this is before most verge plants flower and it will not disturb ground-nesting birds). Cut the verge **once again during September and October** (this slightly later cutting date allows plants that were cut earlier in the year time to grow and set seed).
- N.B. Raising the cutter bar on the back cut will lower the risk to amphibians, reptiles and small mammals.
- Where hedgerow trimming needs to occur delay trimming as late as possible – until **January and February** as the surviving berry crop will provide valuable food for wildlife. The earlier this is cut; the less food will be available to help birds and other wildlife survive through the winter. Any hedgerow cutting will be done outside of the nesting season and due consideration of the Wildlife Act 1976 (as amended) needs to be taken.
- Where possible, cut these outer boundary hedgerows on a minimum **3-year cycle** (cutting annually stops the hedgerow flowering and fruiting), and cut in rotation rather than all at once - this will ensure some areas of hedgerow will always flower (Blackthorn in March, Hawthorn in May etc.).
- Where they occur naturally, Bramble and Ivy should be allowed grow in hedgerows, as they provide key nectar and pollen sources in summer and autumn.

Methods to Avoid

Hedgerows will not be over-managed. Tightly cut hedges mean there are fewer flowers and berries, thus reducing available habitats, feeding sources and suitable nesting sites.

Hedgerows will not be cut between March 1st and August 31st inclusive. It is both prohibited (except under certain exemptions) and very damaging for birds as this is the period they will have vulnerable nests containing eggs and young birds. Red-listed bird species Yellowhammer (recorded on Site) in particular nest up until the end of August.

DO NOT use pesticide/ herbicide sprays or fertilisers near hedgerows as they can have an extremely negative effect on the variety of plants and animals they support.

13.10.4 Enhancement Measures

13.10.4.1 Log Piles for Invertebrates and Fauna

Piles of logs and other woody vegetation arising from the proposed tree felling will be left in suitable secluded corners/margins of the Site as advised by the Project Ecologist; to provide habitat for common Frog and small mammals such as Hedgehog. These areas of woody debris will also benefit local invertebrate species through provision of shelter and food sources.

13.10.4.2 Planting and Landscaping

It is noted that all wildflower seeds will be Irish Provenance Certified Seed, from a reputable source such as Design by Nature (Wildflowers.ie). To maximise the biodiversity value of the landscaping at the Site, consideration has been made to the All-Ireland Pollinator Plan planting code (NBDC, 2015).

13.10.4.3 Bird Box Scheme

A set of 10 bird boxes will be installed at the Site to further offset any loss of nesting habitat associated with the Proposed Development. These boxes will be a mix of open-fronted and hole entrance boxes; which will cater for a number of different species. The bird boxes will be erected on suitably sized trees around the Site, as advised by the Project Ecologist.

13.10.5 Monitoring

13.10.5.1 Construction Phase Monitoring

During the Construction Phase, the following monitoring will be carried out by the construction contractor to ensure the implemented mitigation measures are maintained effectively:

- Dust control measures (as described in Section 13.10.2.9) will be checked on a weekly basis, and more often during dry weather, to ensure they remain effective. The bank vegetation of the located east of the main Site area will be checked for any potential dust impacts, and the dust control measures reviewed if impacts are noted.
- Surface water and groundwater protection measures (as described in Section 13.10.2.2) will be checked weekly to ensure they remain effective, and more often during moderate to heavy rainfall events as appropriate.
- Surface water quality monitoring and visual inspections will be carried out along the River Tolka, at the following key locations as per the recommendations in ***Chapter 6**: **Hydrology and Hydrogeology*** of this EIAR:
  - Upstream of the proposed development;
  - Along the site boundary; and.
  - Downstream of the proposed development.

  Water quality monitoring will be undertaken using both field analysis and laboratory analysis based on the following frequency:

  - **Baseline Sampling** - 2no. baseline monitoring events (field measured parameters and laboratory analysis) at each surface water monitoring location including sampling at the watercourse's closest point to construction activities prior to commencement of any Site works including enabling or construction works;

- **Construction Phase Sampling** – monthly monitoring events (field measured parameters and laboratory analysis) at each surface water monitoring location (including sampling at the watercourse's closest point to construction activities) during Site construction works.
- **Post Construction Phase Sampling** – 2no. monitoring events (field measured parameters and laboratory analysis) at each surface water monitoring location (including sampling at the watercourse's closest point to construction activities) following completion of all construction works.
- **Additional Sampling as needed** - Any additional monitoring events (field measured parameters and laboratory analysis) in the unlikely event of an environmental incident onsite, or in the vicinity of the construction works, or as advised by the Site Environmental Manager/Project Ecologist.

- The results of all of the above monitoring will be made available to Meath CoCo on request and any remedial measures that are required based on the results of same will be agreed with the LPA if required.

13.10.5.2 Operational Phase Monitoring

During the Operational Phase, the following monitoring will be carried out by the relevant designated person to ensure the implemented mitigation and enhancement measures are maintained effectively:

- The standard necessary maintenance checks will be carried out to ensure all SUDS measures and the wastewater pumping station are operating correctly.
- A Biodiversity Monitoring Plan will be prepared by a suitably qualified Ecologist that will cover the post-construction monitoring of the efficacy of the proposed enhancement measures e.g., bird boxes.
- Bird boxes will be inspected annually for a period of 3 years as part of the BMP to assess whether these measures have been adopted by their respective species groups

13.11 Residual Impact Assessment

Residual impacts are defined as '*effects that are predicted to remain after all assessments and mitigation measures*'. They are the remaining 'environmental costs' of a project and are the final or intended effects of a development after mitigation measures have been applied to avoid or reduce adverse impacts. Potential residual impacts from the Proposed Development were considered as part of this environmental assessment.

In summary, the construction mitigation measures detailed in this Chapter (e.g., timing of vegetation clearance, timing of works over the Tolka, pre-construction checks by an Ecologist, preparation of a robust CEMP), along with the design features to be adopted to minimise adverse impacts to fauna at the Site, will be sufficient to reduce any identified potential impact to KERs associated with the Site to **'not-significant' at the local level**.

13.12 Conclusion

It is considered that provided the mitigation measures proposed are carried out in full, there will no significant negative impact to any valued habitats, designated sites or individual or group of species as a result of the Proposed Development.

13.13 The 'Do nothing' Scenario

In the 'Do nothing ' scenario, the land would likely remain as is; biodiversity poor pasture farmland. There would likely continue to be cattle poaching the banks of the Tolka and accessing the river channel. The various treelines and hedgerows would continue to provide habitat connectivity across the agricultural landscape. It is noted, however, that the land in question is zoned for development; to be brought forward within the plan period, and therefore it is reasonable to assume that a similar residential development could be brought forward on the Site during the period up to 2027.

13.14 Risk of Major Accidents or Disasters

In terms of Biodiversity, the main risks of major accidents would be confined to the main sensitive ecological receptor at the Site, which is the River Tolka. In a worst case scenario mitigation measures would not be followed during the construction of the bridge and the excavation works within proximity to the Tolka, resulting in cementitious materials and sediments being discharged to the river during the spawning season for salmonids. This could result in a fish kill downstream from the Site, with potential knock on adverse effects on predators such as kingfisher and otter through the reduction of their food source.

13.15 Significant Interactions

This chapter pertaining to the ecological and biodiversity aspects of the Proposed Development, has the potential to interact with aspects of the following chapters of this EIAR:

- Chapter 5: Land, Soils and Geology
- Chapter 6: Hydrology and Hydrogeology
- Chapter 7: Air Quality
- Chapter 9: Noise and Vibration

13.15.1 Land, Soils and Geology

An assessment of the potential impact of the Proposed Development on the existing land, soils and geological environment; with emphasis on the impact of the Proposed Development on the receiving soils underlying the Site during the Proposed Development, is described in Chapter 5 - 'Land, Soils and Geology' of this EIAR. These impacts are considered to be relevant to the ecological sensitivities associated with the Site of the Proposed Development discussed in this Chapter; and mitigation measures addressing these potential impacts are described in full in Chapter 5. The bulk removal of soils, sands and gravel at the Site can have implications for biodiversity. Natural regeneration of native and local seeds is the preferred option for re-vegetating areas to be retained for biodiversity.

13.15.2 Hydrology and Hydrogeology

The key environmental interaction with biodiversity is water. An assessment of the potential impact of the Proposed Development on the hydrological and hydrogeological environment is described in Chapter 6 - 'Hydrology and Hydrogeology' of this report as well as in this Chapter, to ensure the quality (pollution and sedimentation) and quantity (surface water run-off) of water is of the appropriate standard. Interactions between hydrology and biodiversity can occur through impacts to water quality, arising, for example from an accidental pollution event during the Construction and/or Operational Phase. This interaction has the potential to result in impacts on habitats and fauna that are hydrologically linked to the Site.

13.15.3 Air and Climate

An assessment of the potential impact of the Proposed Development on air quality is included in Chapter 7 of this EIAR. Dust emissions arising from the Construction Phase of the Proposed Development were identified as having potential impacts on local biodiversity. Once dust minimisation measures are implemented, impacts to biodiversity are not predicted to be significant.

13.15.4 Noise and Vibrations

An assessment of the potential impact of the Proposed Development in the form of excess noise and vibrations associated with the Proposed Works are laid out in Chapter 9 - 'Noise and Vibrations'. These impacts are considered to be relevant to the ecological sensitivities associated with the Site of the Proposed Development discussed in this Chapter; and mitigation measures addressing these potential impacts are both referenced in this Chapter and described in full in Chapter 9. There is potential for interactions between noise and sensitive fauna, e.g., birds, that occur in adjacent habitats from increased noise levels during the Construction Phase. However, as described, noise related impacts are not deemed to be significant.

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RECEIVED: 21/09/2023

Volume II

Environmental Impact Assessment Report

CHAPTER 14

Cultural Heritage and Archaeology

August 2023

McCutcheon Halley
CHARTERED PLANNING CONSULTANTS

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14 Cultural Heritage and Archaeology

14.1 Introduction

This chapter assesses the potential impacts of the proposed development, as described in Chapter 2 – Site Location and Project Description, on the known and potential cultural heritage resource concerning the integrity, continuity and context of same for future generations. UNESCO define the term 'Cultural Heritage' as encompassing several aspects of tangible assets (immovable: archaeological sites and monuments, architectural heritage structures; movable: artefacts; and underwater: shipwrecks, submerged features) and intangible assets (such as historical associations, folklore, oral tradition and language).

14.1.1 Author Information and Competency

This chapter was prepared by John Cronin 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). Mr. Cummins holds primary and postgraduate qualifications in archaeology (B.A. 1992 and M.A 1994, UCC). Both individuals have extensive experience in the compilation of archaeological, architectural, and cultural heritage impact assessments.

14.1.2 Reference to 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*.

14.1.3 Methodology

The assessment was based on a programme of desktop research combined with a field survey of the proposed development lands 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 green field lands that contain the proposed residential development and the surrounding lands extending for 1km in all directions from this green field area. This study area was reviewed in order to compile a comprehensive cultural heritage context for the location of the proposed development and surrounding lands.

The following sections present an overview of the methodology applied to determine the baseline cultural heritage environment within the study area and the assessment of potential effects on the cultural heritage resource.

14.1.3.1 Desktop Research

Documentary research on the recorded and potential cultural heritage resource within the study area was carried out in order to identify any recorded archaeological, architectural and other cultural heritage sites and features. This information has provided an insight into the development of the study area over time and also assisted in an evaluation of the potential presence of hitherto unrecorded cultural heritage sites or features within the proposed development site.

The principal sources reviewed for the assessment of the recorded archaeological resource were the Sites and Monuments Record (SMR) and the Record of Monuments and Places (RMP) maintained by the Department of Housing, Local Government and Heritage. The current Record of Protected Structures (RPS) and structures listed in the National Inventory of Architectural Heritage (NIAH) were reviewed in order to assess the designated architectural heritage resource within the study area.

Other sources consulted as part of the assessment included the following:

- Meath County Development Plan 2021-2027 – This publication 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).
- UNESCO designated World Heritage Sites and Tentative List: A review was undertaken of the locations of the two world heritage sites in Ireland and other significant sites included in a Tentative List (2022) nominated by Ireland for inclusion.
- The Database of Irish Excavation Reports: This database contains summary accounts of licensed archaeological excavations carried out in Ireland (North and South) from 1970 to present. Current data was accessed via www.excavations.ie in August 2023.
- 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 in August 2023 to ascertain if any archaeological sites have been identified within the study area identified since the publication of the inventory.
- Heritage Council's Heritage Map Viewer: This online mapping source (www.heritagemaps.ie) collates various cultural heritage datasets sourced from, among others, the National Monuments Service, National Museum of Ireland, local authorities, the Royal Academy of Ireland and the Office of Public Works.
- Literary Sources: Published literary sources consulted to assess the archaeological, historical, architectural heritage and folklore record of the study area are listed in Section 14.6 of this chapter.
- Cartographic sources: Available cartographic depictions of the study area dating from the 17th century onward were reviewed and relevant extracts are presented in Section 14.2.3.3 of this chapter.
- Aerial/Satellite/LiDAR imagery: A review of publicly accessible imagery from the Ordnance Survey Ireland (OSI), Google Earth, and Bing Maps was carried out to appraise whether they revealed 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 and relevant image extracts are presented in Section 14.2.3.4 of this chapter.

- Placenames Database of Ireland: This online database (www.logainm.ie) provides a comprehensive management system for data, archival records and place names research conducted by the State.
- Irish National Folklore Collection: Transcribed material from the National Folklore Collection archive which has been digitised and published online at www.duchas.ie.

14.1.3.2 Field Inspection

All areas within the site were subject to programmes of systematic field-walking in April 2022 and August 2023 and no access constraints were encountered. The lands were assessed in terms of existing land use, any remnants of historic structures or landscaped features, vegetation cover and the potential for the presence of previously unrecorded archaeological and architectural heritage sites/features. The inspection results are described within the chapter (Section 14.2.4) and extracts from the photographic record compiled during the field survey are presented in Appendix 14.1.

14.1.3.3 Geophysical Survey

A geophysical survey of the proposed development site was carried out by Target Archaeological Geophysics in July 2023. A full copy of the report on this non-intrusive survey is presented in Appendix 14.4 and the results are summarised in Section 14.2.5, which includes mapping sourced from the geophysical survey report.

14.1.3.4 Consultation

A scoping request was issued in August 2023 to the Development Applications Unit of the Department of Housing, Local Government and Heritage and no response was received in relation to the archaeological, architectural or cultural heritage resources.

The cultural heritage content contained in the Meath County Council's LRD opinion on the proposed development was reviewed as part of this assessment. This content includes items in relation to archaeological impact assessment, mitigation measures and reporting requirements which are addressed in this chapter.

14.1.3.5 Impact Assessment

The methodology used for the assessment of potential impacts has been informed by the Environmental Protection Agency (EPA) *Guidelines for Information to be Contained in EIAR* (2022), in accordance EIA requirements of codified EU Directive 2011/92/EU as amended by EU Directive 2014/52/EU, per current Planning Legislation, concerning EIA assessment: Planning and Development Act, 2000 (as amended) (Part X) and in Part 10 of the Planning and Development Regulations, 2001 (as amended). The following summation of the criteria used to assess impacts is provided to concisely outline the methodology specifically applied to the cultural heritage resource. Assessment is achieved by a consideration of the duration, quality, type, value and magnitude of effect(s) on the cultural heritage resource:

Duration of Effect is assessed based on the following criteria:

- Momentary (seconds to minutes)
- Brief < 1 day
- Temporary <1 year
- Short-term 1-7 years
- Medium Term 7-15 years
- Long Term 15-60 years
- Permanent > 60 years
- Reversible: Effects that can be undone, for example through remediation or restoration

Quality of Effect on the cultural heritage resource can be positive, neutral or negative.

- Positive: 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: no change or effects that are imperceptible, within the normal bounds of variation for the cultural heritage environment.
- Negative: 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)

Type of Effect on the cultural heritage resource can be direct, indirect or no predicted impact.

- Direct impact: where a cultural heritage site is physically located within the footprint of the proposed development, which will result in its complete or partial removal.
- Indirect impact: where a cultural heritage site or its setting is located in close proximity to the footprint of the proposed development.
- No predicted impact: where the proposed development will not adversely or positively affect a cultural heritage site.

The *Magnitude of Effect* is based on the degree of change, incorporating any mitigation measures, and is based on a consideration of the character, duration, probability and consequences (Table 14.1). The magnitude can be negative or positive and is ranked without regard to the value of the asset according to the following scale: High; Medium; Low and Negligible. The descriptions of magnitudes presented in Table 14.1 are based on guidance published in *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties* (ICOMOS 2011, 16-7).

Table 14.1 Magnitudes of Effect on Cultural Heritage Assets

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

Magnitude	Description
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; Very minor changes to area that affect the Intangible Cultural Heritage activities or associations or visual links and cultural appreciation.

The *Values* assigned to cultural heritage assets for the purposes of this assessment are intended as indicators which contribute to a wider judgment based on the individual circumstances of each asset. Other than the level of legal designations, e.g., National Monuments and recognition as World Heritage sites, there is no formal grading or rating system for Irish archaeological monuments or architectural heritage structures. The non-statutory National Inventory of Architectural Heritage (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 statutory protection they have been utilised as a value indicator for NIAH-listed structures for the purpose of this assessment. The criteria for assessing the value of archaeological and other cultural heritage assets as part of this assessment has been informed by the *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties* (ICOMOS 2011, 14-16). The Value of known or potential cultural heritage assets are ranked according to the following scale: Very High, High; Medium; Low and Negligible (Table 14.2). Generally, the more criteria that are evident for a given asset, the higher in scale its respective Value is deemed to be. Criteria considered in addition to legal designations include condition / preservation; documentary / historical significance; group value; rarity; visibility in the landscape; fragility / vulnerability and amenity value. The values assigned to identified assets within the study area were determined following the completion of the desktop study combined with site inspections and are identified in Section 14.2 of this chapter.

Table 14.2 Guidance Criteria Used For Assessing Values of Cultural Heritage Assets

Indicative Value	Examples of Asset Types
Very High (International Significance)	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 (National Significance)	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 (Regional Significance)	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 (Local Significance)	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 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

The *Significance of Effects* is assessed based on a consideration of the Magnitude of the Impact (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 asset. The significance can be described as Profound, Very Significant, Significant, Moderate, Slight, Not Significant or Imperceptible (Table 14.3 and Table 14.4).

Table 14.3 Description of Significance of Effects (per EPA EIAR Guidelines 2022)

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 14.4 Significance of Effects Matrix (based on 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
		Value of Asset			

14.1.4 Difficulties Encountered in Compiling Information

There were no difficulties encountered during the compilation of this assessment.

14.2 Description of Existing Environment

14.2.1 Introduction

The proposed development site is located in a green field area within the townlands of Bennetstown and Dunboyne and is approximately 1km to the north of the historic core of the Dunboyne settlement. There are no extant recorded archaeological sites or designated architectural heritage structures located within its boundary and further details on the existing environment within the site are provided in **Section 14.2.4**. The following sections present a summary of the legal and planning frameworks relevant to the cultural heritage resource followed by a chronological overview of known settlement patterns and other human activity within the study area from prehistory to the present day which incorporates published information on recorded cultural heritage assets.

14.2.2 Legal and Planning Context

The management and protection of cultural heritage in Ireland is achieved through a framework of national laws and policies which are in accordance with the provisions of the Valetta Treaty (1995) (formally the European Convention on the Protection of the Archaeological Heritage, 1992) ratified by Ireland in 1997; the European Convention on the Protection of Architectural Heritage (Granada Convention, 1985), ratified by Ireland in 1997; and the UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage, 2003, ratified by Ireland in 2015.

The EIA Directives (from 1985 to 2014) set out the requirement for an EIA in European law. This assessment has been prepared in accordance EIA requirements of codified Council Directive 2011/92/EU as amended by EIA Council Directive 2014/52/EU, per current Planning Legislation, concerning EIA assessment: Planning and Development Act, 2000 (as amended) (Part X) and in Part 10 of the Planning and Development Regulations, 2001 (as amended).

Ireland has transposed EU Directive 2014/52/EU by way of the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 which came into operation on 1 September 2018. The Regulations provide for the transposition of the 2014 EIA Directive and give further effect to the 2011 EIA Directive by way of extensive amendments to existing planning law.

The national legal statutes and guidelines relevant to this assessment include:

- National Monuments Act 1930 (as amended);
- Heritage Act 1995 (as amended);
- National Cultural Institutions Act (1997);
- Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act (1999); and
- Planning and Development Act 2000 (as amended).

14.2.2.1 Summary of Legal and Planning Context

The following section presents a summary of the legal and policy frameworks designed to protect the Irish cultural heritage resource and further information is available in the *Framework and Principles for the Protection of the Archaeological Heritage* (Department of Arts, Heritage, Gaeltacht and the Islands (1999) and the *Architectural Heritage Protection Guidelines for Local Authorities* (Department Arts, Heritage and the Gaeltacht 2011).

The administration of national policy in relation to archaeological heritage management is the responsibility of the National Monuments Service (NMS) which is currently based in the Department of Housing, Local Government and Heritage.

The National Monuments Act of 1930, and its Amendments, are the primary means of ensuring the satisfactory protection of the archaeological resource. They include a number of provisions that are applied to secure the protection of archaeological monuments. These include the designations of nationally significant sites as National Monuments as well listing sites in the Register of Historic Monuments, the Record of Monuments and Places, the Sites and Monuments Record, and the placing of Preservation Orders and Temporary Preservation Orders on endangered sites.

Section 2 of the National Monuments Act, 1930 defines a National Monument as 'a monument or the remains of a monument, the preservation of which is a matter of national importance'. The State may acquire or assume guardianship of National Monuments through agreement with landowners or under compulsory orders. The prior written consent of the Minister is required for any works at, or in proximity to, a National Monument in the ownership or guardianship of the State, the Minister or a local authority, or those which are subject to a Preservation Order. There are no National Monuments or archaeological sites with Preservation Orders located within the study area.

The locations of World Heritage Sites (Ireland) and the Tentative List of World Heritage Sites submitted by the Irish State to UNESCO were also reviewed and none are located within the vicinity of the study area.

The National Monuments (Amendment) Act, 1994 made provision for the establishment of the Record of Monuments and Places (RMP) which comprises the known archaeological sites within the State. The RMP, which is based on the earlier Register of Historic Monuments (RHM) and Sites and Monuments Record (SMR), provides county-based lists of all recorded archaeological sites with accompanying maps. All RMP sites receive statutory protection under the National Monuments Act 1994 and the NMS must be given two months' notice in advance of any work proposed at their locations.

The Archaeological Survey of Ireland (ASI) lists fourteen recorded archaeological sites within the 1km study area (see Figure 14.1 and Table 14.5 below). Details on these recorded archaeological sites are presented in Section 14.2.3.1 and their published ASI inventory descriptions are provided in Appendix 14.2.

The protection of the architectural heritage resource 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. The Planning and Development Act 2000 requires all Planning Authorities to keep a 'Record of Protected Structures' (RPS) of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest. As of the 1st January 2000, all structures listed for protection in current Development Plans, have become 'protected structures'. Since the introduction of this legislation, planning permission is required for any works to a protected structure that would affect its character. A protected structure also includes the land and other structures within its curtilage. While the term 'curtilage' is not defined by legislation, the *Architectural Heritage Protection Guidelines for Local Authorities* (Department 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. There are no Protected Structures within the proposed development site or within the surrounding 1km study area.

In addition, local authorities must provide for the preservation of places, groups of structures and townscapes of architectural heritage significance through designation of Architectural Conservation Areas (ACAs). The proposed development site is not located within an ACA and there are none within the surrounding 1km study area.

The National Inventory of Architectural Heritage (NIAH) was established under the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999 to record architectural heritage structures within the State. While inclusion in the NIAH does not provide statutory protection to a structure it is intended to advise local authorities on compilation of their Record of Protected Structures. The NIAH also includes a Designed Landscapes and Historic Gardens Survey which comprises a non-statutory, desk-based survey of such features. There are no NIAH-listed structures, or historical gardens of landscapes, located within the proposed development site while these is one example located within the surrounding 1km study area and this comprises a 19th century railway bridge (NIAH 14405001) located c.60m outside the east end of the nearest section of the proposed development site.

The Meath County Development Plan 2021-2027 is the relevant development plan for the study 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."*

"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."

14.2.3 Desktop Study

14.2.3.1 Archaeological and Historical Context

The following section presents a description of the archaeological and historical context of the study area and identifies the recorded archaeological sites and designated architectural structures located within the area. Datasets have been interrogated and retrieved largely from State organisations and are considered accurate and current per publicly available information. The dating framework used for archaeological periods is based on the *Guidelines for Authors of Reports on Archaeological Excavations* published by the National Monuments Service (2006).

The RMP does not list any recorded archaeological sites within the proposed development site. The SMR does list two sites within the section of the redline boundary that extends within the road-take of the Dunboyne link road (R157) to the north of the green field area of the proposed development. Both of these were identified during archaeological excavations carried out in advance of the construction of the link road. One of these sites (ME050-057---) comprised a series of postholes and pits and the second example (ME050-058----) formed part of a burnt spread which extended outside the north end of the road-take. Radiocarbon dating indicated that both of these sites dated to the Bronze Age. All archaeological features at the locations of these sites which were contained within the road-take were fully excavated and, therefore, no longer remain *in situ* within the redline boundary.

The RMP/SMR list an additional 12 recorded archaeological sites, none of which have extant above ground remains, within the surrounding 1km study area and these include seven examples listed in the SMR which were identified and fully excavated in advance of the construction of sections of the M3 motorway and Dunboyne link road within the study area (Table 14.5 and Figure 14.1). As the archaeological sites which have been subject to full archaeological excavation no longer remain *in situ*, they are deemed to be of negligible value, while the examples that likely retain sub-surface remains are of potential high value. The Archaeological Survey of Ireland inventory descriptions for each of the archaeological sites within the study area are presented in Appendix 14.2, which contains information sourced from reports on the excavated examples.

Table 14.5 Recorded Archaeological Sites in Study Area (fully excavated sites highlighted blue)

Monument no.	Class	Townland	ITM E	ITM N	Distance from green field area of development
ME050-027----	Enclosure - large enclosure	DUNBOYNE	701098	743057	540m south
ME050-029----	Church	DUNBOYNE	700914	743387	430m southwest
ME050-030----	Field system	DUNBOYNE	700971	743204	525m southwest
ME050-056----	Excavation - miscellaneous	PACE	701771	744170	470m north
ME050-056001-	Kiln - corn-drying	PACE	701799	744162	470m north
ME050-057----	Excavation - miscellaneous	BENNETSTOWN	701490	743915	215m north
ME050-058----	Burnt mound	BENNETSTOWN	701594	743995	290m north
ME050-059----	Burnt mound	BENNETSTOWN	701775	743772	110m north
ME050-060001-	Structure	DUNBOYNE	701885	743642	140m east
ME050-060002-	Kiln - corn-drying	DUNBOYNE	701890	743637	140m east
ME050-060003-	Furnace	DUNBOYNE	701915	743647	140m east
ME050-061----	Pit	DUNBOYNE	702002	743278	300m east
ME050-062001-	Structure	DUNBOYNE	701066	743342	330m southwest
ME050-062002-	Kiln	DUNBOYNE	701098	743314	330m southwest

Figure 14.1 Locations of Recorded Archaeological Sites And NIAH Structure Within Study Area[1]

Early Prehistoric Periods

Until the recent identification of Palaeolithic human butchery marks on animal bones recovered from cave sites in Munster, the earliest recorded evidence for human activity in Ireland dated to the Mesolithic period (7000–4000 BC) when groups of hunter-gatherers lived on the heavily wooded island. The archaeological record indicates that these mobile groups tended to favour coastal, lake and river shores which provided a transport resource and also provided elements of their varied diet. These groups did not construct any settlements or monuments that have left above ground traces although their presence in an area can often be identified by scatters of worked flints in ploughed fields or during earth-moving works undertaken as part of development projects. 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 in farmlands within areas of cleared forestry. 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

[1] Archaeological datasets shown on Figure 14.1 were downloaded from NMS Historic Environment Viewer in August 2023

appear in the archaeological record during this period. While there are no recorded early prehistoric sites located within the study area, examples have been identified elsewhere in County Meath.

Late Prehistoric Periods

Metalworking arrived in Ireland with the advent of the Bronze Age period (c. 2400–500 BC) and saw the introduction of a new artefactual assemblage and was also associated with the construction of new monument types such as standing stones, stone rows, stone circles and burnt mounds known as *fulachta fiadh*. The development of new burial practices during this period also saw the construction of funerary monuments such as 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). This period has traditionally been associated with a Celtic 'invasion', although recent archaeological evidence points instead to a gradual development following centuries of contacts with Celtic-type cultures in Europe. Relatively little was known about Iron Age settlement and ritual practices in Ireland until recent decades when the corpus of evidence has been greatly increased by the discovery of sub-surface sites dating to this period during archaeological investigations carried out as part of development projects. The 1km study area contains the locations of a number of sub-surface sites of Bronze Age date, with some evidence of Iron Age activity, which were identified and fully or partially excavated in advance of the construction of the M3 motorway and Dunboyne link road schemes and these comprise structures (ME050-056----, ME050-057----, ME050-060001-, ME050-062001-), a kiln feature (ME050-060002-), a pit feature (ME050-061----) and two burnt mounds (ME050-058---- and ME050-059----). In addition, two iron-working bowl furnace features (ME050-060003-) were identified and excavated during the M3 motorway investigations. While these furnace features were undated, the potential exists that they date to the Iron Age period. The locations of the late prehistoric sites within the study area are identified on Figure 14.1 and the Archaeological Survey of Ireland descriptions of each example, which includes content sourced from their excavation reports, are presented in Appendix 14.2. The amount of evidence for late prehistoric activity identified during archaeological investigations indicates that the study area was widely settled during these periods.

Early Medieval Period

The early medieval (c. 400–1169 AD) period in Ireland broadly commences with the arrival of Christianity to Ireland. While this period saw the emergence of the first phases of urbanisation around the large monasteries and the Hiberno-Norse ports, including Waterford, the dominant settlement pattern of the period continued to be rural-based and centred on enclosed farmsteads known as ringforts. The ubiquity of these enclosures within the Irish landscape is attested to by the fact that their original Gaelic names (rath, lios and dun) still form some of the most common placename elements in the country. Archaeological excavations have demonstrated that the majority comprised enclosed farmsteads containing evidence for occupational, agricultural and craft/industrial activities. 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. 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. The study area does not contain any extant early medieval sites such as ringforts but a sub-surface kiln feature

(ME050-056001-) identified and excavated in advance of the construction of the M3 motorway produced dating evidence demonstrating that it was of early medieval date.

High and Late Medieval Periods

The arrival and conquest of large parts of Ireland by the Anglo-Normans in the late 12th century broadly marks the advent of the high medieval period which continued to c.1400 AD, which was followed by the late medieval period which extended to c.1550 AD. 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 as local or regional market centres. While earlier masonry castles were already in existence, the descendants of the Anglo-Norman gentry began the widespread construction of tower-houses as fortified residences within their landholdings at the start of the 15th century and this trend was subsequently adopted by wealthy Irish families within areas under Gaelic 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 historic settlement (ME050-021----) around the medieval core of Dunboyne is located outside the south end of the 1km study area and the lands containing the proposed development likely formed part of the agricultural hinterland around the settlement during the medieval period. Archaeological excavations within a levelled enclosure (ME050-027----) within the south end of the study area produced evidence indicating that it was constructed during the 13th or 14th centuries (see Figure 14.1 and Appendix 14.2): This enclosure site is located c. 550m to the south of the green field area containing the proposed residential development. The recorded location of a levelled church site (ME050-029----) of potential medieval date was identified by aerial survey within the southern end of the study area and is located c.340m to the southwest of the green field area of the proposed residential development (see Figure 14.1 and Appendix 14.2).

Post-Medieval and Early Modern Periods

The centuries following 1550 are referred to as the post-medieval period, which is generally considered to continue into the mid-19th century and the period thereafter is described as early modern. These periods saw the continuing expansion of Irish urbanisation as many of the port cities, including Waterford, developed into international trading centres and numerous villages and market towns began to develop throughout the country. The early part of the post-medieval period was a turbulent time in Irish history and in the later decades of the 16th century the Tudors sought to re-assert English control over the country. The resultant wars between the 1560s and 1603 brought this unsettled period to a temporary end although further widespread strife ensued during the Cromwellian Wars (1649–53) which ended with extensive dispossession of forfeited Gaelic lands. An agricultural boom in the late 18th and early 19th centuries saw a rise in prices for both tillage and dairy produce which resulted in landlords investing in extensive land improvement works within their holdings to increase land productivity. This included the extensive enclosure of open lands into field systems that survive to the present-day. The post-medieval period also saw the development of high and low status stone 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 in the 19th century. The settlement pattern throughout much of the rural landscape was greatly affected by the famine period in the middle of the 19th century and subsequent decades saw an intensification of agricultural practices which was further increased by the advent of mechanised farming practices in the 20th century.

While there are no recorded post-medieval archaeological sites within the study area, there are a number of historical references to landowners in Bennetstown townland during the period. In the 16th century Nicholas Huse was resident in the area in 1531 while the townland is included in a list of lands leased by a Edward Waterhowse in 1566[2]. The 17th century Down Survey records that in 1641 and 1670 the townland formed part of the Meath landholdings of Thomas Luttrell of Luttrellstown Castle, Clonsilla, Co. Dublin. The mid-19th century Griffith Valuation Survey records that the landowners of the area of Bennetstown townland containing the proposed development were John Preston and John Scriven who both leased lands to a tenant farmer named Thomas Murphy[3]. Samuel Lewis's *A Topographical Dictionary of Ireland* (1837) provides descriptions of Irish parishes during the 1830s and often provides information on contemporary land use patterns, historical events as well as the presence of archaeological sites and structures of architectural heritage interest such as large country houses. The description of Dunboyne parish, an extract of which is included below, does not contain any references to Bennetstown townland, but does provide an overview of the 19th century settlement and agricultural practices within the general area.:

> *"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 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."*

[2] https://www.logainm.ie/en/37761

[3] https://www.askaboutireland.ie/griffith-valuation/index.xml?action=doNameSearch&PlaceID=986248&county=Meath&barony=Dunboyne&parish=Dunboyne&townland=Bennetstown

Further details on the character of the proposed development site during the post-medieval and early modern periods are presented in the review of cartographic sources provided below (Section 14.2.3.3).

Database of Irish Excavation Reports

This database contains summary accounts of licensed archaeological excavations carried out in Ireland from 1970 to present. A review of the database revealed that a series of archaeological investigations were carried out within the study area in advance of the construction of the M3 motorway and Dunboyne link road (R157) schemes and the identified archaeological sites have been included in the SMR (see Figure 14.1). The Database entries for these investigations are presented in Appendix 14.3. The Archaeological Survey of Ireland inventory descriptions of the identified sites are presented in Appendix 14.2, and these include content sourced from their excavation reports. None of the identified sites contained above ground remains and their discoveries highlight the potential for the presence of sub-surface archaeological remains within green field locations in the study area. It is noted that the archaeological investigations along the route of the Dunboyne link road (R157) did not reveal any archaeological sites in the section of the road that adjoins the west side of the green field area of the proposed development.

The Database does not contain any entries for archaeological investigations within the green field area of the proposed development. A 2023 program of geophysical survey and archaeological test trenching in advance of a proposed development within the sections of the fields located immediately outside the northwest corner of the proposed development revealed nothing of archaeological significance (O'Connell 2023a). In addition, another 2023 program of geophysical survey and archaeological test trenching in a field to the north of the proposed development, located on the opposite side of the Dunboyne link road, also revealed nothing of archaeological significance (O'Connell 2023b).

National Museum of Ireland Topographical Files

An inspection of the topographical file archive held in the National Museum's premises in Kildare Street, Dublin was carried out in July 2023. This revealed that the archive contains no files describing the discovery of archaeological objects within Bennetstown townland. The archive contain a number of files detailing the discovery of archaeological objects in Dunboyne townland and those which contain contextual information for the discovery locations indicate that they were found within known archaeological sites or in the village area. None of the files contained information indicating that objects were retrieved from the small section of Dunboyne townland that extends into the south end of the proposed development site.

14.2.3.2 Architectural Heritage

There are no extant structures of any date located inside the boundary of the proposed development site and the existing built environment within its immediate surrounds to the north is modern in date with green field lands located in other directions. The Meath Development Plan 2021-2027 does not list any Protected Structures or Architectural Conservation Areas within the study area. The National Inventory of Architectural Heritage (NIAH) also does not list any structures or historic gardens/landscapes within the proposed development site. It lists one structure within the surrounding study area, and this comprises a 19th century railway bridge (NIAH 14405001) located c.60m outside the east end of the proposed development site (Figure 14.1). This bridge has been assigned a regional rating by the NIAH, which is indicative of a medium value, and is described in the inventory as follows:

> *Single-arch rock-faced limestone railway bridge with string courses and copings, built c.1850, carrying the road over the former railway track which is now disused. The masonry treatment of this railway bridge adds textural interest to the site. The robust rustication of the walls, voussoirs, string courses and copings was executed by skilled craftsmen. This bridge forms part of a group with the related railway structures along this disused line.*

14.2.3.3 Review of Cartographic Sources

The cartographic sources examined for the study area comprised the 17th-century Down Survey mapping (Figure 14.2), the 1st edition 6-inch Ordnance Survey (OS) map series (published 1837) (Figure 14.3) and the 25-inch OS map (published 1911) (Figure 14.4). The location of Bennetstown townland is indicated on the Down Survey mapping which shows no large structures or other features of potential cultural heritage interest within its boundary. The review of the 6-inch and 25-inch OS maps revealed that they both depict the proposed development site as vacant fields with no buildings or other structures of potential cultural heritage interest indicated within its boundary. The Dublin-Navan branch of the Midland Great Western Railway, which opened in the 1860s, is shown in the area to the east of the proposed development site on the 25-inch map and does not extend into its boundary. The maps do show the boundary between the townlands of Bennetstown and Dunboyne extending in an east to west direction through the south end of the proposed development site and this is described in Section 14.2.3.5.

Figure 14.2 Down Survey Map showing Bennetstown townland

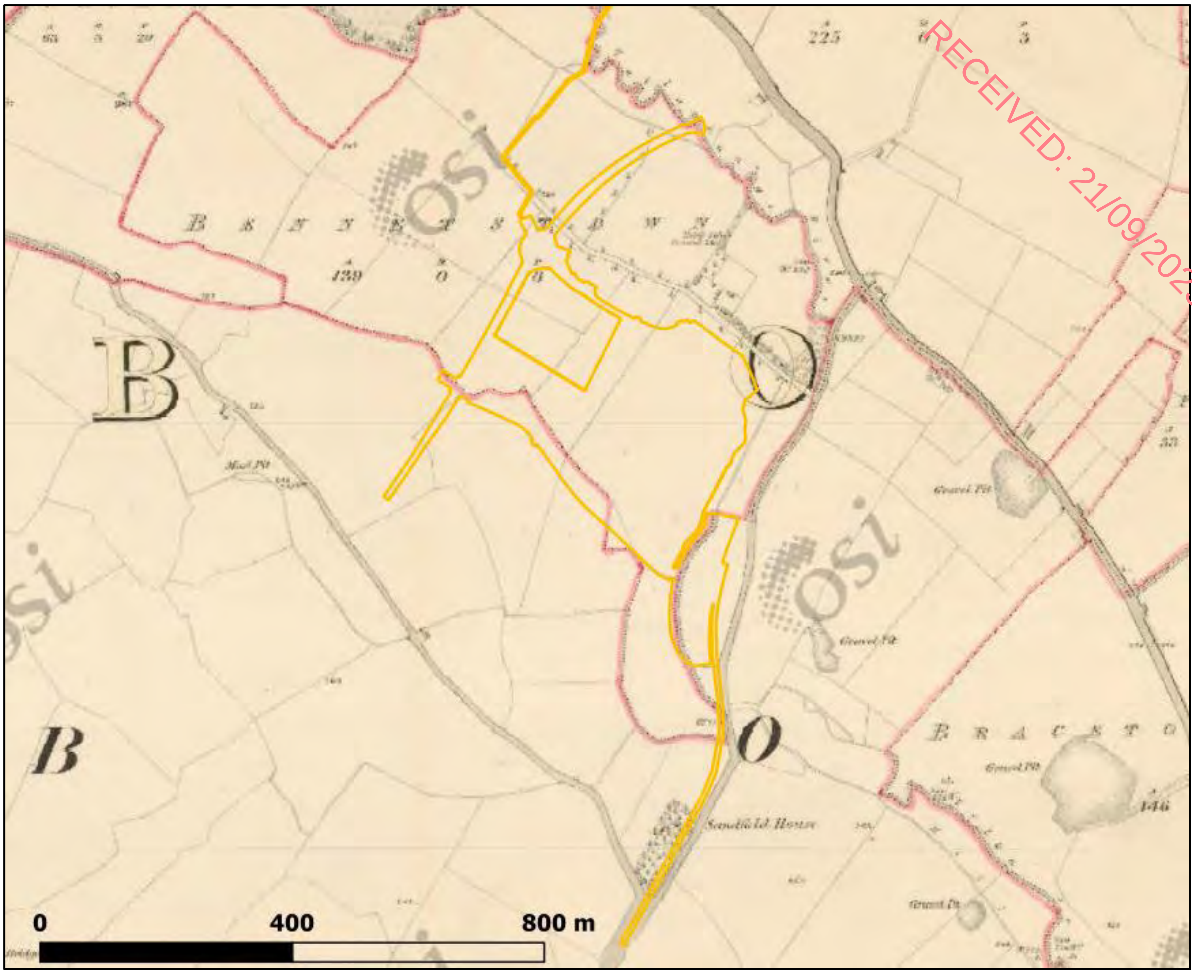

Figure 14.3: 1st edition 6-inch OS Map (1837) Showing Proposed Development (OSI SU 0003323)

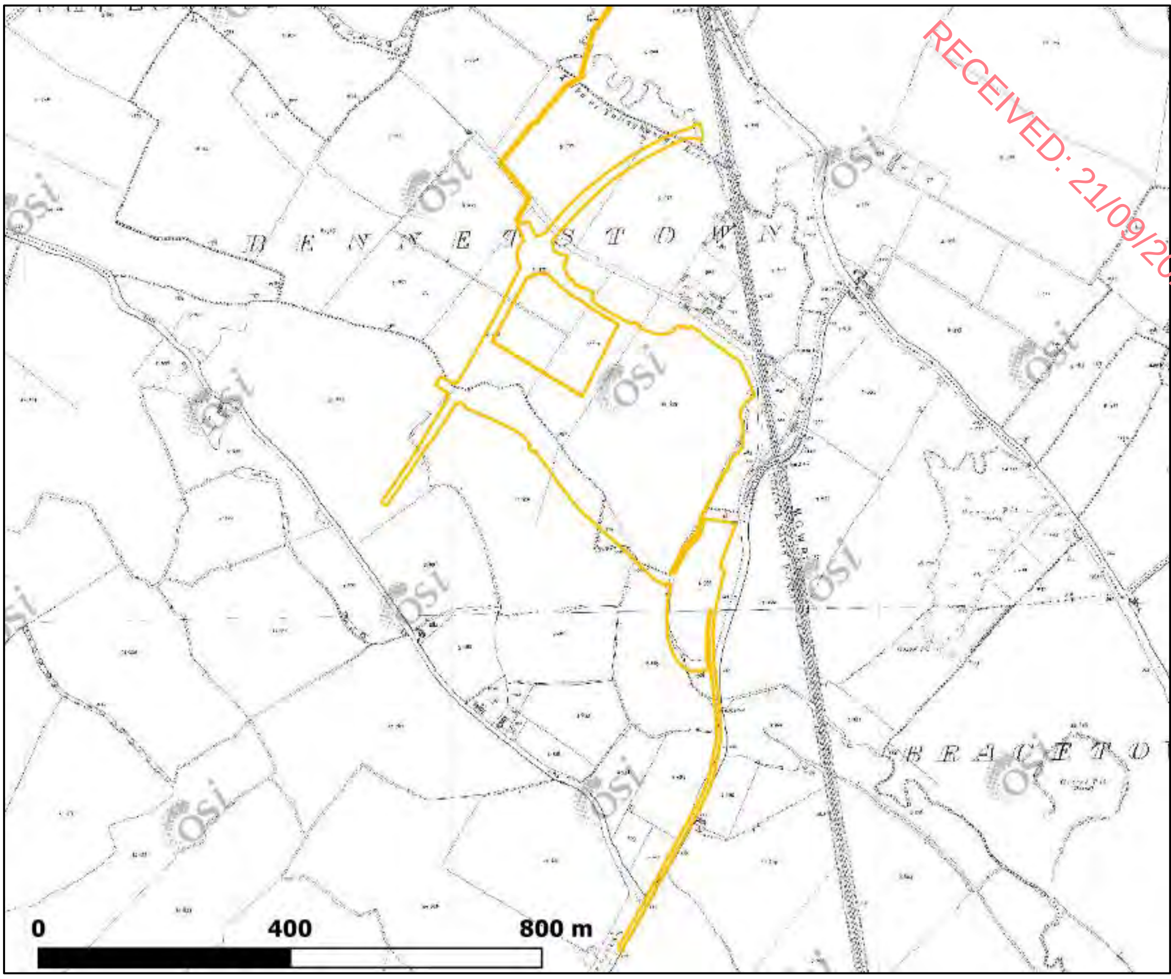

Figure 14.4: 25-inch OS Map (1911) Showing Proposed Development (OSI SU 0003323)

14.2.3.4 Aerial, Satellite and LiDAR Imagery

A review of modern aerial and satellite images published online by Ordnance Survey Ireland, Google and Bing revealed no potential unrecorded archaeological sites within the proposed development site and indicated that the layout of the green fields within the proposed development has not been significantly altered since the publication of the 25-inch OS map in 1911 (Figure 14.4). A review of LiDAR datasets published online by the Geological Survey of Ireland[4] was also carried out and this revealed traces of regular linear features extending through the fields which appear to be the result of agricultural activity, such as land divisions, field drainage and cultivation. No surface traces of potential unrecorded archaeological sites were noted during the review of the LiDAR imagery of the proposed development site.

[4] https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=b7c4b0e763964070ad69bf8c1572c9f5

Figure 14.5 Satellite image of green field area within proposed development (source: Google)

Figure 14.6: LiDAR image of green field area within proposed development site

14.2.3.5 Undesignated Cultural Heritage Assets

While encompassing the designated archaeological and architectural heritage resources, cultural heritage also includes various undesignated assets such as settlements, demesne landscapes, vernacular structures, folklore, cultural traditions and place names. There are no historic settlement centres, extant structures or associations with historical events located within, or in close proximity to, the proposed development site. The online archive of the National Folklore Collection (www.duchas.ie) was consulted and contains no records of folklore or traditions associated with potential unrecorded cultural heritage sites within proposed development site. While the consulted historical OS maps show a number of country houses within the surrounding landscape none of their formal demesne features, such as avenues, woods or gardens, are shown within the environs of the proposed development site (Figures 14.3 and 14.4).

The proposed development site is contained within the sections of the townlands of Bennetstown and Dunboyne which formed part of agricultural lands within the northern hinterland of the settlement of Dunboyne. Townlands are the smallest unit of land division in the Irish landscape, and many may preserve early Gaelic territorial boundaries that pre-date the Anglo-Norman conquest. The boundaries and names of Irish townlands were recorded and standardised by the Ordnance Survey in the 19th century. The Irish roots of townland names often refer to natural topographical features, but some name elements may also give an indication of the presence of past human activity within the townland, e.g., lios or rath may indicate the presence of a ringfort while temple, saggart, termon or kill indicate associations with church sites. The townland name Bennetstown is English in origin and has been used as the townland name since at least the publication of the Down Survey in the 17th century. The Placenames Database (www.logainm.ie) cites *Dún Búinne* as the Gaelic version of the townland name Dunboyne which may potentially be associated with a recorded castle site (ME050-021005-) located within the village area outside the south end of the study area. The townland boundary between Bennetstown and Dunboyne extends in an east to west direction through the south end of the proposed development site and its line is marked by a tree-lined field boundary.

14.2.4 Field Inspection

The proposed development site was inspected in April 2022 and August 2023 during clear weather conditions that afforded good landscape visibility and extracts from the photographic record of the site inspections are presented in Appendix 14.1. The proposed development site contains a number of pasture fields located directly to the south of the M3 Parkway and is located between the M3 motorway and the Dunboyne link road (R157). The centre of Dunboyne village is located c.1km to the south and lands to the west, east and south of the site are under agricultural use. The River Tolka runs in a broadly north to south direction in the area to the east of the proposed development site. This watercourse is located outside the east end of the site boundary and no in-channel works are proposed as part of the proposed development. As detailed in Section 14.2.5 below, a geophysical survey carried out within the proposed development site in July 2023 revealed the presence of two potential sub-surface archaeological enclosures and their locations were subject to field walking inspections and a targeted photographic record in August 2023.

The green field area of the proposed development is located within four land parcels of which the two central ones are further subdivided by post and electric wire fences. The field boundaries consist of ditches flanked by tall hedges which are interspersed with mature trees and this includes the field division forming the townland boundary between Bennetstown and Dunboyne. The lands are currently used for grazing (cattle and sheep) and the grass was low at the time of the survey. The Tolka River extends along the eastern boundary of the site with a wide, low lying, waterlogged area immediately to the west. The main portion of the site is located on a very slight south-facing slope with the portion to the east of the Tolka river situated on slightly elevated ground. There are no visible above ground remains of the two enclosures identified by the geophysical survey and no surface traces of any other potential archaeological or cultural heritage features were noted during the walkover surveys.

14.2.5 Geophysical Survey

A geophysical survey (Licence No. 23R0292) of the proposed development site was carried out by Target Archaeological Geophysics (TAG) in July 2023. All lands that were deemed suitable by TAG for geophysical investigation were investigated and this comprised a total of 6.8ha green field areas which were subject to high-resolution recorded magnetometry across seven areas within the site boundary.

The results of the survey are summarised in this section and a full copy of the geophysical report is presented in Appendix 14.4 The survey identified a number of potential archaeological features within the proposed development site and the reference numbers for these used below are sourced from the geophysical report. The locations of the potential features, including their associated reference numbers, are also identified on Figure 14.7. The survey identified two enclosures in the east end of the surveyed green field areas. Geophysical Feature 1 comprised a small circular enclosure measuring c.10m in diameter and the geophysical report notes that it is indicative of a ring-ditch site. This classification is applied to sites containing circular ditches, usually less than 20m in diameter, which may potentially be the remains of ploughed out prehistoric barrow sites although other functions may be possible, e.g., stockades, round houses, and their origins can often only be ascertained by archaeological excavation. Geophysical Feature 4 comprised a circular ditched enclosure c.40m in diameter, which the geophysical report identifies as a probable ringfort, with trends of unknown significance noted within its the internal area. As noted in Section 14.2.3, ringforts are one of the most common settlement sites of the early medieval period and excavations indicate that the majority comprised enclosed farmsteads containing evidence for occupational, agricultural and craft/industrial activities. The geophysical survey also identified a number of linear trends within the fields of unknown origin but the potential that some of these may indicate early field divisions and a trackway is noted within the geophysical report (see Appendix 14.4).

Figure 14.7 Interpretative plan of geophysical anomalies (arrows indicate enclosure locations)

14.3 Predicted Impacts

14.3.1 Do Nothing Scenario

A 'Do Nothing Scenario' will see the continued preservation of recorded and potential cultural heritage features within the study area.

14.3.2 Construction Phase

There are no extant archaeological sites listed in the SMR/RMP located within the boundary of the proposed development site and the construction phase will, therefore, have a neutral effect on the known archaeological resource listed in these records.

The geophysical survey of the green field areas within the proposed development site identified the sub-surface remains of two enclosures as well as a number of other features of archaeological potential (see Section 14.2.5 and Appendix 14.4). The ground works required for the construction phase within the proposed development site will result in permanent, direct, moderate to significant, negative effects on these features and this will require mitigation.

The River Tolka is located outside the east end of the proposed development site and no in-channel works which would have the potential to impact on any unrecorded underwater archaeological sites will be carried out.

There are no Protected Structures located within the proposed residential development site or within the surrounding 1km study area and it is not located within, or adjoining, an Architectural Conservation Area. There also are no NIAH-listed buildings or lands within the proposed development site and the nearest structure listed in the inventory is a railway bridge (NIAH ref. 14405001) located c.60m outside the east end of the site boundary. The construction phase of the proposed development will, therefore, have a neutral effect 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. A section of the townland boundary between Bennetstown and Dunboyne, extends through the south end of the proposed development site and continues outside its boundary. The construction phase of the proposed development will result in a direct, permanent, slight, negative effect on this local (low value) element of the undesignated cultural heritage resource and this will require mitigation.

14.3.3 Operational Phase

There is no intervisibility between the proposed development site and the extant archaeological sites listed in the RMP/SMR within the surrounding 1km study area as none retain any recorded above ground remains. The proposed development will, therefore, have a neutral effect on the setting of the recorded archaeological resource within the study area during the operational phase. Following the successful implementation of archaeological mitigation measures presented in Section 14.4, it is predicted that no impacts will arise in relation to the potential archaeological resource within the proposed development site during the operational phase.

There is one designated architectural heritage structure within the surrounding 1km study area and this comprises a railway bridge listed in the NIAH (ref. 14405001) which is located 60m outside the east end of the proposed development site. The operation phase of the proposed development will have a negligible, indirect, negative effect on this element of the architectural heritage resource during the operational phase which does not require mitigation.

The section of the townland boundary between Bennetstown and Dunboyne within the proposed development site comprises an undesignated cultural heritage asset. Following the implementation of the mitigation measures detailed in Section 14.4, no effects on this element of the cultural heritage resource are predicted during the operational phase.

14.3.4 Risks to Human Health

There are no predicted risks to human health associated with potential effects on the cultural heritage resource.

14.3.5 Cumulative Impacts

A review of the Meath County Council planning enquiry system was carried out in relation to a proposed office development (planning ref. 23/424) within a green field site in lands to the north of the proposed development, which is located on the opposite side of the Dunboyne link road. The online planning file for that development includes an archaeological assessment report which notes that a geophysical survey and subsequent phase of archaeological test trenching at this location did not identify anything of archaeological significance[5]. The assessment report recommended that archaeological monitoring of the construction phase of the development should be carried out (O'Connell 2023b).

A review of the Meath County Council planning enquiry system was carried out in relation to an application for a single storey commercial building within a site adjacent to the north end of the green field area of the proposed development (planning ref. 23/60065[6]), The online planning files contain an archaeological impact assessment report describing the results of a geophysical survey and test trenching of the proposed development location which revealed nothing of archaeological significance (O'Connell 2023a). The assessment report recommended that archaeological monitoring of the construction phase of the development should be carried out.

A review of online planning files for the Dunboyne Link Road - Dunboyne Business Park and the R157 project (Meath County Council ref. P822022) revealed that a Heritage Assessment was prepared as part of the assessment of this proposed development[7]. The assessment concluded that, given the proximity of archaeological remains in the area, that the site should subject to advance archaeological trial trench testing and that any archaeological remains found should be assessed for significance and then, if appropriate, be subject to licensed archaeological rescue excavation.

[5] http://idocswebdpss.meathcoco.ie/iDocsWebDPSS/ViewFiles.aspx?docid=2515671&format=djvu

[6] http://idocswebdpss.meathcoco.ie/iDocsWebDPSS/listFiles.aspx?catalog=planning&id=2360065&orderBy=type

[7] http://idocswebdpss.meathcoco.ie/iDocsWebDPSS/listFiles.aspx?catalog=planning&id=P822022

The recorded archaeological sites within the 1km study area comprise examples that have either been fully excavated or retain no discernible above ground expressions and, therefore, are not considered to have the potential for significant cumulative effects on their wider settings. Following the application of the site-specific archaeological mitigation measures presented in Section 14.4, it is concluded that the proposed development will not act in combination with other developments to result in any significant cumulative impacts on the cultural heritage resource.

14.4 Mitigation Measures

14.4.1 Construction Phase Mitigation

There are no extant 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 the site and it is not within, in the close environs of, an Architectural Conservation Area. No mitigation measures for the architectural heritage resource are, therefore, required.

A suitably qualified archaeologist will be appointed to carry out a programme of archaeological test trenching of the proposed development site in advance of the construction phase under licence by the National Monuments Service. These site investigation works will comprise testing of 10-12% of the site area and will include targeted test trenching of all features of archaeological potential identified during the geophysical survey of the proposed development site as well as the section of the townland boundary between Bennetstown and Dunboyne. The townland boundary will also be subject to a written and photographic record. All archaeological remains identified during the test trenching investigations will be cordoned off and recorded *in situ* in written, drawn and photographic formats. A report on the test trenching results, including detailed written, illustrative and photographic records, will then be submitted to the National Monuments Service, per licensing requirements, who will 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 of any identified archaeological remains as well as archaeological monitoring of the construction phase. The report will also detail proposals for short term (construction phase) and long term (operation phase) preservation measures for any identified archaeological remains that will be preserved *in situ*.

Any archaeological excavation works to preserve identified archaeological remains by record will be carried out under licence by the National Monuments Service and in advance of any construction works at the locations of the relevant identified archaeological remains. All required archaeological excavation works, including post-excavation analyses as well as preliminary and final reporting, will be carried out in accordance with the archaeological method statement submitted to the National Monuments Service and the National Museum of Ireland as part of the licence application. An archive containing stratigraphic records (including all associated digital and hard copy records and reports) will be submitted to the National Monuments Service upon completion of archaeological works. Any archaeological objects and relevant environmental material retrieved during archaeological excavation works, as well as all relevant reports, will be provided to the National Museum of Ireland upon completion of all archaeological works, including post-excavation analyses.

14.4.2 Operational Phase Mitigation

Any measures required to ensure the preservation in situ of any identified archaeological remains during the operation phase will be agreed with the National Monuments Service. All other required mitigation measures will be enacted prior to and during the construction phase and, therefore, no cultural heritage mitigation measures during the operational phase of the proposed development are predicted.

14.4.3 Monitoring

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 test trenching and excavation works and these will allow for monitoring of the successful implementation of mitigation measures. A detailed method statement stating the proposed strategy for the test trenching works will accompany the submitted licence application which will clearly detail the extent of the archaeological works and outline the processes to be enacted in the event that any archaeological remains are encountered. A revised method statement for any required excavation works will be submitted to the National Monuments Service and National Museum of Ireland as part of an application for a licence to complete these works. Reports on the archaeological site investigations will then be submitted to the National Monuments Service, the National Museum of Ireland and the Planning Authority which will clearly describe the results of all archaeological works in written, mapped and photographic formats.

14.5 Residual Impacts

The proposed development site and its close environs do not contain any known archaeological sites, structures of architectural heritage significance or undesignated cultural heritage assets and no residual impacts on these elements of the cultural heritage resource are predicted. The mitigation measures presented in Section 14.4 will provide for either the preservation *in situ* of any currently unknown archaeological features within the proposed development site or the proper and adequate recording of this resource by full archaeological excavation. Preservation *in situ* shall allow for a negligible magnitude of impact resulting in a potential not significant/imperceptible significance of effect in the context of residual impact on the unrecorded archaeological resource. Preservation by record shall allow for a high magnitude of impact, albeit ameliorated by the creation of a full and detailed archaeological record, the results of which shall be publicly disseminated. This shall result in a potential slight/moderate range of significance of effect in the context of residual impacts on the unrecorded archaeological resource.

14.6 References

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.*

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.

Moore, M. (1987) *Archaeological inventory of County Meath*. Stationery Office, Dublin.

National Monuments Service (2006) *Guidelines for Authors of Reports on Archaeological Excavations*

O' Connell, A. (2023a) 'Dunboyne North Retail, Co. Meath, Archaeological Impact Assessment: Excavation Licence 23E0180'. Unpublished report, Archer Heritage Planning report.

O' Connell, A. (2023b) 'Dunboyne North Business Park, Co. Meath, Archaeological Impact Assessment: Excavation Licence 22E0726. Unpublished report, Archer Heritage Planning.

Consulted online sources:

http://gis.teagasc.ie/soils/map.php (Soils)

http://map.geohive.ie/mapviewer.html (Geology)

http://maps.osi.ie/publicviewer/#V2,591271,743300,1,10 (Historic OS maps)

http://downsurvey.tcd.ie/down-survey-maps.php (Down Survey)

http://spatial.dcenr.gov.ie/imf/imf.jsp?site=GSI_Simple (Bedrock)

www.archaeology.ie (SMR and NIAH)

www.duchas.ie (Folklore)

www.excavations.ie (Archaeological investigations)

www.logainm.ie (Placenames)

www.heritagemaps.ie/WebApps/HeritageMaps/index.html (Irish Heritage Council)

https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=b7c4b0e763964070ad69bf8c1572c9f5 (LiDAR)

Large Scale
Residential Development
at Dunboyne North, Co. Meath

Volume II

Environmental Impact Assessment Report

CHAPTER 15

Significant Interaction of Impacts

August 2023

McCutcheon Halley
CHARTERED PLANNING CONSULTANTS

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15 Significant Interaction of Impacts

15.1 Introduction

The construction, operational and cumulative impacts of the proposed development have been assessed within each chapter of the EIAR. This chapter describes any interactions of impacts identified in the previous chapters and identifies where any of these are significant.

The potential cumulative effects of the proposed project in combination with other permitted developments in proximity has been considered in each chapter as relevant.

15.2 Expertise & Qualifications

This chapter of the EIAR has been prepared by Saoirse Kavanagh, Executive Planning Consultant of McCutcheon Halley Planning Consultancy. Saoirse holds a bachelor's degree in Arts (International), majoring in Geography, and a Master's in Planning and Sustainable Development. She has over 4 years' experience working with multi-disciplinary teams and has provided input into a variety of projects. In particular, she has co-ordinated the preparation of the following three Environmental Impact Assessment Reports (EIARs) including the completion of the Introduction, Alternatives, and Population and Human Health chapters.

- Cooldown Commons Strategic Housing Development, Citywest, Dublin.
- Parkside 5B Strategic Housing Development, Belmayne, Dublin.
- Clonattin Strategic Housing Development, Gorey, Co. Wexford.
- Rathgowan Large Scale Residential Development, Mullingar, Co. Westmeath

15.3 Proposed Development

The full description of the proposed development is outlined in Chapter 2 'Development Description' of this EIAR.

15.4 Methodology

The EIAR has considered and assessed the interactive effects and cumulative impacts arising from the construction and operation of the proposed development based on best scientific knowledge. Interactive effects (or interactions), specifically refer to any direct or indirect effects caused by the interaction of environmental factors as outlined in Article 3 (1) of the amended EIA Directive:

> *"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 the landscape;

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

Annex IV of the amended Directive states that a description of impacts should include:

> *"…the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the project"*
>
> *EU Guidance identifies that;*
>
> *"Cumulative effects are changes to the environment that are caused by an action in combination with other actions. They can arise from:*
>
> *the interaction between all of the different Projects in the same area;*
>
> *the interaction between the various impacts within a single Project (while not expressly required by the EIA Directive, this has been clarified by the CJEU – see the box below).*
>
> *The coexistence of impacts may increase or decrease their combined impact. Impacts that are considered to be insignificant, when assessed individually, may become significant when combined with other impacts."*

The relevant interactions and interdependencies between specific environmental aspects have been summarised in the matrix set out in Table 15.1.

15.5 Difficulties Encountered

There were no difficulties encountered in completing this EIAR chapter.

15.6 Potential Significant Interactions

15.6.1 Population and Human Health

Chapter 4 assesses the likely impacts to Population and Human Health arising from the proposed development. During the construction phase, the following aspects would interact with Population and Human Health and in the absence of mitigation may give rise to significant effects.

- Land, Soil, and Geology: Site clearance has the potential to result in increased dust and particulate emissions to air as well as the potential to release contaminated soils to the local environment.
- Hydrology: Site clearance has the potential to release contaminated soils to the local environment and River Tolka.
- Air Quality and Climate: Construction activities may result in a decrease in local air quality which has the potential to negatively impact on human health.

- Noise and Vibration: Increased levels of noise and vibration during construction activities may result in negative impacts to the amenity of local residents.
- Landscape and Visual Impact: There will be visual changes associated with removal of some trees and hedgerows and emerging plant and machinery.
- Traffic and Transport: Construction traffic has the potential to negatively impact local residents and businesses through increased delays and potential impacts on health and safety.
- Material Assets: Service Infrastructure and Utilities: Extended power or telecommunications outages, or disruption to water supply or sewerage systems for existing properties in the area could negatively impact on the surrounding human population and their overall health.

During the operational phase, the potential interactions are:

- Landscape and Visual Impact: There will be permanent visual changes to the landscape which may impact the residential dwellings surrounding the proposed development.
- Traffic and Transportation: Increased traffic once the development is fully operational has the potential to negatively impact local residents and temporary receptors.

The potential significant impacts to Population and Human Health have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant residual negative impacts are predicted.

15.6.2 Land, Soil and Geology

- Biodiversity: Site clearance and earth works may result in disturbance or displacement of fauna and birds.
- Air Quality and Climate: Potential effects on the receiving Land, Soils and Geology environment could also affect air quality conditions present. However, the mitigation measures described in Chapter 5 – Land, Soils & Geology, and those relevant in Chapter 7 - Air Quality & Chapter 8 – Climate Change will ensure that this will not occur.
- Hydrology: Potential effects on the receiving land, soils and geology environment could also affect hydrology and hydrogeology conditions present. However, the mitigation measures described in Chapter 9– Hydrology & Hydrogeology, and those relevant in Chapter 5 – Land, Soils & Geology will ensure that this will not occur.
- Service Infrastructure and Utilities: Potential impacts on the receiving land soils and geology environment could also impact on material assets. However, the mitigation measures described in Chapter 5 – Land Soils and Geology, and those relevant in Chapter 12– Material Assets: Service Infrastructure & Utilities will ensure that this will not occur.

The potential significant impacts to Soils and Geology have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant residual negative impacts are predicted.

15.6.3 Hydrology and Hydrogeology

Chapter 6 assesses the likely potential impacts on Hydrology and Hydrogeology arising from the proposed development. Hydrology and Hydrogeology attributes interact with other environmental attributes are summarised as follows:

- Population and Human Health: Potential impacts on the receiving hydrology and hydrogeology environment could also impact on human health. However, the mitigation measures described in Chapter 6 – Hydrology and Hydrogeology, and those relevant in Chapter 4 – Population and Human Health will ensure that this will not occur.
- Biodiversity: Any negative impacts on water quality as a result of excavations and discharge of silt, sediment or pollutants to surface waters may result in impacts to biodiversity downstream of the site. Potential impacts on the receiving hydrology and hydrogeology environment could also impact on biodiversity conditions present. However, the mitigation measures described in Chapter 6 – Hydrology and Hydrogeology, and those relevant in Chapter 13 – Biodiversity will ensure that this will not occur.
- Air Quality and Climate: Potential impacts on the receiving hydrology and hydrogeology environment could also impact on air quality conditions present. However, the mitigation measures described in Chapter 6 – Hydrology and Hydrogeology, and those relevant in Chapter 7 - Air Quality & Chapter 8 Climate will ensure that this will not occur.
- Land, Soil and Geology: Potential impacts on the receiving hydrology and hydrogeology environment could also impact on land, soils and geology conditions present. However, the mitigation measures described in Chapter 6 – Hydrology and Hydrogeology, and those relevant in Chapter 5– Land, Soils and Geology will ensure that this will not occur.
- Material Assets Service Infrastructure and Utilities: Potential impacts on the receiving hydrology and hydrogeology environment could also impact on material assets. However, the mitigation measures described in Chapter 6 – Hydrology and Hydrogeology, and those relevant in Chapter 12– Material Assets will ensure that this will not occur.

The potential significant impacts to Hydrology and Hydrogeology have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant residual negative impacts are predicted.

15.6.4 Air Quality

Chapter 7 assesses the likely potential impacts on Air Quality arising from the proposed development. During the construction phase, the following aspects would interact with Air Quality and in the absence of mitigation may give rise to significant effects.

- Population and Human Health: Dust and emissions from the construction phase of the proposed development have the potential to impact on the local population and human health.
- Traffic: Emissions from construction traffic may result in a decrease in local air quality.
- Climate: Increased greenhouse gas emissions from construction traffic may contribute to climate change.

During the operational phase the potential interactions are:

- Population and Human Health: Emissions from the operational phase of the proposed development have the potential to impact on the local population and human health.
- Traffic: Emissions from construction traffic may result in a decrease in local air quality.

- Climate: Increased greenhouse gas emissions from construction traffic may contribute to climate change.

The potential significant impacts to Air Quality have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant residual negative impacts are predicted.

15.6.5 Climate

Chapter 8 assesses the likely potential impacts on the climate arising from the proposed development. Climate interacts with the following environmental aspects:

- Hydrology: Increased rainfall and flooding events as a result of climate change have the potential to impact the proposed development.
- Air Quality: 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.

The potential significant impacts of climate have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant residual negative impacts are predicted.

15.6.6 Noise and Vibration

Chapter 9 assesses the likely potential impacts on Noise and Vibration arising from the proposed development. During the construction phase, the following aspects would interact with Noise and Vibration and in the absence of mitigation may give rise to significant effects.

- Traffic and Transportation: Construction traffic may give rise to local noise and vibration which may have an impact on the amenity of local residents;

During operation, the potential interactions are;

- Traffic and Transportation: Additional construction traffic may give rise to increased local noise and vibration which may have an impact on the amenity of local residents.

The potential significant impacts of Noise and Vibration have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant residual negative impacts are predicted.

15.6.7 Landscape

Chapter 10 assesses the likely potential impacts on Landscape and any visual impacts arising from the proposed development.

- Biodiversity: Changes to the landscape associated with the proposed development have the potential to impact the local biodiversity.
- Cultural Heritage: Changes to the landscape associated with the proposed development have the potential to impact the local cultural heritage and archaeology.

No other potential significant interactions have been identified other than those already described. The potential significant impacts of Landscape and any visual impacts have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant residual negative impacts are predicted.

15.6.8 Material Assets: Traffic and Transport

Chapter 11 assesses the likely impacts on Traffic and Transport arising from the proposed development. Traffic and Transportation interacts with other environmental attributes as follows:

- Air Quality: Particulates and gaseous emissions from traffic (both on and off-site) and residual dust dispersal associated with traffic movements could negatively impact the local air quality.
- Climate: Increased emissions due to the burning of fossil fuels generates impacts on the climate.
- Noise: Increased traffic levels associated with the proposed development will increase noise levels in the area.

The potential significant impacts of Traffic and Transport have been considered within the relevant discipline and mitigation measures outlined where required. No other significant interactions have been identified, other than those discussed above. With mitigation measures in place, no significant residual negative impacts are predicted.

15.6.9 Material Assets Service Infrastructure and Utilities

Chapter 12 assesses the likely impacts on Services and Infrastructure arising from the proposed development. During the construction phase, the following aspects would interact with Services and Utilities, and in the absence of mitigation may give rise to significant effects:

- Biodiversity: Construction lighting within the footprint of the proposed development has the potential to cause increased light pollution of adjacent areas and could potentially impact on fauna (bats, mammals, or birds) foraging in adjacent habitats.
- Land Soil and Geology: Site clearance may result in disturbance to service infrastructure and utilities, in turn impacting the local population.
- Cultural Heritage and Archaeology: There may be an impact to Cultural Heritage and Archaeology if previously undiscovered sub-surface remains are damaged or destroyed during excavations to provide utilities.

During the operational phase the potential interactions are as follows:

- Biodiversity: disturbance to fauna (bats, mammals, or birds) arising from artificial light spillage into the environment from the associated lighting scheme.

The potential significant impacts to Services Infrastructure and Utilities have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant residual negative impacts are predicted.

15.6.10 Biodiversity

Chapter 13 assesses the likely impacts on Biodiversity arising from the proposed development. The potential significant impacts to Biodiversity have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant residual negative impacts are predicted.

15.6.11 Cultural Heritage and Archaeology

Chapter 14 assesses the likely impacts to Cultural Heritage and Archaeology arising from the proposed development. The potential significant impacts to Cultural Heritage and Archaeology have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant residual negative impacts are predicted.

Table 15.1 below provides an overview of the above interactions. Potential Interactions are represented by an 'X'. Cells without an 'X' indicate that no interaction is expected. 'X' in the columns headed 'C' represent interactions expected in the construction phase while an 'X' in the columns headed 'O' represent interactions expected in the operational phase.

Table 15.1 Summary of Interactions

	Population & Human Health		Land, Soil & Geology		Hydrology		Air Quality		Climate		Noise & Vibration		Landscape & Visual		Traffic & Transport		Service Infrastructure and Utilities		Biodiversity		Cultural Heritage and Archaeology	
	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O
Population and Human Health			X		X		X		X		X		X	X	X	X	X					
Land, Soil and Geology					X		X		X								X		X			
Hydrology	X		X				X		X								X		X	X		
Air Quality	X	X							X	X					X	X						
Climate					X	X	X	X														
Noise & Vibration															X	X						
Landscape and Visual																			X	X	X	X
Traffic and Transport							X	X	X	X	X	X										
Service Infrastructure and Utilities			X																X	X	X	
Biodiversity																						
Cultural Heritage and Archaeology																						

Large Scale
Residential Development
at Dunboyne North, Co. Meath

Volume II

Environmental Impact Assessment Report

CHAPTER 16

Summary of Mitigation Measures and Monitoring

August 2023

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CHARTERED PLANNING CONSULTANTS

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16 Summary of Mitigation Measures and Monitoring

16.1 Introduction

This chapter includes the full schedule of mitigation measures and monitoring where proposed.

16.1.1 Mitigation

The draft EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2017) identifies that there are 4 established strategies for the mitigation of effects; avoidance, prevention, reduction and offsetting.

Mitigation by Avoidance: Avoidance usually refers to strategic issues, such as site selection, site configuration or selection of process technology. This may be the fastest, cheapest and most effective form of effect mitigation. In some cases mitigation by avoidance may also be considered as part of the "consideration of alternatives".

Mitigation by Prevention: This usually refers to technical measures. Where a potential exists for unacceptable significant effects to occur (such as noise or emissions) then measures are put in place to limit the source of effects to a permissible and acceptable level.

Mitigation by Reduction: This is a very common strategy for dealing with effects which cannot be avoided. It tends to concentrate on the emissions and effects and seeks to limit the exposure of the receptor. This is regarded as a less sustainable, though still effective, approach, implemented through reducing the effect and/or reducing exposure to the effects.

Mitigation by Remedy/Offsetting: This is a strategy used for dealing with adverse effects which cannot be prevented or reduced. Remedy is compensating for or counteracting adverse effects. Examples include increased planting of specific trees/shrubs to replace unavoidable loss of vegetation, or provision of a new amenity area to compensate for the unavoidable loss of access to the grounds of an old house. Examples of Offsetting include reinstating buildings, walls or features, or the introduction of tunnels to enable wildlife to access other comparable habitats.

16.1.2 Monitoring

Some disciplines have proposed monitoring following their assessment of impacts and implementation of proposed mitigation measures. Monitoring will take place after consent is granted in order to demonstrate that the project in practice conforms to the predictions made during the EIA process. Monitoring provides assurance that proposed systems are operating as intended. This allows adjustments of operations to be made to ensure continued compliance with consent conditions such as emission limit values, conditions of operation, performance criteria/ indicators and detection of unexpected mitigation failures.

The EPA Guidelines also state that "*It is particularly important that the developer understands their commitment to mitigation measures that are proposed in an EIS. These are enforceable undertakings that will have to be put in place and sustained when the project is implemented*".

The following mitigation and monitoring measures have been proposed by the specialist consultants during preparation of the EIAR, and approved by Glenveagh Homes Ltd.

Table 16.1 Table of Mitigation Measures

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
Chapter 4 Population and Human Health	
Health and safety risks are the primary concern during the construction phase. These will be managed in accordance with Safety, Health, and Welfare at Work (Construction) Regulations, 2013. The design of the proposed development will be subject to safety design reviews to ensure that all requirements of the project are safe. A project supervisor for construction stage (PSCS) will be appointed and a contractor safety management program will be implemented to identify potential hazards associated with the proposed works. When issues are identified, corrective actions will be implemented to amend design issues prior to the issuance of final design for construction. Temporary contractor facilities and areas under construction will be fenced off from the public with adequate warning signs of the risks associated with entry to these facilities. Entry to these areas will be restricted and they will be kept secure when construction is not taking place. Site lighting and camera security may be used to secure the site and any lighting will be set up with consideration of the adjoining property. Measures to ensure public safety, with respect to construction traffic and the construction phase have been included in the be included in the Construction Traffic Management Plan and the Construction and Environment Management Plan submitted with the application. A final CTMP and CEMP will be agreed with the Planning Authority prior to commencement of development.	Measures to avoid potential negative impacts on Population and Human Health have been fully considered in the design of the project and are integrated into the final layout and design. Compliance with the layout and design will be a condition of the permitted development. As such no mitigation measures are required.

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
Chapter 5 Land Soil and Geology	
Stripping of topsoil will be carried out in a controlled and carefully managed way and coordinated with the proposed staging for the development. At any given time, the extent of topsoil strip (and consequent exposure of subsoil) will be limited to the immediate vicinity of active work areas. Topsoil stockpiles will be protected for the duration of the works and will be located so as not to necessitate double handling. The design of road levels and finished floor levels has been carried out in such a way as to minimise cut/fill type earthworks operations. The duration that subsoil layers are exposed to the effects of weather will be minimised. Disturbed subsoil layers will be stabilised as soon as practicable (e.g., backfill of service trenches, construction of road capping layers, construction of building foundations and completion of landscaping). Similar to comments regarding stripped topsoil, stockpiles of excavated subsoil material will be protected for the duration of the works. Stockpiles of subsoil material will be located separately from topsoil stockpiles. The Contractor will be responsible for ensuring these measures are fully implemented. The excavation of material will be minimised as much as possible to reduce the effect on soils and geology. No material excavated from the former compound area at the north of the site shall be reused onsite. Due to the exceedance in barium (albeit naturally occurring) identified onsite no soils shall be reused onsite as topsoil in gardens or areas with potential for homegrown vegetables without further environmental testing and confirmation of suitability for reuse in these areas. Any surplus material, or materials which are deemed not suitable for onsite reuse will be	No material excavated from the former compound area at the north of the site shall be reused onsite. Due to the exceedance in barium (albeit naturally occurring) identified onsite no soils shall be reused onsite as topsoil in gardens or areas with potential for homegrown produce during the operational phase without further environmental testing and confirmation of suitability for reuse in these areas. No further mitigation measures will be required during the operational phase. No monitoring will be required during the operational phase.

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
classified in accordance with the EPA Guidance Document 'Waste Classification, List of Waste & Determining if Waste is Hazardous or Non-Hazardous' (2015). It will be the Contractors responsibility to ensure that all waste soils are classified correctly and managed, transported and disposed of offsite in accordance with the requirements of the Waste Management Act 1996, as amended, the Waste Framework Directive 2008/98/EC of the European Parliament and Council on waste and any relevant subsequent waste management legislation. As a precautionary measure, no soils excavated from the localised former compound area in the northern portion of the site (Refer to Table 5.1 in Chapter 5) will be reused onsite. All soil excavated from this particular area will be tested and removed offsite for disposal to a suitably permitted / licenced waste recovery / disposal facility in accordance with relevant waste management legislation (including but not limited to the Waste Management Act of 1996, 2001 and 2003 and all subsequent waste management regulations as amended). It will be the Contractors responsibility to ensure that a project specific Detailed Resource and Waste Management Plan is fully implemented onsite for the duration of the project. Further mitigation measures for the prevention of soil / bedrock contamination during construction are proposed below. The Contractor will be responsible for ensuring these measures are fully implemented: ▪ In advance of commencement of the Construction Stage, all onsite monitoring wells (as identified in the Site Investigation Reports (GII, 2022, 2023) presented in Appendix 5.1, will be fully decommissioned by an experienced borehole specialist in accordance with relevant guidelines, 'Good practice for	

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
decommissioning redundant boreholes and wells' (UK Environment Agency, 2012); ▪ Earthworks / piling plant and vehicles delivering construction materials to Site will be confined to predetermined haul routes around the Site for each phase of the proposed development; ▪ The need for vehicle wheel wash facilities will be assessed by the Contractor depending on the phasing of works and onsite activity and will be installed as needed, near any Site entrances and road sweeping implemented as necessary to maintain the road network in the immediate vicinity of the Site; ▪ Dust suppression measures (e.g., dampening down) will be implemented as necessary during dry periods; ▪ All excavated materials will be stored away from the excavations / immediate works area, in an appropriate manner at a safe and stable location. The maximum height of temporary stockpiles will be 3m; ▪ A comprehensive monitoring and supervisory regime including monitoring of all excavations and stability assessments as required will be put in place to ensure that the proposed construction works do not constitute a risk to the stability of the Site; ▪ The employment of good construction management practices will serve to minimise the risk of pollution from construction activities at the proposed development in line with the Construction Industry Research and Information Association (CIRIA) publication entitled, Control of Water Pollution from Construction Sites,	

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
Guidance for Consultants and Contractors, CIRIA - C532 (2001) which are also detailed in Chapter 6 Hydrology & Hydrogeology; and, ▪ Specifically, regarding pollution control measures, the following will be adhered to; ○ Fuels, lubricants and hydraulic fluids for equipment used on the construction Site, as well as any solvents, oils, and paints will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to best codes of practice; ○ Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the proposed development for disposal or re-cycling; ○ Any spillage of fuels, lubricants or hydraulic oils will be immediately contained and the contaminated soil removed from the proposed development and properly disposed of; ○ All Site vehicles used will be refuelled in bunded and adequately sealed and covered areas in the construction compound area; ○ All plant and machinery will be serviced before being mobilised to Site; ○ No plant maintenance will be completed on Site, any broken-down plant will be removed from Site to be fixed;	

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
○ Refuelling will be completed in a controlled manner using drip trays at all times; ○ Mobile bowsers, tanks and drums will be stored in secure, impermeable storage areas away from open water; ○ Fuel containers will be stored within a secondary containment system, e.g., bunds for static tanks or a drip tray for mobile stores; ○ Containers and bunding for storage of hydrocarbons and other chemicals will have a holding capacity of 110% of the volume to be stored; ○ Ancillary equipment such as hoses and pipes will be contained within the bund; ○ Taps, nozzles or valves will be fitted with a lock system; ○ Fuel and chemical stores including tanks and drums will be regularly inspected for leaks and signs of damage; ○ Drip-trays will be used for fixed or mobile plant such as pumps and generators to retain oil leaks and spills; ○ Only designated trained operators will be authorised to refuel plant on Site; ○ Procedures and contingency plans will be set up to deal with emergency accidents or spills; ○ An emergency spill kit with oil boom, absorbers etc. will be kept on-site for use in the event of an accidental spill. A specific team of staff will be trained in the use of spill containment;	

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
○ Appropriate PPE including appropriate gloves, must be worn at all times by operatives onsite during the construction phase. ○ Strict supervision of contractors will be adhered to in order to ensure that all plant and equipment utilised on-Site is in good working condition. Any equipment not meeting the required standard will not be permitted for use within the Site. This will minimise the risk of soils and bedrock becoming contaminated through Site activity; and, ○ The highest standards of Site management will be maintained and utmost care and vigilance followed to prevent accidental contamination or unnecessary disturbance to the Site and surrounding environment during construction. A named person will be given the task of overseeing the pollution prevention measures agreed for the Site to ensure that they are operating safely and effectively. Mitigation measures outlined in Chapter 6 - Hydrology & Hydrogeology are also applicable to the protection of soils and geology during the construction phase. The above mitigation measures will be incorporated (as required) during Detailed Design Stage and will form part of a site-specific Construction Environmental Management Plan (CEMP) which will be implemented during the Construction Stage (including initial Site preparatory / enabling works).	

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
Following mitigation measures the effects on lands soils and geology will be slight negative permanent and not significant. **Monitoring** A comprehensive monitoring and supervisory regime including monitoring of all excavations and stability assessments as required will be put in place to ensure that the proposed construction works do not constitute a risk to the stability of the Site. Further environmental testing will be carried out across the site if any excavated soils are to be used in areas where there may be plant uptake . All soils being removed offsite will be subject to hazardous waste screening and waste acceptance criteria screening before being moved offsite.	
Chapter 6 Hydrology and Hydrogeology	
With regard to groundwater and surface water quality impacts the following mitigation measures are proposed. The Contractor will be responsible for ensuring these measures are fully implemented: ▪ In advance of commencement of the Construction Stage, all onsite monitoring wells (as identified in the Ground Investigation Reports (GII, 2022) (GII, 2023) presented in Appendix 5.1 will be fully decommissioned by an experienced borehole specialist in accordance with relevant guidelines, '*Good practice for decommissioning redundant boreholes and wells*' (UK Environment Agency, 2012); ▪ The construction management of the Site will take account of the recommendations of the Construction Industry Research and Information Association (CIRIA) guidelines '*Control of Water Pollution from Construction Sites*' *and 'Groundwater control - design and practice*' and CIRIA 2010 '*Environmental*	With regard to groundwater and surface water quality impacts the following mitigation measures are proposed; ▪ All of the mitigation measures (for the protection of soils and geology) listed in Chapter 5 will be implemented onsite during the Construction Stage; ▪ All plant and equipment utilised onsite during maintenance works should be checked and in good working condition. Any equipment not meeting the required standard will not be permitted for use within the Site. Relevant maintenance contractors will be responsible for ensuring that these measures are fully implemented; ▪ Any minor volumes of fuel, oil or chemicals required during routine maintenance works will be brought to and from Site by the maintenance contractor. While temporarily onsite all chemicals will be kept in secure and bunded areas, with relevant Material Safety Data Sheets available onsite. Any fuel / oil tanks temporarily stored on Site will be located in a suitably bunded area and all

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
Good Practice on Site' to minimise as far as possible the risk of pollution; ▪ All of the mitigation measures (for the protection of soils and geology) listed in Chapter 5 will be implemented onsite during the construction phase; ▪ Any groundwater temporarily dewatered during the excavation works for the proposed attenuation tanks and for building foundations and during piling (as required), will be treated via. the installation of a temporary in-situ water treatment system; - This system should be designed and sized to ensure that all pumped groundwater water is treated via. a temporary attenuation pond, prior to discharge to a selected onsite location (via. a temporary soakaway). - The Contractor will be required to provide a Site-specific dewatering plan, clearly setting out proposed excavation methodology, estimated dewatering rates, details of proposed treatment system, and discharge location. The discharge location will be selected in the northern most section of the site and outside the source protection zone for Dunboyne PWS. No groundwater discharge will be permitted within the area designated as the source protection zone for Dunboyne PWS. ▪ The Contractor will be responsible for ensuring that the existing drainage network, specifically along the existing road, and as required elsewhere across the site, will be suitably protected (via. the use of physical barriers and / or the implementation a Site-specific water run-off management plan as required); ▪ Neither groundwater nor surface water runoff from the working areas will be permitted to discharge directly to the environment (e.g., existing ditches or River Tolka). Runoff generated within the site during construction will be filtered and treated to remove hydrocarbons and	tanks will be double skinned, with oil / chemical absorbent materials held onsite in close proximity to the tanks. Relevant maintenance contractors will be responsible for ensuring that these measures are fully implemented; ▪ In the unlikely event of a fuel / oil or chemical spill / leak during routine maintenance works, emergency spill response measures will be implemented with the aim of limiting the volume spilled and recovering as much of the lost product as possible (relevant maintenance contractors will be responsible for ensuring that these measures are fully implemented); and, ▪ A maintenance programme for the proposed surface water drainage system should be implemented. The Contractor, in consultation with the Client and the design team, will be responsible for ensuring that these measures are fully implemented. Following the implementation of these mitigation measures the likely effect on the water environment will be negligible not significant and long term.

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
sediment. Total Suspended Solids (TSS), pH/EC and colour will be monitored daily and outlets from sedimentation ponds will incorporate a turbidity monitor with alarm at a high level. ▪ During localised construction works along the existing drainage ditch in the west and south of the Site (to facilitate the culverting of parts of the ditch and construction of headwalls/outfalls), a construction methodology will be drawn up. This will detail the approach to the construction and installation of culverts along the southern drainage ditch (both the western and eastern sections). Any such works e.g., re-profiling of ditch and channel, are to take part in dry weather conditions, when the ditch bed is dry, to minimise sedimentation of watercourses downstream. Any minor volumes of stripped soils from these works will be stockpiled a minimum distance of 10m from the channel and will be appropriately covered. A temporary stormwater management system will be implemented by the Contractor. ▪ In order to prevent any potential surface water / groundwater impacts via. release of hydrocarbon / chemical contaminants the following standard measures will be implemented: - Fuels, lubricants and hydraulic fluids for equipment used on the construction Site, as well as any solvents, oils, and paints will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to best codes of practice; - Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the proposed development for disposal or re-cycling; ▪ The Construction Phase CEMP will collate and set out the environmental control measures required to minimise, and control adverse environmental impacts associated	

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
with the Proposed Development. It is intended that the CEMP will be a live document, which will capture all Construction Phase environmental mitigation measures included within the EIAR, NIS and any other measures which become apparent through the EIA consultation process and/or are prescribed through planning conditions etc. The CEMP will include enabling and decommissioning works. ▪ The CEMP will include an Emergency Response Plan (ERP) based on the Contractor's Risk Assessment, to be reviewed and approved by the Project Ecologist. The ERP will include (but not limited to): Training of relevant staff, including cover staff, in the implementation of the ERP and the use of spill kits; Procedures to be undertaken in the event of the release of any sediment into a watercourse, or any spillage of chemicals, fuel, oil or other hazardous materials or wastes; Procedures to be undertaken in the event of any non-compliance incidents with any permit or licence, or other such risks that could lead to a pollution incident, including flood risks; The number, specification and location of all spill kits which shall be carried/kept on the site; and Information on clean-up and reporting procedures. ▪ A response procedure to deal with any accidental pollution events will be clearly outlined within the ERP. Any spillage of fuels, lubricants or hydraulic oils will be immediately contained and the contaminated soil removed from the proposed development and properly disposed of in accordance with all relevant waste management legislation; - All Site vehicles used will be refuelled in bunded and adequately sealed and covered areas in the construction compound area. - Strict supervision of contractors will be adhered to in order to ensure that all plant and equipment utilised on-Site is in	

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
good working condition. Any equipment not meeting the required standard will not be permitted for use within the Site. This will minimise the risk of groundwater becoming contaminated through Site activity. - All oil stored on Site for construction vehicles will be kept in a locked and bunded area; - Generators, pumps and similar plant will be placed on drip-trays to prevent contamination; - All Site vehicles used will be refuelled in bunded areas; - All temporary construction fuel tanks will also be located in a suitably bunded area and all tanks will be double skinned. Relevant Material Safety Data Sheets along with oil absorbent materials will be kept on Site in close proximity to any fuel storage tanks or bowsers during proposed Site development works; and, - All fuel / oil deliveries to on-Site oil storage tanks will be supervised, and records will be kept of delivery dates and volumes. ▪ In order to prevent any potential surface water / groundwater impacts via. release of cementitious materials the following measures will be implemented where poured concrete is being used on Site; - The production, transport and placement of all cementitious materials will be strictly planned and supervised. Site batching/production of concrete will not be carried out on Site and therefore these aspects will not pose a risk to the waterbodies present, namely any temporarily exposed perched water, and the River Tolka; - Shutters will be designed to prevent failure. Grout loss will be prevented from shuttered pours by ensuring that	

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
all joints between panels achieve a close fit or that they are sealed; - Any spillages will be cleaned up and disposed of correctly; - Where concrete is to be placed by means of a skip, the opening gate of the delivery chute will be securely fastened to prevent accidental opening; - Where possible, concrete skips, pumps and machine buckets will be prevented from slewing over water when placing concrete; - Mixer washings and excess concrete will not be discharged directly into the drainage network, or any drainage ditches, surface water bodies or exposed groundwater; and, - Surplus concrete will be returned to batch plant after completion of a pour. ▪ Foul drainage from Site offices and Site compounds will be directed to the existing wastewater network or will be contained and disposed of off-site in an appropriate manner and in accordance with the relevant statutory regulations; and, ▪ Silt fencing will be installed 1m back from the land drain and the River Tolka and no works will be carried out between the silt fencing and the drain or river. ▪ The location of the site compound will be selected to avoid areas at risk of flooding from the River Tolka and the inner source protection zone for the Dunboyne PWS, and a minimum distance of 50m from proposed piling locations associated with the construction of the apartment blocks and the bridge structure over the River Tolka. ▪ There will be no bulk storage of fuels onsite. Chemicals, oils or hazardous materials shall be stored in fully bunded containers and outside areas at risk of flooding from the River Tolka, and the inner source protection zone for the Dunboyne PWS, and a minimum	

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
distance of 50m from proposed piling locations. ▪ Surface water monitoring (as detailed in Section 6.6) will be carried out at key locations along the River Tolka, before, during and after the Construction Phase to ensure water quality is monitored during the proposed works including during the construction of the proposed bridge structure. The above mitigation measures will form will be included and further developed by the Contractor within the project-specific Detailed CEMP which will be in operation during the construction phase. All Mitigation Measures as detailed within the Natura Impact Statement (Enviroguide Consulting, 2023) submitted as part of this planning application, which include specific mitigation measures during the proposed installation of the bridge over the River Tolka, will be fully implemented during the Construction Phase. Following the implementation of these mitigation measures the likely effect on the water environment during construction will be slight adverse not significant and short term	
Monitoring Surface water quality monitoring and visual inspections will be carried out along the River Tolka, at the following key locations: ▪ upstream of the proposed development; ▪ along the site boundary; and. ▪ downstream of the proposed development. The monitoring programme will include the following; ▪ Water quality monitoring will be undertaken using both field analysis and laboratory analysis based on the following frequency: - **Baseline Sampling** - 2no. baseline monitoring events (field measured	A maintenance programme for the proposed surface water drainage system including swales, detention basins, petrol interceptors, and hydrobrake flow control systems as required should be implemented during the operational phase.

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
parameters and laboratory analysis) at each surface water monitoring location including sampling at the watercourse's closest point to construction activities prior to commencement of any site works including enabling or construction works; - **Construction Phase Sampling** – monthly monitoring events (field measured parameters and laboratory analysis) at each surface water monitoring location (including sampling at the watercourse's closest point to construction activities) during site construction works. - **Post Construction Phase Sampling** – 2no. monitoring events (field measured parameters and laboratory analysis) at each surface water monitoring location (including sampling at the watercourse's closest point to construction activities) following completion of all construction works. - **Additional Sampling as needed** - Any additional monitoring events (field measured parameters and laboratory analysis) in the unlikely event of an environmental incident onsite, or in the vicinity of the construction works, or as advised by the Site Environmental Manager / Project Ecologist. ▪ During each surface water sampling event the following methodology will apply; - Surface water sampling must be carried out in accordance with the EN ISO 5667-6:2016/A11:2020 -Water quality - Sampling - Part 6: Guidance on sampling of rivers and streams (ISO 5667-6:2014). - Field notes will be recorded at each location including any olfactory or physical evidence of contamination. Specific precautions must be taken to ensure no potential for cross contamination (including the use of disposable nitrile gloves during sample handling at each location and the	

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
decontamination of equipment as required between sample locations). - Grab samples will be taken at each proposed surface water monitoring location using a telescopic pole (comprising a sample container and telescopic rods) and sample containers provided by the laboratory. - All surface water samples will be labelled appropriately, stored in chilled cooler boxes prior to same day dispatch to a UKAS certified laboratory for analysis, and tracked through completed Chain Of Custody documentation. ▪ The following field measured parameters will be recorded at each location using a calibrated field probe: Temperature (°C); Electrical Conductivity (µS/cm); pH; Total Dissolved Solids (ppm); Total Suspended Solids (ppm); Dissolved Oxygen (mg/l); Turbidity. ▪ The following suite of laboratory analysis will be carried out on each surface water sample: Total Dissolved Solids; Total Suspended Solids; Biochemical Oxygen Demand; Chemical Oxygen Demand; Alkalinity (Total); Hardness (as $CaCO_3$); Total Petroleum Hydrocarbons - Total TPH >C6-C40; and any additional key parameters as may be required. This suite may be added to by the Site Environmental Manager / Project Ecologist as required during the monitoring programme. ▪ All analytical results must be screened against the Generic Assessment Criteria (GAC) for surface water quality: Surface Water Regulations - S.I. No. 272 of 2009 as amended (2012 – 2022), and any additional relevant statutory or best practice requirements. ▪ All monitoring records, results and assessments will be held onsite for the duration of Construction Phase and will be made available to relevant stakeholders upon request if required.	

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
Chapter 7 Air Quality	
The proposed development has been assessed as having a medium risk of dust soiling impacts and a low risk of dust related human health impacts during the construction phase as a result of earthworks, construction and trackout activities. Therefore, the following dust mitigation measures shall be implemented during the construction phase of the proposed development. These measures are appropriate for sites with a medium risk of dust impacts and aim to ensure that no significant nuisance occurs at nearby sensitive receptors. The mitigation measures draw on best practice guidance from Ireland (DCC, 2018), the UK (IAQM (2014), BRE (2003), The Scottish Office (1996), UK ODPM (2002)) and the USA (USEPA, 1997). These measures will be incorporated into the overall Construction Environmental Management Plan (CEMP) prepared for the site. The measures are divided into different categories for different activities. *Communications* ▪ Develop and implement a stakeholder communications plan that includes community engagement before works commence on site. Community engagement includes explaining the nature and duration of the works to local residents and businesses. ▪ The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board should also include head/regional office contact details. *Site Management* ▪ During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions.	The impact of the operational traffic associated with proposed development on air quality is predicted to be imperceptible with respect to the operational phase in the long term. Therefore, no site-specific mitigation measures are required.

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
Dry and windy conditions are favourable to dust suspension therefore mitigations must be implemented if undertaking dust generating activities during these weather conditions. ▪ A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out *<u>Preparing and Maintaining the Site</u>* ▪ Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible. ▪ Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site. ▪ Avoid site runoff of water or mud. ▪ Keep site fencing, barriers and scaffolding clean using wet methods. ▪ Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below. ▪ Cover, seed or fence stockpiles to prevent wind whipping. *<u>Operating Vehicles / Machinery and Sustainable Travel</u>* ▪ Ensure all vehicles switch off engines when stationary - no idling vehicles. ▪ Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable. ▪ Impose and signpost a maximum-speed-limit of 15 kph haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided,	

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate). ▪ Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials. ▪ Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing) *Operations* ▪ Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems. ▪ Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate. ▪ Use enclosed chutes and conveyors and covered skips. ▪ Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate. ▪ Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods. *Waste Management* ▪ Avoid bonfires and burning of waste materials. *Measures Specific to Earthworks*	

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
▪ Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable. ▪ Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable. ▪ Only remove the cover in small areas during work and not all at once. ▪ During dry and windy periods, and when there is a likelihood of dust nuisance, a bowser will operate to ensure moisture content is high enough to increase the stability of the soil and thus suppress dust. *Measures Specific to Construction* ▪ Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place. ▪ Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery. ▪ For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust. *Measures Specific to Trackout* ▪ A speed restriction of 15 kph will be applied as an effective control measure for dust for on-site vehicles. ▪ Avoid dry sweeping of large areas. ▪ Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.	

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
▪ Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable. ▪ Record all inspections of haul routes and any subsequent action in a site log book. ▪ Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned. ▪ Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable). ▪ Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits. ▪ Access gates to be located at least 10 m from receptors where possible. *Monitoring* ▪ Undertake daily on-site and off-site inspections, where receptors (including roads) are nearby, to monitor dust, record inspection results in the site inspection log. This should include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100 m of site boundary, with cleaning to be provided if necessary. ▪ Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.	

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
Chapter 8 Climate	
Embodied carbon of materials and construction activities will be the primary source of climate impacts during the construction phase. During the construction phase the following best practice measures shall be implemented on site to prevent significant GHG emissions and reduce impacts to climate: ▪ 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. ▪ Waste materials will be re-used on site where possible and where re-use is not possible on-site they will be sent off-site for recycling, re-use or recovery. ▪ Sourcing materials locally where possible to reduce transport related CO_2 emissions. Additionally, as per Section 8.8.1.2, the site contractor will be required to prepare risk assessments to assess the risk of potential impacts from climate change during the construction stage of the development. If necessary, the contractor will be required to develop mitigation and procedures for dealing with climate change related impacts during construction such as intense rainfall events or storms.	A number of measures have been incorporated into the design of the development in order 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 8.8.2.1). A number of incorporated design mitigation measures have been incorporated into the design of the development to reduce the impact on climate wherever possible. The development will be in compliance with the requirements of the Near Zero Energy Building (NZEB) Standards and will achieve a Building Energy Rating (BER) in line with the NZEB requirements. Renewable technologies will be implemented for the energy or heating requirements of the units to meet the BER of the NZEB requirements. All lighting will be fully energy efficient lighting. Durable building material will be selected to prevent the need for frequent replacement or maintenance thereby reducing the embodied footprint of the development. Bicycle parking has been incorporated into the development to provide an alternative, more sustainable mode of transport compared to private vehicles. These identified measures will aid in reducing the impact to climate during the operational phase of the proposed development in line with the goals of the Climate Change Action Plan. Further details on some of the incorporated design measures can be found in the Energy Statement prepared by Morely Walsh in respect of this planning application.

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
Chapter 9 Noise and Vibration	
With regard to construction activities, best practice operational and control measures for noise and vibration from construction sites are found within BS 5228 (2009 +A1 2014) Code of Practice for Noise and Vibration Control on Construction and Open Sites Parts 1 and 2. BS5228 includes guidance on several aspects of construction site practices, including, but not limited to: - ▪ Selection of quiet plant. ▪ Control of noise sources. ▪ Screening (boundary, and or localised plant screening). ▪ Hours of work. ▪ Liaison with the public. ▪ Monitoring. Detailed comment is offered on these items in the following paragraphs. Noise control measures that will be considered include the selection of quiet plant, enclosures and screens around noise sources, limiting the hours of work and noise monitoring. 16.1.2.1 Selection of Quiet Plant This practice is recommended in relation to sites with static plant such as compressors and generators. It is recommended that these units be supplied with manufacturers' proprietary acoustic enclosures where possible. The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. The least noisy item should be selected wherever possible. 16.1.2.2 Noise Control at Source If replacing a noisy item of plant is not a viable or practical option, consideration should be given to noise control "at source". This refers to the modification of an item of plant or the application of improved sound reduction methods in consultation with the supplier. For	The British Standard BS EN 12354-3: 2000: Building acoustics – Estimation of acoustic performance of buildings from the performance of elements – Part 3: Airborne sound insulation against outdoor sound provides a calculation methodology for determining the sound insulation performance of the external envelope of a building. The method is based on an elemental analysis of the building envelope and can take into account both the direct and flanking transmission paths. The Standard allows the acoustic performance of the building to be assessed taking into account the following: ▪ Construction type of each element (i.e. windows, walls, etc.); ▪ Area of each element; ▪ Shape of the façade, and; ▪ Characteristics of the receiving room. The principles outlined in BS EN 12354-3 are also referred to in BS8233 and Annex G of BS8233 provides a calculation method to determine the internal noise level within a building using the composite sound insulation performance calculated using the methods outlined in BS EN 12354-3. The methodology outlined in Annex aG of BS8233 has been adopted here to determine the required performance of the building facades. This approach corrects the noise levels to account for the frequency content of the source in question. In this instance, rail and road traffic noise, depending on the buildings in question. For properties with cumulative impacts from both rail and road, the frequency content of the dominant source has been used for calculations. As is the case in most buildings, the glazed elements of the building envelope are typically the weakest element from a sound insulation

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures

example, resonance effects in panel work or cover plates can be reduced through stiffening or application of damping compounds; rattling and grinding noises can often be controlled by fixing resilient materials in between the surfaces in contact.

BS5228 states that "as far as reasonably practicable sources of significant noise should be enclosed". In applying this guidance, constraints such as mobility, ventilation, access and safety must be taken into account. Items suitable for enclosure include pumps and generators.

BS5228 makes a number of recommendations in relation to "*use and siting of equipment*". These are all directly relevant and hence are reproduced below. These recommendations will be adopted on site.

> *"Plant should always be used in accordance with manufacturers' instructions. Care should be taken to site equipment away from noise-sensitive areas. Where possible, loading and unloading should also be carried out away from such areas.*
>
> *Machines such as cranes that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum. Machines should not be left running unnecessarily, as this can be noisy and waste energy.*
>
> *Plant known to emit noise strongly in one direction should, when possible, be orientated so that the noise is directed away from noise-sensitive areas. Attendant operators of the plant can also benefit from this acoustical phenomenon by sheltering, when possible, in the area with reduced noise levels.*

perspective. The tables below provide the calculated specification for glazing and ventilation, respectively.

Table 16.2 Sound Insulation Performance Requirements of Glazing (dB)

Facade	Octave Band Centre Frequency (Hz)						Rw
	125	250	500	1k	2k	4k	
RED	28	29	33	42	45	53	39
All Other Facades	27	26	33	39	39	47	37

Table 16.3 Sound Insulation Performance Requirements for Ventilation, SRI (dB)

Facade	Octave Band Centre Frequency (Hz)						$D_{ne,w}$
	125	250	500	1k	2k	4k	
RED	46	44	38	43	43	55	42
All Other Facades	30	33	38	37	36	36	38

The figure below highlights the **RED** façades that require the higher level of noise mitigation, all other facades will require the lower level of mitigation.

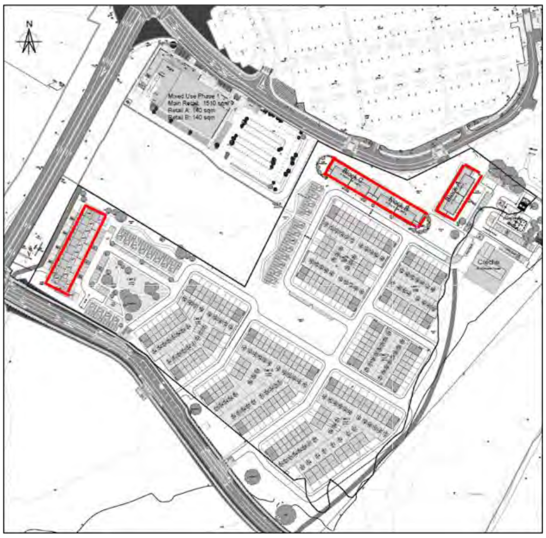

Figure 16.1 Facade Mitigation

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
*Acoustic covers to engines should be kept closed when the engines are in use and idling. The use of compressors that have effective acoustic enclosures and are designed to operate when their access panels are closed is recommended.** *Materials should be lowered whenever practicable and should not be dropped. The surfaces on to which the materials are being moved could be covered by resilient material."* Other forms of noise control at source relevant to the development works are set out below: - ▪ For mobile plant items such as cranes, dump trucks, excavators and loaders, the installation of an acoustic exhaust and or maintaining enclosure panels closed during operation can reduce noise levels by up to 10dB. Mobile plant should be switched off when not in use and not left idling. ▪ For percussive tools such as pneumatic concrete breakers and tools a number of noise control measures include fitting muffler or sound reducing equipment to the breaker 'tool' and ensure any leaks in the air lines are sealed. Erect localised screens around breaker or drill bit when in operation in close proximity to noise sensitive boundaries. ▪ For concrete mixers, control measures should be employed during cleaning to ensure no impulsive hammering is undertaken at the mixer drum. ▪ For all materials handling ensure that materials are not dropped from excessive heights, lining drops chutes and dump trucks with resilient materials.	The overall R_w and $D_{ne,w}$ outlined above are provided for information purposes only. The over-riding requirement is that the internal noise criteria is achieved, other combinations of upgraded glazing and ventilation may provide the same or better performance than those outlined within this report. In the context of the acoustic performance specification the 'glazing system' is understood to include any and all of the component parts that form part of the glazing element of the façade, i.e. glass, frames, seals, openable elements etc. The assessment has demonstrated that the recommended internal noise criteria can be achieved through consideration of the proposed façade elements at the design stage. The calculated glazing and ventilation specifications are preliminary and are intended to form the basis for noise mitigation at the detailed design stage. Consequently, these may be subject to change as the project progresses. *Wall Construction* In general, all wall constructions (i.e. block work or concrete) offer a high degree of sound insulation, much greater than that offered by the glazing systems. Therefore, noise intrusion via the wall construction will be minimal. The calculated internal noise levels across the building façade have assumed a minimum sound reduction index of 50 dB Rw for this construction. Internal Noise Levels Taking into account the external façade levels and the specified acoustic performance to the building envelope, the internal noise levels have been calculated. For all buildings within the development site, the good internal noise levels are achieved with windows closed.

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▪ Demountable enclosures can also be used to screen operatives using hand tools/ breakers and will be moved around site as necessary. ▪ All items of plant should be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures. **16.1.2.3 Screening** Typically screening is an effective method of reducing the noise level at a receiver location and can be used successfully as an additional measure to all other forms of noise control. The effectiveness of a noise screen will depend on the height and length of the screen and its position relative to both the source and receiver. Screening may be a useful form of noise control when works are taking place at basement and ground level to screen noise levels at ground floor adjacent buildings. In addition, careful planning of the site layout should also be considered. The placement of site buildings such as offices and stores and in some instances materials such as aggregate can provide a degree of noise screening if placed between the source and the receiver. The use of localised mobile (mobile hoarding screens and / or acoustic quilts) to items of plant with the potential to generate high levels of noise are an effective noise control measure. These options should be considered when percussive works are taking place in close proximity to the nearest sensitive perimeter buildings. **16.1.2.4 Liaison with the Public** A designated noise liaison should be appointed to site during construction works. All noise complaints should be logged and followed up in a prompt fashion by the liaison officer. In	

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
addition, prior to particularly noisy construction activity, e.g. demolition, breaking, piling, etc., the liaison officer should inform the nearest noise sensitive locations of the time and expected duration of the noisy works. 16.1.2.5 Hours of Work Construction works will be undertaken within the times below, taken from the Section 6 of the Draft Construction Management Plan: - ▪ Monday to Friday: 07:00 to 19:00hrs ▪ Saturday: 07:00 to 14:00hrs ▪ Sunday and Public Holidays: No noisy work on site.	
Chapter 10 Landscape and Visual Impact	
No significant landscape nor visual impacts are expected during construction. Despite that, less visually intrusive hoarding is proposed to reduce visibility of moving plant from outside the site.	No significant landscape nor visual impacts are expected during the operational phase. Nonetheless, the proposed development design includes tree retention of perimeter hedgerow that will help to mitigate against some of the less significant landscape and visual impacts on receptors most affected, namely R1 and R2. This is complementary to the proposed soft landscaping and planting schedules incorporate native tree and shrub species to encourage and support biodiversity which will improve the visual amenity and further mitigate against negative landscape and visual impacts.
Chapter 11 Material Assets: Traffic and Transport	
The following mitigation measure shall apply during the construction stage: ▪ All construction activities will be managed and directed by a Construction Traffic Management Plan (CTMP). The details of the CTMP will be agreed with the roads department of the Local Authority in advance of construction activities commencing on-site. ▪ Below is a list of proposed traffic management measures to be	The proposed development is consistent with all national, regional and local policies. In particular, those policies and objectives aligned with active and sustainable travel and transportation. Some of the mitigation measures proposed by the local and national authorities in the future include the following: ▪ The upgrades of road infrastructure were proposed in the future such as R147/R157 roundabout upgrade to Signalised junction, Signalisation along R147, Signalisation of R157 and Access

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
adopted during the construction works by the Contractor. Note that this is not an exhaustive list, and it will be the appointed contractor's responsibility to prepare a detailed Construction Traffic Management Plan to be approved with the Planning Authority prior to commencement of construction. ▪ Warning signs / Advanced warning signs will be installed at appropriate locations in advance of the construction access; ▪ Construction and delivery vehicles will be instructed to use only the approved and agreed means of access and movement of construction vehicles will be restricted to these designated routes; ▪ Restriction of HGV movements during drop off and pick up times associated with the adjacent schools; ▪ Appropriate vehicles will be used to minimise environmental impacts from transporting construction material, for example the use of dust covers on trucks carrying dust producing material; ▪ Speed limits of construction vehicles to be managed by appropriate signage, to promote low vehicular speeds within the Site; ▪ Parking of Site vehicles will be managed, and will not be permitted on public roads, unless proposed within that designated area that is subject to traffic management measures; ▪ A road sweeper will be employed to clean the public roads adjacent to the Site of any residual debris that may be deposited on the public road leading away from the construction Site; ▪ On Site wheel washing will be undertaken for construction trucks and vehicles to remove any debris prior to	Junctions, Dunboyne Business Park link to the R157, Eastern Distributor Road (EDR) between Station Road and Dunboyne Business Park and Link between the R157 and the Old Navan Road ▪ The DART + expansion programme, as set out in the Greater Dublin Area Transport Strategy 2016 -2035 (NTA, 2016), it is planned to deliver additional carriages, followed in the longer term by electrification, upgrade and more frequent rail services which will see a train depart every 12 minutes in the peak hour. Customer capacity and train service frequency on these lines will be significantly increased as a result of the programme, delivering a more efficient transport system that allows more people to make sustainable travel choices to meet the goals set out in the State's Climate Action Plan ▪ BusConnects Scheme, N3 Navan Corridor is seen as a 'spine' route which will operate between Blanchardstown and Dublin City Centre with continuous bus priority. Once implemented, Dunboyne will be served by routes 70 and 270 (renamed 364 and 264 respectively) which shall be extended from Dunboyne Town Centre to M3 Parkway to create a multi-modal interchange. These routes will become high frequency feeder routes to a major bus interchange at the Blanchardstown Centre, ▪ The development takes cognisance of the NTA's plans to redesign the bus network and provide a more efficient network with high frequency spines, new orbital routes and increased bus services

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
leaving the Site, to avoid any potential for debris on the local roads; ▪ All vehicles will be suitably serviced and maintained to avoid leaks or spillage of oil, petrol or diesel. Spill kits will be available on Site. All scheduled maintenance carried out off Site will not be carried out on the public highway; and, ▪ Safe and secure pedestrian facilities are to be provided where construction works obscure any existing pedestrian footway. Alternative pedestrian facilities will be provided in these instances, supported by physical barriers to segregate traffic and pedestrian movements, and to be identified by appropriate signage. Pedestrian facilities will cater for vulnerable users and mobility impaired persons. ▪ HGV movements will be managed so as not to occur during the network traffic peak period, particularly the AM school drop off period. The above mitigation measures will minimise any significant environmental degradation or safety concerns in the vicinity of the proposed works, due to the presence of construction traffic. Furthermore, it is in the interest of the construction programme that deliveries, particularly concrete deliveries are not unduly hampered by traffic congestion, and as a result continuous review of haulage routes, delivery timings and access arrangements will be undertaken as construction progresses to ensure smooth operation.	▪ The National Remote Work Strategy was published by the Department of Enterprise Trade and Employment which lays out the long-term strategy to promote home and remote working for public sector and private sector employees. The strategy mandates that 20% of the public sector workforce move to home and remote working in 2021. Furthermore, the strategy notes that more than 25% of the private sector workers in Ireland have the ability to work remotely, ▪ The development is adjacent and accessible to Routes DB1, DB2 and M14 of the N5 Greater Dublin Area Cycle Network Plan. Also, the Dunboyne North Masterplan document includes high walking and cycling permeability offering direct routes to local destinations and public transport stops. As per the document, connections will be facilitated through the introduction of north/south links between Dunboyne Town Centre and the Dunboyne North lands through the revitalisation of the Old Navan Road, provision of new pedestrian and cycle routes and in the form of a Linear Park along the Tolka River creating a new amenity for the area and ▪ The propensity for car ownership and car use is managed through measures that include reduced residential parking provision and increased cycle parking provision in line the 'Design Standards for New Apartments'. The provision of car club parking spaces will facilitate a lower level of car ownership. The above mitigation measures will provide alternatives to the private car for making trips and are envisaged to promote low car ownership

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
	which will in turn ensure that the level of traffic generation and thus the traffic impact on the local road network is mitigated.
Chapter 12 Material Assets: Service Infrastructure and Utilities	
Built Services The following mitigation measures will be implemented during the construction phase; ▪ A project-specific Detailed Construction Environmental Management Plan (CEMP) will be prepared by the appointed Contractor prior to the commencement of construction works. This document will take account of, and further develop, all of the environmental considerations (including water, dust and noise nuisance control; soil / stockpile management; temporary groundwater management; appropriate Site management of compound area; fuel, oil and chemical storage and use; and waste management) set out in the Outline CEMP submitted as part of this planning application; ▪ The construction compounds will include adequate temporary welfare facilities including foul drainage and potable water supply. Foul drainage discharge from the compound will be removed off site to an appropriately licensed facility for disposal until a connection to the public foul drainage network has been established; ▪ All newly installed utilities/ services will be assessed, tested and certified as required prior to being fully commissioned; ▪ Connections to the existing and proposed foul networks will be coordinated with the relevant utility provider. All works associated with the existing and proposed utilities for the	**Built Services** As no significant adverse effects are predicted to occur during the operational phase, no mitigation measures apply to the operational phase of the proposed development.

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
proposed development will be carried out in strict accordance with the guidelines of the relevant stakeholders (specifically ESB, eir and Uisce Éireann), and any additional site specific requirements; ▪ A copy of all available existing, and as built utility plans will be maintained on Site during the construction of the proposed development. Any existing services located onsite will be clearly marked and all Site personnel will be made aware of the known location of any onsite underground or over ground services during the construction phase; and, ▪ Street Lighting will be implemented in accordance with the Outdoor Lighting Report prepared by Morley Walsh Consulting Engineers (2023).	
Waste Management The following mitigation measures will be implemented during the construction phase: ▪ All waste management procedures implemented onsite during the construction phase will be in accordance with the Outline CWMP submitted as part of this planning application. In advance of commencement onsite, the Contractor will prepare a project specific Detailed Waste Management Plan which will further develop this outline plan, and will provide specific details in terms of proposed permitted haulage contractors, and permitted / licenced waste disposal / recovery facilities; ▪ Scheduling and planning the delivery of materials will be carried out on an 'as needed' basis to limit any surplus materials;	**Waste Management** Waste management during the operational phase of the development will be undertaken by private waste contractors (in accordance with statutory waste management and environmental requirements, regional waste related policy, and best practice waste management guidance), and regulated by Meath County Council. The following mitigation measures will be implemented during the operational phase in order to minimise the potential effect of litter pollution; ▪ Suitably sized waste receptacles will be provided in communal areas within the residential development and commercial units by private waste contractors; ▪ During the operational phase waste shall be collected on a regular basis; and,

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
• Materials will be ordered in sufficient dimensions so as to optimise the use of these materials onsite, and will be carefully handled and stored so as to limit the potential for any damage; • Where feasible, sub-contractors will be responsible for the provision of any materials they require onsite in order to help reduce any surplus waste; • All loaded trucks entering and exiting the Site will be appropriately secured and covered; and, Mud will be controlled at entry and exits to the Site using wheel washes (as required) and/or road sweepers, and tools and plant will be washed out and cleaned in designated areas. Wheel / road sweeper washings will be contained and treated prior to discharge	It will be the responsibility of residents, crèche users and maintenance workers to ensure that all waste generated is disposed of appropriately and responsibly, with penalties and legal sanctions being issued to anyone who is found to litter
Monitoring The Contractor will be responsible for maintaining waste records and documentation for the full duration of the construction phase. The Contractor will track and monitor all waste volumes transported offsite. All waste records will be maintained onsite throughout the project and will be made available for viewing by the Client, Employer's Representative and statutory consultees (MCC, EPA) as required,	No monitoring is required during the operational phase of the proposed development
Chapter 13 Biodiversity	
Pre-construction Surveys: Badger and Otter A minimum of 2-3 months prior to the commencement of works on Site (including enabling works), a suitably qualified Ecologist will be instructed to carry out surveys of the Site and river Tolka upstream and downstream of the proposed bridge crossing, for the below listed species. The results of these pre-commencement surveys will be provided to Meath CoCo prior to commencement of works on Site.	Bat Friendly Lighting In order to minimise disturbance to bats commuting/foraging in the vicinity of the Site, lighting has been designed to minimise light-spill onto any hedgerows or treelines to be retained or planted at the Site. This can be achieved by ensuring that the design of lighting adheres to the guidelines presented in the Bat Conservation Trust & Institute of Lighting Engineers *'Bats and Lighting in the UK - Bats and Built Environment Series',* (ILP, 2018) the Bat Conservation Trust *'Artificial Lighting and Wildlife Interim Guidance'*

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
▪ Badger. ▪ Otter. These pre-commencement surveys will ensure that no change has occurred in the status of these species at or near the Site since planning was submitted. The above surveys should confirm whether any nesting/resting places etc., for the above three species have occurred since previous surveys and will advise further mitigation measures etc as required. CEMP A CEMP based on the mitigation commitments presented in the various EIAR Chapters and this NIS, will be prepared for the Construction Phase. A planning stage CEMP has been prepared for submission with the planning application (PMG, 2023b), which entails an Environmental Management Section. This outline document provides a framework for the contractor to develop further as the project moves into the Construction Phase. The Construction Phase CEMP will collate and set out the environmental control measures required to minimise, and control adverse environmental impacts associated with the Proposed Development. It is intended that the CEMP will be a live document, which will capture all Construction Phase environmental mitigation measures included within the EIAR, NIS and any other measures which become apparent through the EIA consultation process and/or are prescribed through planning conditions etc. The CEMP will include enabling and decommissioning works. ▪ All construction and operations are to be carefully planned and implemented with a series of environmental management and control procedures. The CEMP will detail the general pollution prevention principles and measures which are to be	and the Bat Conservation Trust *'Statement on the impact and design of artificial light on bats'*. Through coordination between Enviroguide and the lighting consultants Morely Walsh Consulting Engineers, the lighting scheme will include the following: ▪ The minimisation of night-time lighting emitted during both the Construction and Operational Phases of the Proposed Development (once health and safety requirements are met). ▪ The avoidance of direct lighting of existing treelines and hedgerows and those to be planted at the Site, as much as is practicable. ▪ Dark corridors to be provided for movement of bats along the south-eastern, eastern and northern external boundaries of the Site at night. ▪ The avoidance of light spill onto the Tolka River from the proposed bridge. ▪ Planting will provide areas of darkness suitable for bats to feed and commute. ▪ Lighting to be directed downwards away from the treetops i.e., no spotlighting. ▪ The public lighting will have photocell/timer control to minimise lighting during the hours of darkness. ▪ Unnecessary light spill on to areas of retained/planted hedgerow controlled through a combination of directional lighting and hooded / shielded luminaires. ▪ All luminaires shall lack UV elements when manufactured and shall be LED. ▪ A warm white spectrum (2700-3000 Kelvin) will be used to reduce blue light component. ▪ Luminaires will feature peak wavelengths higher than 550 nm. A post construction check of the proposed lighting will be carried out by a suitably qualified

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
implemented, water and sediment management measures to prevent pollution during the Construction Phase and measures to ensure the potential for pollution fuel, oil, chemicals and other construction materials is minimised. ▪ The Contractor shall engage a suitably experienced ecologist, the Project Ecologist/Ecological Clerk of Works (ECoW), who will be a full member of a relevant professional institute such as CIEEM, have relevant experience in the management of ecological constraints during construction. The Project Ecologist shall be appointed sufficiently in advance of construction to arrange for any mitigation requirements to be incorporated into the CEMP and any site-specific method statements. ▪ The construction management of the Site will take account of the recommendations of the Construction Industry Research and Information Association (CIRIA) guides 'Control of Water Pollution from Construction Sites' and 'Groundwater control - design and practice' to minimise as far as possible the risk of pollution. ▪ The Contractor shall take all necessary precautions to prevent pollution or siltation of surface or groundwaters from construction activities; with a particular focus on the protection of existing drainage ditches and the River Tolka. The following management, control and mitigation measures will be implemented: ○ Any groundwater temporarily dewatered during the construction of the attenuation basins and any deep building foundations will be treated via	bat ecologist once the development is complete; to ensure that it is operating effectively and that impacts to bats through operational lighting at the Proposed Development are minimised and mitigation has been successful. Where necessary the bat ecologist will make recommendations to address any problem areas for bats and lighting. The bat ecologist will furnish the Biodiversity officer/Parks Department of Meath CoCo with a report detailing the survey results and mitigation installed once complete. Hedgerow Management Plan The existing hedgerows proposed to be retained within the south of the Site, along with any reinstated hedgerows, will be managed in a way that maximises the ecological value they provide at the Site, with habitat connectivity maintained along the south-eastern, eastern and northern margins of the Site; connecting it in with the wider field boundary network in the area and the River Tolka riparian corridor. This connectivity is vital for wildlife such as birds, bats, mammals and insect pollinators in a human landscape such as that which will be provided by the Proposed Development. Additionally, by managing hedgerows and treelines in a more natural way, they will provide more in terms of biodiversity; through increased plant diversity, increase provision of food resources and higher quality shelter to wildlife inhabiting and commuting through the area. To ensure the retained and newly planted hedgerows provide an adequate replacement of continuous habitat for the hedgerows to be removed at the Site, a Hedgerow Management Plan (HMP) will be prepared by a suitably qualified Ecologist. The HMP will specify the management of the retained and newly planted hedgerows for the party who will take charge of the operational landscape management of the Site. The HMP will be prepared in line with the recommendations made in the Hedgerow

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the installation of a temporary in-situ water treatment system; ○ This system should be designed and sized to ensure that all pumped groundwater water is treated prior to discharge to a selected onsite location (via a temporary soakaway). The Contractor will be required to provide a site-specific dewatering plan, clearly setting out proposed excavation methodology, estimated dewatering rates, details of the proposed treatment system, and discharge location. ○ Surface water attenuation measures are to be designed which will not be overwhelmed by one-off adverse precipitation events. ○ Where practical, cut-off V drains will be utilised to divert water entering Site and reduce the amount of water to be managed on-Site. Attention will be given to the maintenance and protection of all drains and temporary channels to minimise scour and the mobilisation of suspended solids (e.g. lining with hessian or clean stone, check dams, silt fencing etc.). ○ Mud will be controlled at entry and exits to the site using wheel washes and/or road sweepers, and tools and plant will be washed out and cleaned in designated areas. Wheel washings will be contained and treated prior to discharge. ○ Runoff will be directed to and intercepted by temporary	Appraisal Report (Enviroguide, 2023c) appended to this Chapter (provided in Appendix 13.5). To mitigate and compensate for the impact of the Proposed Development on hedgerows at the Site, it is recommended that areas of new hedgerows planted at the Site will be maintained in such a way that they achieve the same or higher condition scores as those hedgerows that will be lost as a result of the Proposed Development, namely: their overall score as per the HAS (Foulkes et al, 2013) **should be 2- Favourable or 3- Highly favourable.** In practice, to achieve these scores the new hedgerows should be ultimately have the following characteristics: ▪ A minimum 2.5m in height. ▪ A minimum of 2m in width. ▪ Have a dense base (regardless of whether they are to be topped or 'escaped' (un-topped) hedgerows). ▪ Have >2m meadow margin on one side at least. ▪ Have <5% gaps. ▪ Support <20% noxious species and no invasive species. This low-intervention management approach may not be appropriate for internal ornamental hedgerows planted within the main residential component of the Proposed Development, due to aesthetic or logistical reasons, however, it is best suited for external hedgerows to be located along the margins of the Site. In the case of this Proposed Development, the eastern and southern boundaries along with the F1 zoned lands within the River Tolka's flood plain are ideal areas for the provision of this semi-natural, high biodiversity value hedgerows (See Figure 13.29 in Chapter 13). <u>The goal of the HMP will be to ensure a semi-natural, network of wildlife corridors is created</u>; leading from the south of the main Site area, along the link road and connecting with the Tolka riparian corridor.

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settlement lagoons. The size of the settlement lagoon will be determined from predicted flow rates and retention times based on sediment particle size and density. ○ Neither groundwater nor surface water runoff from the working areas will be permitted to discharge directly to the environment (e.g., existing ditches or River Tolka). Runoff generated within the site during construction will be filtered and treated to remove hydrocarbons and sediment. Total Suspended Solids (TSS), pH/EC and colour will be monitored daily and outlets from sedimentation ponds will incorporate a turbidity monitor with alarm at a high level. ○ Subject to consent, water that is unpolluted, aside from its silt content, may be pumped out over adjacent vegetated ground, where appropriate, with consideration given to groundwater level and saturation, wildlife importance and proximity to drainage channels. ○ In the event of surface water failing to meet the required standards water will be recirculated to the inlet of the sediment pond to provide further time for settlement. A penstock will be provided on the outlet from the sediment pond to control discharge from the site. ○ The performance of the surface water drainage network will be maintained and monitored throughout the construction of the Proposed Development, noting that	Generally, hedgerows with high ecological value can be divided into two types of profiles, namely: <u>escaped hedges,</u> which remain un-topped but can be side-trimmed, and <u>topped hedges,</u> which are trimmed to an A-shaped cross-section with a wide base, excluding occasional trees. Both profiles should have a flowering canopy. Although the original hedgerows to be lost at the Site have the profile of escaped hedges, the management of the proposed hedgerows will ultimately depend on their location and feasibility within the Proposed Development. The period, frequency and intensity of management will depend on the choice of whether escaped hedges, managed with coppicing and laying, or topped hedges are being proposed. In any case, it is desirable that partial cutting/laying is carried out every year, e.g., a third of the entire length of the hedge annually and done in multi-year (three years at the minimum) rotation, and that the management and maintenance is continued in perpetuity, with monitoring conducted until the new hedges achieve the targeted overall scores (for details see Appendix 13.5 –Hedgerow Appraisal Report). The following measures will also be included in the HMP: ▪ The hedgerows located along the outer boundaries of the Site will, as much as is practicable, link up with each other. The provision of an almost continuous vegetative margin around the Site; through planted native hedgerows and trees, will maintain habitat connectivity with the surrounding environment. ▪ Hedgerows will be maintained with a **natural meadow strip of 1-2m** at their base wherever possible. Hedges with plenty of naturally occurring flowers and grasses at the base support will provide

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the proposed storm system will include permanent hydrocarbon separators. o Where the Contractor utilises pumping to drain works areas, a back-up pump and generator must be provided on Site for use in the event of the primary pump failing. o Procedures are to be put in place to ensure the identification, remediation and correct reporting of any silt or other pollution incidents that may occur. ▪ **During localised construction works along the existing drainage ditch in the west and south of the Site** (to facilitate the culverting of parts of the ditch and construction of headwalls/outfalls), a construction methodology will be drawn up. This will detail the approach to the construction and installation of culverts along the southern drainage ditch (both the western and eastern sections). ▪ Any such works e.g., re-profiling of ditch and channel, are to take part in dry weather conditions, when the ditch bed is dry, to minimise sedimentation of watercourses downstream. ▪ Any minor volumes of stripped soils from these works will be stockpiled a minimum distance of 10m from the channel and will be appropriately covered. A temporary stormwater management system will be implemented by the Contractor. ▪ Areas will be designated where stockpiles will be established in order to facilitate the efficient transfers of material within the Site. Stockpiles will be stabilised as soon as possible (e.g.	higher quality habitat for local wildlife using the hedges. ▪ The 1-2m strip at the base of the hedgerow will be cut on a reduced mowing regime to encourage wildflower growth and maximise the value of the hedgerow for pollinators. A **two-cut management approach** is ideal for suppressing coarse grasses and encouraging wild flowers. Cut the hedgerow basal strip **once during February and March** (this is before most verge plants flower and it will not disturb ground-nesting birds). Cut the verge **once again during September and October** (this slightly later cutting date allows plants that were cut earlier in the year time to grow and set seed). ▪ N.B. Raising the cutter bar on the back cut will lower the risk to amphibians, reptiles and small mammals. ▪ Where hedgerow trimming needs to occur delay trimming as late as possible – until **January and February** as the surviving berry crop will provide valuable food for wildlife. The earlier this is cut; <u>the less food will be available</u> to help birds and other wildlife survive through the winter. Any hedgerow cutting will be done outside of the nesting season and due consideration of the Wildlife Act 1976 (as amended) needs to be taken. ▪ Where possible, cut these outer boundary hedgerows on a minimum **3-year cycle** (cutting annually stops the hedgerow flowering and fruiting), and cut in rotation rather than all at once - this will ensure some areas of hedgerow

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sealed, closed over, seeded or covered using geotextile mats), and bunded by earth or silt fences at the toe to intercept silt-laden runoff during rainfall events. ▪ Appropriate working practices to avoid the repetitive handling of excavated substrates, minimise vehicle movements, limit the size, number and frequency of stockpiles, reduce the compaction and erosion of soils etc. and control the generation of dust. The implementation of a construction traffic management plan and controls on the locations of plant and materials will minimise the compaction and erosion of soil. Excavation is to be restricted during high winds and heavy rainfall to minimise dust generation and contaminated surface runoff. ▪ Excavated materials are to be inspected for signs of possible contamination, such as staining or strong odours. Should any be noticed, substrates are to be segregated and samples analysed for contaminants to determine an appropriate means of disposal to licensed/permitted facilities appropriate for the waste classification. ▪ In order **to prevent any potential surface water/groundwater impacts via. release of hydrocarbon/chemical contaminants** the following standard measures will be implemented: o The Contractor will ensure all Site personnel are trained in the handling of materials, the sensitive nature of the receiving environment, the drainage system and the consequences of accidental spillages.	will always flower (Blackthorn in March, Hawthorn in May etc.). ▪ Where they occur naturally, Bramble and Ivy should be allowed grow in hedgerows, as they provide key nectar and pollen sources in summer and autumn. *Methods to Avoid* **Hedgerows will not be over-managed**. Tightly cut hedges mean there are fewer flowers and berries, thus reducing available habitats, feeding sources and suitable nesting sites. **Hedgerows will not be cut between March 1st and August 31st inclusive**. It is both prohibited (except under certain exemptions) and very damaging for birds as this is the period they will have vulnerable nests containing eggs and young birds. Red-listed bird species Yellowhammer (recorded on Site) in particular nest up until the end of August. **DO NOT use pesticide/ herbicide sprays or fertilisers near hedgerows** as they can have an extremely negative effect on the variety of plants and animals they support

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○ Fuels, lubricants and hydraulic fluids for equipment used on the construction Site, as well as any solvents, oils, and paints, will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to best codes of practice; ○ Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the Proposed Development for disposal or recycling; ○ Any spillage of fuels, lubricants or hydraulic oils will be immediately contained and the contaminated soil removed from the Proposed Development and properly disposed of; ○ All Site vehicles used will be refuelled in bunded and adequately sealed and covered areas in the construction compound area. ○ Strict supervision of contractors will be adhered to in order to ensure that all plant and equipment utilised on Site is in good working condition. Any equipment not meeting the required standard will not be permitted for use within the Site. This will minimise the risk of groundwater becoming contaminated through Site activity. ○ All oil stored on Site for construction vehicles will be kept in a locked and bunded area;	

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○ Generators, pumps and similar plant will be placed on drip-trays to prevent contamination; ○ All temporary construction fuel tanks will also be located in a suitably bunded area and all tanks will be double skinned. Relevant Material Safety Data Sheets along with oil absorbent materials will be kept on Site in close proximity to any fuel storage tanks or bowsers during proposed Site development works; and, ○ All fuel/oil deliveries to on Site oil storage tanks will be supervised, and records will be kept of delivery dates and volumes. ○ Fixed plant shall be self-bunded; mobile plant shall be in good working order, kept clean, fitted with drip trays where appropriate and subject to regular inspection. Drip trays will be covered, emptied regularly as required and disposed of off Site having regard for local waste management legislation. ○ Spill kits and oil absorbent material shall be carried with mobile plant and located at vulnerable locations around the Site to reduce the risk of spillages entering the sub-surface or groundwater environment; booms shall be held on-site for works near drains or dewatering points. ○ Procedures are to be put in place to ensure the identification, remediation and correct reporting of any fuel, oil, chemical or other pollution incidents that may occur.	

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• In order **to prevent any potential surface water/groundwater impacts via. release of cementitious materials** the following measures will be implemented: ○ No mixing of concrete will be carried in close proximity to existing watercourses or drainage ditches as will be detailed in the CEMP. The measures detailed below will be employed where poured concrete is being used in the construction process; ○ The production, transport and placement of all cementitious materials will be strictly planned and supervised; ○ Shutters will be designed to prevent failure. Grout loss will be prevented from shuttered pours by ensuring that all joints between panels achieve a close fit or that they are sealed; ○ Any spillages will be cleaned up and disposed of correctly; ○ Where concrete is to be placed by means of a skip, the opening gate of the delivery chute will be securely fastened to prevent accidental opening; ○ Where possible, concrete skips, pumps and machine buckets will be prevented from slewing over water when placing concrete; ○ Surplus concrete will be returned to batch plant after completion of a pour; and	

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
○ The Contractor will dispose of all alkaline wastewaters and contaminated stormwater offsite having regard for local waste management legislation. ▪ The Contractor will implement procurement procedures to ensure that aggregate, fill material and topsoil are acquired from reputable sources with suitable environmental management systems as well as regulatory and legal compliance. ▪ The Contractor will vet the source of aggregate, fill material and topsoil imported to the Site in order to ensure that it is of a reputable origin and that it is "clean" (i.e. it will not contaminate the environment). ▪ All material to be disposed of off Site to a facility licensed having regard for local waste management legislation. Where material is to be stockpiled on site prior to disposal, the Contractor will control all run-off to prevent contamination of surrounding watercourses (via silt-fencing etc.). ▪ **The CEMP will include an Emergency Response Plan (ERP)** based on the Contractor's Risk Assessment, to be reviewed and approved by the Project Ecologist. The ERP will include (but not limited to): ○ Training of relevant staff, including cover staff, in the implementation of the ERP and the use of spill kits; ○ Procedures to be undertaken in the event of the release of any sediment into a watercourse, or any spillage of chemicals, fuel,	

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- oil or other hazardous materials or wastes; - Procedures to be undertaken in the event of any non-compliance incidents with any permit or licence, or other such risks that could lead to a pollution incident, including flood risks; - The number, specification and location of all spill kits which shall be carried/kept on the site; and - Information on clean-up and reporting procedures; etc. While it is expected that the Site drainage system will be installed and commissioned early in the Site construction programme, and will therefore be operational for much of the Construction Phase, there will be a period of the construction phase during which the Site drainage system will not be operational. The CEMP is required to cover this period and to deal with other issues during the Construction Phase. Construction Programme The CEMP will include a section setting out the construction programme and will include all the environmental control measures required to avoid impacts to salmonids and other species, as set out below. All discrete elements involving construction over or within the River Tolka (such as bridge construction, banks works etc.) are to be programmed to take place outside the spawning season for salmonids (i.e. they will **take place between July and September**) to ensure that impacts to protected fish species are avoided. Bridge Construction The installation of a bridge over the River Tolka will bring works close to the river channel. The	

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proposed bridge has a clear span of 12m and traverses a section of the river (See Figure 13.2 and Figure 13.2). Consequently, bridge abutment construction will be several metres away from the channel which will reduce the risk of silt or construction debris entering the watercourse in the event of spillages during the excavation or construction process. During the construction of the bridge, the Contractor will ensure that the river is protected from any inputs of contaminants/pollutants for the duration of the works. To minimise risks, best practise Construction measures for works within, or in the vicinity of watercourses will also be followed as per '*Guidelines for the crossing of watercourses during the construction of national road schemes*' (TII, 2008) and '*Control of water pollution from linear construction projects - CIRIA C648'* (CIRIA, 2006). The below measures will be included in the Contractor's CEMP to prevent the release of hydrocarbons, polluting chemicals, sediment/silt and contaminated waters into the receiving surface water network: ▪ A **Construction Method Statement** for the bridge construction will be prepared by the Contractor and signed off by the Project Ecologist/ECoW. This Method Statement will detail the mitigation/protection measures that will be put in place to protect the river during these works. ▪ All works adjacent to the River Tolka will be carried out in accordance with Inland Fisheries Ireland (IFI), "*Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters*". ▪ Prior to commencement on Site, **contact will be made with IFI** to ensure the works comply with the provisions of the Fisheries Act and Habitats Regulations,	

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
and that said works will be in accordance with any detailed operational and construction requirements issued by IFI. ▪ Works will be carried out from the bank side, **and in-stream works will be restricted to the period 1st July through 30th September,** to comply with the seasonal restrictions in salmonid rivers. ▪ A **suitably qualified ECoW** will be present on-site during the installation of the bridge and associated bank works. ▪ Wet concrete works in proximity to the watercourse will be avoided as much as practicable and the use of precast elements to form retaining structures and bridge foundations (e.g., segmental retaining walls, driven piles) will form part of the construction specification where feasible in lieu of in-situ concrete alternatives. ▪ It will be ensured that **all river protection measures will be maintained in good and effective condition** for the duration of the proposed works and checked regularly to ensure that the silt fencing and other mitigation measures are operating effectively. ▪ To prevent elevated levels of erosion and sedimentation at the Site during the Construction Phase, surface water at the Site will be managed and controlled for the duration of the construction works, until the permanent surface water drainage system (including attenuation and storage) for the Proposed Development is complete. ▪ Entry to the river channel by vehicles will be avoided, while vehicle usage along the banks will be restricted as much as practicable. Any machines working in	

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the watercourse must be protected against leakage or spillage of fuels, oils, greases and hydraulic fuels. ▪ Works involving the breaking of river banks e.g., any reprofiling of the river bank, will be carried out with suitable and effective mitigation in place to minimise/ prevent sediment release to the river i.e., cofferdams, Silt-traps and other suitable in-stream measures for the collection/filtration of sediment. ▪ Suitable temporary erosion control measures will be employed where required, to prevent sedimentation/erosion arising from any newly profiled banks until new vegetation establishes e.g., **jute/coir mesh blankets** (plastic will be avoided where possible). ▪ Features such as silt fencing and berms, will be installed prior to the commencement of construction to ensure the protection of the river during construction works. A silt fence set back **at least 10m** from the watercourse will be required, to be constructed of a suitable geotextile membrane to ensure water can pass through, but that silt will be retained. ▪ An interceptor trench will be required in front of the silt fencing where space allows. The silt fence must be capable of preventing 425µ (micron) and above sediment from passing through. It should also be resistant to damage during deformation resulting from loading by entrapped sediment. ▪ The silt fences will be monitored to ensure that they remain functional throughout construction of the	

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Proposed Development. Where necessary, maintenance will be carried out on the fences to ensure that they continue to be effective. This will be particularly important after heavy rainfall events. The checks will be undertaken by a suitably qualified person. The frequency of monitoring will depend on the stage of works, and local environmental conditions. Daily checks may be appropriate during the initial site clearance, during works in the vicinity of the watercourse, and during and after storm events. Weekly or bi-weekly checks may be appropriate at other times. ▪ When cofferdams are being kept dry by pumping, the discharge must be routed to an approved settlement facility before return to the river. ▪ Every care must be taken to insure against spillage of concrete or leakage of cement grout within cofferdams if being used. ▪ In a worst case scenario where a spillage of pollutants or cement grout etc into the river occurs during the construction of the bridge, the source of the pollution will be addressed immediately and works will cease until the situation has been rectified. ▪ Should such a spillage occur, the project ECoW, Meath CoCo and IFI will be contacted and informed immediately. Timing of Vegetation Clearance To ensure compliance with the Wildlife Act 2000 as amended, the removal of areas of vegetation <u>will not take place</u> within the nesting bird season (March 1st to August 31st inclusive) to ensure that no significant impacts (i.e., nest/egg destruction,	

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harm to juvenile birds) occur as a result of the Proposed Development. Where any removal of vegetation within this period is deemed unavoidable, a qualified ecologist will be instructed to survey the vegetation prior to any removal taking place. Should nesting birds be found, then the area of habitat in question will be noted and suitably protected until the ecologist confirms the young have fledged. Table 13.14 of Chapter 13 provides guidance for when vegetation clearance is permissible. Information sources include The Herpetological Society of Ireland, British Hedgehog Preservation Society's *Hedgehogs and Development* and *The Wildlife (Amendment) Act, 2000*. The preferred period for vegetation clearance is **within the months of September and October**. Vegetation will be removed in sections working in a consistent direction to prevent entrapment of protected fauna potentially present (e.g., Hedgehog). Where this seasonal restriction cannot be observed, a check for active roosts and nests, as well as signs of amphibians and Lizards, will be carried out immediately prior to any Site clearance by an appropriately qualified ecologist and repeated as required to ensure compliance with legislative requirements. Protection of Mammals As best-practise all construction-related rubbish on site e.g., plastic sheeting, netting etc. will be kept in a designated area and kept off ground level so as to prevent small mammals such as Hedgehogs from entrapment and death. Trenches/pits must be either covered at the end of each working day or include a means of escape for any animal falling in e.g., a plank or objects placed in the corner of an excavation. (Species such as badgers will continue to use established paths across a site even when construction work has started).	

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Any temporarily exposed open pipe system will be capped in such a way as to prevent animals gaining access as may happen when contractors are off Site. Tree Protection Protective tree fencing in compliance with BS 5837:2012 'Trees in relation to design, demolition and construction – Recommendations' will be erected prior to any Construction works being undertaken to prevent damage to the canopy and root protection areas of existing trees at the Site. The fencing should be signed off by a qualified arborist prior to Construction to ensure it has been properly erected. No ground clearance, earthworks, stock-piling or machinery movement will be undertaken within these areas. The project Arborist will be instructed prior to commencement on Site; to ensure that appropriate tree protection measures are in place. These measures will entail robust fencing around the root protection zones of all trees and hedgerows being retained on Site. An adequate level of signage will also be provided to highlight 'no work zones' and ensure that Site creep and damage to retained habitats does not occur. The areas of the southern east-west hedgerow that are to be retained at the Site must be sufficiently protected for the duration of the Construction Phase to ensure maximise their value in the final landscape plan. The project Arborist, the project Ecologist and the Site Manager will work together to ensure these sections of hedgerow protected for the duration of the works. Noise Control Short-term increases in disturbance levels as a direct result of human activity and through increased generation of noise during the Construction Phase can have a range of impacts depending upon the sensitivity of the ecological	

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receptor, the nature and duration of the disturbance and its timing. Noise generated during the Construction Phase of the Proposed Development could cause temporary disturbance to a number of faunal species in the vicinity of the Site of the Proposed Development. To mitigate this disturbance, the following measures will be implemented: ▪ Selection of plant with low inherent potential for generating noise. ▪ Siting of plant as far away from sensitive receptors as permitted by site constraints. ▪ Avoidance of unnecessary revving of engines and switch off plant items when not required. ▪ Keep plant machinery and vehicles adequately maintained and serviced. ▪ Proper balancing of plant items with rotating parts. ▪ Keep internal routes well maintained and avoid steep gradients. ▪ Minimise drop heights for materials or ensure a resilient material underlies. ▪ Where noise originates from resonating body panels and cover plates, additional stiffening ribs or materials should be safely applied where appropriate. ▪ Limiting the hours during which site activities likely to create high levels of noise are permitted. ▪ Appointing a site representative responsible for matters relating to noise.	

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▪ Monitoring typical levels of noise during critical periods and at sensitive locations. These measures will ensure that any noise disturbance to nesting birds or any other fauna species in the vicinity of the Site of the Proposed Development will be reduced to a minimum. Dust Control The objective of dust control at the Site is to ensure that no significant nuisance occurs at nearby sensitive receptors, including the River Tolka. In order to develop a workable and transparent dust control strategy, a Dust Management Plan (DMP) will be implemented and included within the Contractor's CEMP. The following measures will be included: ***General Monitoring*** ▪ Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This will include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100 m of Site boundary, with cleaning to be provided if necessary. ▪ Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked. Increase the frequency of site inspections by the person accountable for air quality and dust issues on Site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions. ▪ Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring	

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locations with the Local Authority. Baseline monitoring will commence at least three months before work commences on site or before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction. ***Communications*** ▪ Develop and implement a stakeholder communications plan that includes community engagement before work commences on site. ▪ Display the name and contact details of person accountable for air quality and dust issues on the site boundary. ▪ Display the head or regional office contact information. ▪ Develop and implement a DMP, which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk and should include as a minimum the measures in this document. The desirable measures should be included as appropriate for the site. ***Site Management*** ▪ Regular inspections of the Site and boundary, particularly vegetation along the banks of the Tolka, will be carried out to monitor dust, records and notes on these inspections should be logged. ▪ Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.	

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
▪ Make the complaints log available to the local authority when asked. ▪ Record any exceptional incidents that cause dust and/or air emissions, either on- or off Site, and the action taken to resolve the situation in the logbook. ***Preparing and Maintaining the Site*** ▪ Plan Site layout so that machinery and dust causing activities are located away from receptors, as far as is possible. ▪ Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on Site. ▪ Fully enclose specific operations where there is a high potential for dust production and the Site is active for an extensive period. ▪ Avoid Site runoff of water or mud. ▪ Keep Site fencing, barriers and scaffolding clean using wet methods. ▪ Remove materials that have a potential to produce dust from Site as soon as possible, unless being re-used on Site. If they are being re-used on Site cover as described below. ▪ Cover stockpiles to prevent wind whipping. ***Operating Vehicles / Machinery and Sustainable Travel*** ▪ Ensure all vehicles switch off engines when stationary - no idling vehicles. ▪ Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable.	

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
▪ Impose and signpost a maximum-speed-limit of 20 kph haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate). ▪ Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials. ▪ Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing) ***Operations*** ▪ Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g., suitable local exhaust ventilation systems. ▪ Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate. ▪ Use enclosed chutes and conveyors and covered skips. ▪ Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate. ▪ Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably	

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
practicable after the event using wet cleaning methods. ***Measures Specific to Earthworks*** ▪ Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable. ▪ Use Hessian or mulches where it is not possible to re-vegetate or cover with topsoil, as soon as practicable. ▪ Only remove the cover in small areas during work and not all at once. ▪ During dry and windy periods, and when there is a likelihood of dust nuisance, a bowser will operate to ensure moisture content is high enough to increase the stability of the soil and thus suppress dust. ***Measures Specific to Construction*** ▪ Avoid scabbling (roughening of concrete surfaces) if possible. ▪ Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place. ▪ Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery. ▪ For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust. ***Measures Specific to Trackout***	

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
Site roads (particularly unpaved) can be a significant source of fugitive dust from construction sites if control measures are not in place. The most effective means of suppressing dust emissions from unpaved roads is to apply speed restrictions. Studies show that these measures can have a control efficiency ranging from 25 to 80%. ▪ A speed restriction of 15 km/hr will be applied as an effective control measure for dust for on Site vehicles. ▪ Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the Site. This may require the sweeper being continuously in use. ▪ Avoid dry sweeping of large areas. ▪ Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport. ▪ Inspect on Site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable. ▪ Record all inspections of haul routes and any subsequent action in a Site log book. ▪ Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned. ▪ Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable). ▪ Ensure there is an adequate area of hard surfaced road between the wheel wash	

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
facility and the Site exit, wherever site size and layout permits. ▪ Access gates to be located at least 10 m from receptors where possible. ***Dust Control – Public Roads*** Spillage and blow-off of debris, aggregates and fine material onto public roads will be reduced to a minimum by employing the following measures. ▪ Vehicles delivering material with potential for dust emissions to an off Site location shall be enclosed or covered with tarpaulin always to restrict the escape of dust; ▪ Public roads outside the Site shall be regularly inspected for cleanliness, as a minimum daily, and cleaned as necessary. A road sweeper will be made available to ensure that public roads are kept free of debris. If practicable, a wheel wash facility will be employed at the exit of the Site so that traffic leaving the Site compound will not generate dust or cause the build-up of aggregates and fine material in the public domain.	
Monitoring During the Construction Phase, the following monitoring will be carried out by the construction contractor to ensure the implemented mitigation measures are maintained effectively: ▪ Dust control measures (as described in Section 13.11.2.9) will be checked on a weekly basis, and more often during dry weather, to ensure they remain effective. The bank vegetation of the located east of the main Site area will be checked for any potential dust impacts,	Monitoring During the Operational Phase, the following monitoring will be carried out by the relevant designated person to ensure the implemented mitigation and enhancement measures are maintained effectively: ▪ The standard necessary maintenance checks will be carried out to ensure all SUDS measures and the wastewater pumping station are operating correctly. ▪ A Biodiversity Monitoring Plan will be prepared by a suitably qualified Ecologist that will cover the post-construction monitoring of the efficacy

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
and the dust control measures reviewed if impacts are noted. ▪ Surface water and groundwater protection measures (as described in Section 13.11.2.2) will be checked weekly to ensure they remain effective, and more often during moderate to heavy rainfall events as appropriate. ▪ Surface water quality monitoring and visual inspections will be carried out along the River Tolka, at the following key locations as per the recommendations in ***Chapter 6**: **Hydrology and Hydrogeology*** of this EIAR: - Upstream of the proposed development; - Along the site boundary; and. - Downstream of the proposed development. Water quality monitoring will be undertaken using both field analysis and laboratory analysis based on the following frequency: - **Baseline Sampling** - 2no. baseline monitoring events (field measured parameters and laboratory analysis) at each surface water monitoring location including sampling at the watercourse's closest point to construction activities prior to commencement of any Site works including enabling or construction works; - **Construction Phase Sampling** – monthly monitoring events (field measured parameters and laboratory analysis) at each surface water monitoring location (including sampling at the watercourse's closest point to	of the proposed enhancement measures e.g., bird boxes. ▪ Bird boxes will be inspected annually for a period of 3 years as part of the BMP to assess whether these measures have been adopted by their respective species groups

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
construction activities) during Site construction works. - **Post Construction Phase Sampling** – 2no. monitoring events (field measured parameters and laboratory analysis) at each surface water monitoring location (including sampling at the watercourse's closest point to construction activities) following completion of all construction works. - **Additional Sampling as needed** - Any additional monitoring events (field measured parameters and laboratory analysis) in the unlikely event of an environmental incident onsite, or in the vicinity of the construction works, or as advised by the Site Environmental Manager/Project Ecologist. ▪ The results of all of the above monitoring will be made available to Meath CoCo on request and any remedial measures that are required based on the results of same will be agreed with the LPA if required.	
Chapter 14 Cultural Heritage and Archaeology	
There are no extant 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 the site and it is not within, in the close environs of, an Architectural Conservation Area. No mitigation measures for the architectural heritage resource are, therefore, required. A suitably qualified archaeologist will be appointed to carry out a programme of archaeological test trenching of the proposed development site in advance of the construction	Any measures required to ensure the preservation in situ of any identified archaeological remains during the operation phase will be agreed with the National Monuments Service. All other required mitigation measures will be enacted prior to and during the construction phase and, therefore, no cultural heritage mitigation measures during the operational phase of the proposed development are predicted.

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
phase under licence by the National Monuments Service. These site investigation works will comprise testing of 10-12% of the site area and will include targeted test trenching of all features of archaeological potential identified during the geophysical survey of the proposed development site as well as the section of the townland boundary between Bennetstown and Dunboyne. The townland boundary will also be subject to a written and photographic record. All archaeological remains identified during the test trenching investigations will be cordoned off and recorded *in situ* in written, drawn and photographic formats. A report on the test trenching results, including detailed written, illustrative and photographic records, will then be submitted to the National Monuments Service, per licensing requirements, who will 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 of any identified archaeological remains as well as archaeological monitoring of the construction phase. The report will also detail proposals for short term (construction phase) and long term (operation phase) preservation measures for any identified archaeological remains that will be preserved *in situ*. Any archaeological excavation works to preserve identified archaeological remains by record will be carried out under licence by the National Monuments Service and in advance of any construction works at the locations of the relevant identified archaeological remains. All required archaeological excavation works, including post-excavation analyses as well as preliminary and final reporting, will be carried out in accordance with the archaeological method statement submitted to the National Monuments Service and the National Museum	

Construction Phase Mitigation Measures	Operational Phase Mitigation Measures
of Ireland as part of the licence application. An archive containing stratigraphic records (including all associated digital and hard copy records and reports) will be submitted to the National Monuments Service upon completion of archaeological works. Any archaeological objects and relevant environmental material retrieved during archaeological excavation works, as well as all relevant reports, will be provided to the National Museum of Ireland upon completion of all archaeological works, including post-excavation analyses.	
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 test trenching and excavation works and these will allow for monitoring of the successful implementation of mitigation measures. A detailed method statement stating the proposed strategy for the test trenching works will accompany the submitted licence application which will clearly detail the extent of the archaeological works and outline the processes to be enacted in the event that any archaeological remains are encountered. A revised method statement for any required excavation works will be submitted to the National Monuments Service and National Museum of Ireland as part of an application for a licence to complete these works. Reports on the archaeological site investigations will then be submitted to the National Monuments Service, the National Museum of Ireland and the Planning Authority which will clearly describe the results of all archaeological works in written, mapped and photographic formats.	

Large Scale
Residential Development
at Dunboyne North, Co. Meath

Volume II

Environmental Impact Assessment Report

CHAPTER 17

Screening for Major Accidents

August 2023

McCutcheon Halley
CHARTERED PLANNING CONSULTANTS

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17 Screening for Major Accidents

17.1 Introduction

In order to ensure a comprehensive assessment of potential environmental effects due to risks of major accidents and/or disasters as relevant to the development, this chapter presents a review of the characteristics of the proposed development and of the project location to consider potential for accident scenarios.

In assessing likely potential and predicted impacts, account has been taken of both the importance of the attributes and the predicted scale and duration of the likely impacts. Section 8 of Annex IV of the EIA Directive specifies that the EIAR must include:

> *"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".*

A major accident can be defined as an acute or chronic accident or disaster, of human or natural origin, which occurs either as a consequence of, or which interacts with, the construction or operation of the proposed Scheme, and which has substantial consequences for people or the environment.

The Seveso III Directive (2012/18/EU) also requires Member States to apply land-use or other relevant policies to ensure that appropriate distances are maintained between residential areas, areas of substantial public use and the environment, including areas of particular natural interest and sensitivity and hazardous establishments (commonly referred to as Seveso sites). For existing establishments, Member States are required to implement, if necessary, additional technical measures so that the risk to persons or the environment is maintained at an acceptable level.

The Health and Safety Authority (HSA) is the Competent Authority in Ireland as defined by Chemicals Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015, (COMAH Regulations 2015) which implements the Seveso III Directive in Ireland. The HSA is responsible for ensuring that the impacts of facilities which fall within the remit of this legislation are taken into account with respect to land use planning. This

The HSA does not currently consider the proposed development to be a COMAH facility. However, in order to ensure a comprehensive assessment of potential environmental effects due to risks of major accidents and/or disasters as relevant to the development, this chapter presents a review of the characteristics of the proposed development and of the project location to consider potential for accident scenarios that do not fall under COMAH reporting requirements.

17.2 Expertise & Qualifications

This chapter of the EIAR has been prepared by Saoirse Kavanagh, Executive Planning Consultant of McCutcheon Halley Planning Consultancy. Saoirse holds a bachelor's degree in Arts (International), majoring in Geography, and a Master's in Planning and Sustainable Development. She has over 4 years' experience working with multi-disciplinary teams and has provided input into a variety of projects. In particular, she has co-ordinated the preparation of the following three Environmental Impact Assessment Reports (EIARs) including the completion of the Introduction, Alternatives, and Population and Human Health chapters.

- Cooldown Commons Strategic Housing Development, Citywest, Dublin.
- Parkside 5B Strategic Housing Development, Belmayne, Dublin.
- Clonattin Strategic Housing Development, Gorey, Co. Wexford.

17.3 Proposed Development

The full description of the proposed development is outlined in Chapter 2 'Development Description' of this EIAR.

17.4 Methodology

In the EIA assessment, consideration is given to both the importance of an attribute and the magnitude of the potential environmental impacts of the proposed activities on that attribute.

The principal attributes (and impacts) to be assessed include the following:

- Localised flooding (potential increase or reduction) and floodplains including benefitting lands and drainage districts (if any).
- Potential Seismic Activity (if any).
- Proximity to any COMAH/SEVESO sites.

COMAH/Seveso sites are defined as industrial sites that, because of the presence of dangerous substances in sufficient quantities, are regulated under the Seveso II Directive.

17.4.1 Relevant Legislation & Guidance

The assessment has been carried out generally in accordance with the following guidelines:

- EPA 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports' (2022),
- EPA 'Draft Advice Notes on Current Practice in the Preparation of Environmental Impact Statements' (2015), and;
- National Roads Authority (NRA) 'Guidelines on Procedures for the Assessment and Treatment of Hydrology for National Road Schemes' (2009).

17.4.2 Site Surveys/Investigation

The collection of baseline regional data was undertaken by reviewing the following sources:

- Office of Public Works (OPW) flood mapping data (www.floodinfo.ie).

Site specific data was derived from the following sources:

- Engineering reports prepared by Atkins and Paul McGrail Consulting Engineers.
- Site plans and drawings prepared and submitted with the planning application.

17.4.3 Consultation

The Health Safety Authority were contacted in August 2023 regarding the proposed development and were notified that an EIAR was being completed. The Authority did not provide any feedback in relation to the proposed development or the content of the EIAR.

17.5 Difficulties Encountered

There were no difficulties encountered during the compilation of this chapter.

17.6 Baseline Environment

The description of the site context and proposed development is presented in detail in Chapter 2 – Project Description.

17.6.1 Site Description

The site is a greenfield site, located to the north of Dunboyne town centre and south of the M3 Parkway train station and car park. The R157 bounds the site to the west and the River Tolka flows through the site to the east. The surrounding lands comprise primarily agricultural lands which have been zoned for development.

17.6.2 Flood Risk

A Site Specific Flood Risk Assessment of the site was carried out by IE Consulting (2023). The most immediate and significant hydrological feature in the vicinity of the proposed development site is the River Tolka located adjacent to the eastern boundary of the site. There is also a Drainage Channel location in the south-western area of the site, which converges with the Naulswood Stream at a point located approximately 120m south of the site. There are a number of field drains located within the vicinity of the site that drain into the watercourses described above. These drains generally do not perform a significant drainage function in the vicinity of the site, mainly drains the runoff from the adjacent lands only. The catchment areas associated with these field drains have been accounted for in the hydrological assessment of the Drainage Channel, Naulswood Stream and the River Tolka.

The primary potential flood risk to the proposed development site can be attributed to an extreme fluvial flood event in the River Tolka, the Drainage Channel and the Naulswood Stream located in the vicinity of the site. Secondary flood risk can be attributed to surcharge due to potential blockage of the bridge on the River Tolka 240m downstream of the site

There are three single flood events and two recurring flood events in this area of Dunboyne in the OPW's floodinfo.ie database of maps and the most eastern area of the subject site lies within the flood zones shown in the County Development Plan. Map information for river and coastal flood events were viewed for the proposed site. The river flood map for low, medium and high probability fluvial flood events were assessed. The map confirms that the eastern area of the site falls within a fluvial flood risk zone.

The information reviewed during the Site Specific Flood Risk Assessment identifies that the primary flood risk to the proposed site is fluvial flooding on the eastern area of the development site. In order to ensure a sustainable development of the site and to reduce flood risk to the site itis proposed to limit any highly vulnerable development (residential dwelling houses, crèche, etc.) to within Flood Zone 'C'. It is not proposed to undertake any highly vulnerable development within Flood Zone 'A' or Flood Zone 'B'. It is also proposed to raise the proposed development access road above the predictive 0.1% AEP (1 in 1000 year flood) levels in the southern area of the site. he proposed development is considered to comply with the requirements of the Justification Test for development management. In consideration of the proposed development scenario, flood risk to and from the development is considered to be LOW. The development as proposed is not expected to result in an adverse impact to the hydrological regime of the area or increase flood risk elsewhere.

17.6.3 Seisimc Activity

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 the 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 landslides and falls lead 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.

In Ireland, seismic activity is recorded by the Irish National Seismic Network. The Geophysics Section of the School of Cosmic Physics, Dublin Institute for Advanced Studies (DIAS) has been recording seismic events in Ireland since 1978. The station configuration has varied over the years. However, currently there are five permanent broadband seismic recording stations in Ireland including IWEX on Carrickbyrne Hill, Co. Wexford, running from 01/01/2011 and operated by DIAS. The seismic data from the stations comes into DIAS in real-time and are studied for local and regional events.

As can be seen in Figure 18.1 above, the principal events have occurred along/ beyond the east, south-east and south of Ireland with seismic movements generally up to 2.9 Magnitude recorded on land with no large seismic events recorded in the immediate vicinity of the subject site.

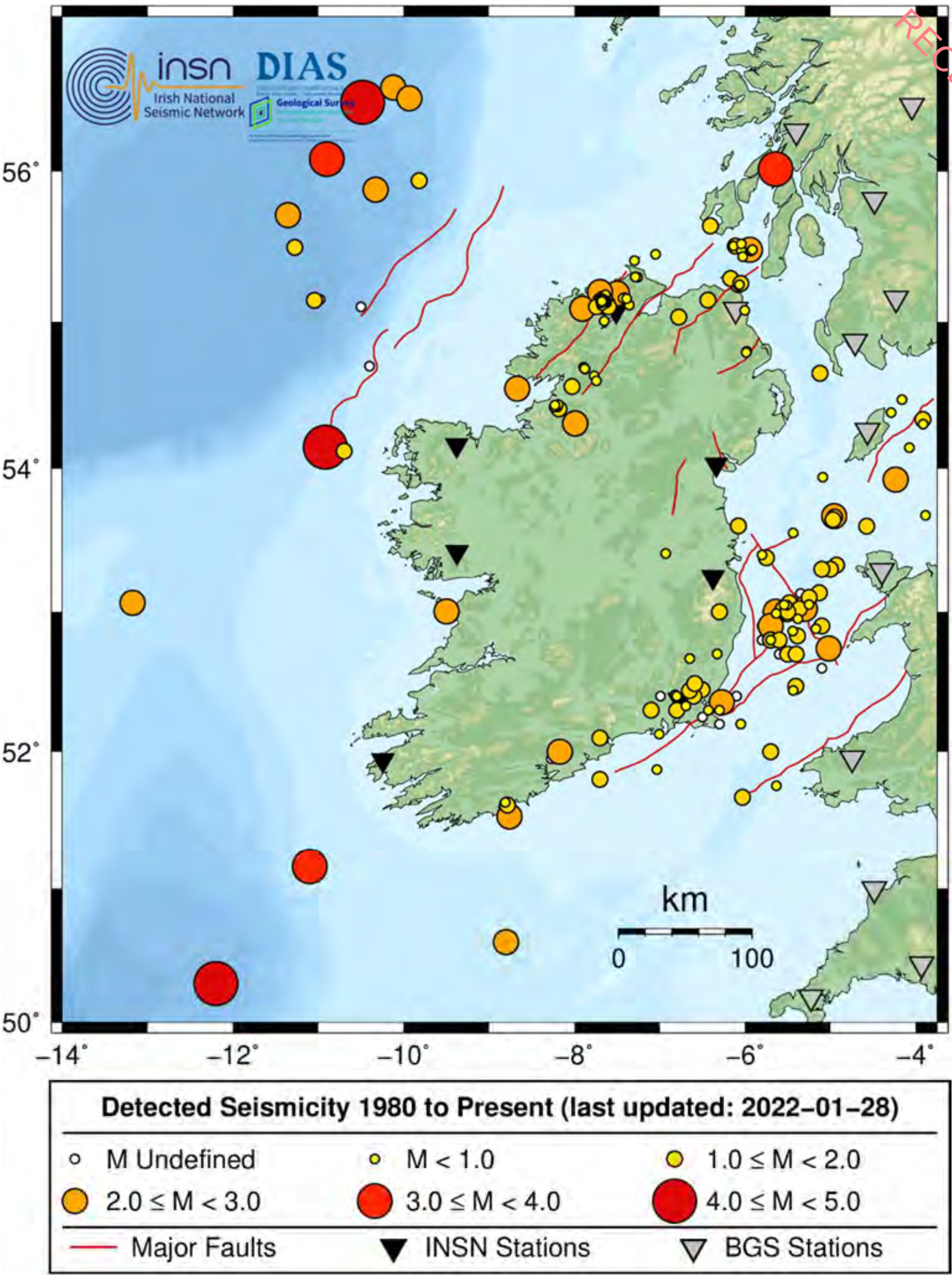

Figure 17.1 Seismic Movements. Source: Irish National Seismic Network

17.6.4 COMAH/SEVESO Sites

The Seveso Directive (Directive 82/501/EEC, Directive 96/82/EC, Directive 2012/18/EU) was developed by the EU after a series of catastrophic accidents involving major industrial sites and dangerous substances. Such accidents can give rise to serious injury to people or serious damage to the environment, both on and off the site of the accident. The Chemicals Act (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2015 (S.I. No. 209 of 2015) (the "COMAH Regulations"), implement the latest Seveso III Directive (2012/18/EU).

The purpose of the COMAH Regulations is to transpose the Seveso Directive into Irish law and lay down rules for the prevention of major accidents involving dangerous substances, and to seek to limit as far as possible the consequences for human health and the environment of such accidents, with the overall objective of providing a high level of protection in a consistent and effective manner.

There are two tiers of establishment, which are related to the quantities of dangerous substances present. Depending on quantity, an establishment may be upper-tier or lower-tier. Upper-tier establishments have greater quantities of dangerous substances present and therefore are obliged to comply with additional requirements specified in the Regulations. Lower-tier establishments have lower quantities of dangerous substances present.

There are six Seveso sites located in the Damastown Industrustial Park and Westport Business Park in Mulhuddart which is in the administrative area of Final County Council. The closest to the subject site is the Astellas Ireland Co., Ltd. site which is located c. 3.7km from the subject site. This is a 'lower tier establishment' and has a consultation distance of 1,000m. The details of these sites are provided in the table below.

Given the distances between the subject site and these Seveso sites, it is not considered a concern for the proposed development at construction or operational phase.

The proposed development has been designed in accordance with the Safety, Health and Welfare at Work Act 2005 (S.I. 10 of 2005) as amended and the Safety, Health and Welfare at Work (General Application) Regulations 2007 to 2016 (S.I. 299 of 2007, S.I. 445 of 2012, S.I. 36 of 2016) as amended and associated regulations.

Table 17.1 Seveso Sites

Site	Tier	Consultation Distance	Distance to Site
Astellas Ireland Co., Ltd.	Lower Tier	1,000m	3.7km
Clarochem Ireland Ltd., (formally Helsinn),	Lower Tier	1,000m	3.9km
Chemco (Ire) Ltd. T/A Macetown North	Upper Tier	700m	4.6km
Contract & General Warehousing Ltd.	Upper Tier	700m	4.6km
Barclay Chemicals Manufacturing Ltd	Upper Tier	1,000m	4.9km
Mallinckrodt Medical Imaging-Ireland T/A Convidien	Upper Tier	1,000m	6.3km

17.7 The 'Do nothing' Scenario

The site will remain as underutilized greenfield area.

17.8 Potential Significant Effects

17.8.1 Construction Phase

No scenarios of concern have been identified during the construction phase. As such the predicted impact is considered to be short term, imperceptible and neutral.

17.8.2 Operational Phase

The red line boundary includes a portion of land located within the flood zone. None of the proposed residential units or the creche are located within this area and mitigation works will be carried out as part of the proposal to minimise the potential for future flooding events at the subject site as a result of climate change.

The proposed development is not located in an area prone to seismic events or within close proximity to a COMAH/Seveso site. As such, these accident scenarios are not of concern.

Therefore, the impact is considered to be long term, imperceptible and neutral.

17.8.3 Cumulative Effects

Cumulative impacts are considered imperceptible and neutral.

17.9 Mitigation

17.9.1 Construction Phase Mitigation

No mitigation measures necessary.

17.9.2 Operational Phase Mitigation

Mitigation measures have been designed into the proposal. No further mitigation measures necessary.

17.9.3 Cumulative Mitigation

No mitigation measures necessary.

17.9.4 Monitoring

No monitoring proposed.

17.10 Residual Impact Assessment

17.10.1 Construction Phase

No scenarios of concern have been identified during the construction phase. As such the predicted impact is considered to be short term, imperceptible and neutral.

17.10.2 Operational Phase

Once the mitigation measures designed into the scheme are implemented correctly, the predicted impact as a result of flooding is long term, imperceptible and neutral.

17.10.3 Cumulative Impact

Cumulative impacts are considered imperceptible and neutral.

17.11 References & Sources

- EPA 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports' (2022).
- EPA 'Draft Advice Notes on Current Practice in the Preparation of Environmental Impact Statements' (2015).
- National Roads Authority (NRA) 'Guidelines on Procedures for the Assessment and Treatment of Hydrology for National Road Schemes' (2009).
- Office of Public Works (OPW, www.floodinfo.ie).
- Irish National Seismic Network (INSN, www.insn.ie)
- Engineering Reports prepared by Paul McGrail Consulting Engineers and Atkins.